



The important role of marine debris networks to prevent and reduce ocean plastic pollution



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ABSTRACT

Societal change is needed to prevent and reduce the growth in the amount of solid waste entering the sea. Marine debris networks cover a broad range of activities in order to protect our oceans. By following a common vision and a collective systematic approach they are capable of creating synergies between all relevant stakeholders that result in reducing the flow of waste into our oceans. Thus, they are key to achieving the Sustainable Development Goals. During the 6th International Marine Debris Conference in San Diego in 2018, different marine debris networks from different parts of the world presented their activities, achievements and challenges. This led to network representatives agreeing to collaborate as members of an International Waste Platform. This platform aims to harmonize objectives, share knowledge, join forces and help new networks to emerge.

1. Introduction

Marine debris is one of the main challenges for the whole of humankind.¹ Estimations by Jambeck et al. (2015) show that between 4.8 and 12.7 million metric tons of plastic enters the oceans every year. The main reasons are a lack of effective solid waste management and insufficient waste water treatment, inadequate corporate social responsibility, littering, illegal dumping and natural disasters. In general it can be said that marine litter originates from different sea- and land-based sources and is largely based on the prevailing production and consumption pattern. Due to its ubiquity and persistence, plastic marine debris poses the potential to become an increasing threat to human health, economies, aquatic habitats and wildlife as well as to a variety of freshwater and saltwater environments. There are still many knowledge gaps relating to sources, pathways, composition, transport patterns, distribution, hotspots and impacts of plastic debris. However, according to a current review of the harm caused by marine debris, the numbers of animals affected from negative interactions with marine debris and the associated suffering that affects animals welfare in combination with the extent of encounters, which in some represent a substantial proportion of a population, clearly show, that further

input and existing amounts of marine debris need to be reduced (Werner et al., 2016). Given these facts, a systematic change of the current reality of profit maximization in a throwaway society towards a moderate and fair circular society as well as an acceleration in decision-making processes is urgently needed. A key question in overcoming the challenge of marine debris is by whom and how these objectives can be achieved.

2. Network theory

Networks are significant players in the field of environmental and development policies. Their relevance increased principally after the United Nations Conference on Environment and Development (UNCED). This conference, also known as the Earth Summit, was a major United Nations conference held in Rio de Janeiro from 3 to 14 June 1992.² During the UNCED networks managed to have their voice heard, and for the first time, their messages were taken seriously by the media and spread around the world (Walk and Brunnengraber, 1994). Since then the number of networks and their influence on shaping political processes has risen rapidly (Princen and Finger, 1994).

Networks are defined as a “mode of organization that facilitates

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¹ Marine debris is described as “any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment” (UNEP, 2009).

² United Nations Conference on Environment and Development (UNCED), Earth Summit; link: <https://sustainabledevelopment.un.org/milestones/unced> [09.01.2019].

collective action and cooperation, exercises influence, or serves as a means of international governance” (Hafner-Burton et al., 2009:5). Networks do not pursue profit maximization. Instead they produce non-material products like information, principled or moral beliefs and norms (Finnemore and Sikkink, 1998). Their approach may vary depending on scope, visions and goals. Their core activities can be organized at a local, national, regional or global level. Networks develop joint problem-solving strategies, share and provide access to information, and raise people’s awareness. By offering environmental, scientific and legal expertise, members are strongly connected through a network and provide linkages to further organized interest groups. They strive to build bridges between stakeholders from national and local governments, as well as informal workers, academia, the private sector, and regional development partners (Stafford et al., 2000).

Networks and organized interests can play a major role in policy making processes (Kenis and Schneider, 1991). The influence of a network on decision-making depends on its structure, and composition of representatives of different entities including community and voluntary sectors, government, and businesses (Keast et al., 2004). Furthermore, it can be distinguished between participant-governed and externally-governed networks. While a participant-governed network is either lead by a group of network members or by a single member, externally-governed networks are governed by a separate administrative entity, which may consist of an executive director, staff, and a corresponding board that addresses strategic-level network concerns (Provan and Kenis, 2008). Each of these network structures has its strengths and weaknesses. Main factors for networks to gain access to political decision-making and increase influence are size, structure, unity of its members, communication and finance. Schattschneider concludes that networks that consist of fewer members are more effective due to facilitated organization and consensus finding (Schattschneider, 1935), whereas larger groups fail more easily to provide sufficient incentives for members to gain power and influence in the decision-making process (Olson, 1965). However, in order to understand and to derive recommendations on how a network should be structured to be effective and influential on different scales, there is the need to analyze the characteristics of existing networks.

This study focuses on six marine debris networks that differ in size, structure, organizational level, finance, and core activities. The analysis shows their current influence and identifies future needs for marine debris networks to find solutions for global marine debris pollution.

3. Marine debris networks

The formation of marine debris networks is one strategy to achieve societal change by providing platforms that can engage at a national or regional scale, but also communicate, share ideas, and advocate at a global scale. They form a common vision and follow a collective systematic approach based among others on the Honolulu Strategy – a global framework to prevent further inputs of litter from land-based and sea-based sources and to reduce the amount of marine debris on shorelines and in the various marine compartments (United Nations Environment Program (UNEP) and National Oceanic and Atmospheric Administration (NOAA), 2011). They demonstrate their willingness to collaborate, connect and increase capacity, combine skills as well as resources to assemble and coordinate (Provan and Kenis, 2008). The influence of marine debris networks’ activities is not limited to certain areas. Instead, they contribute to a variety of fields, inter alia education, improvement of stakeholder collaboration, monitoring, capacity building, operationalization, specifications and roadmaps to implement voluntary and mandatory actions and measures, as well as increasingly contributing to scientific data for research (UNESCO, 2017).

Marine debris networks can play an active part in assisting countries achieve their Sustainable Development Goal³ SDG 14 “Life below Water” and SDG 17 “Partnerships for the Goals” as they create synergies

³The United Nations General Assembly adopted the 2030 Agenda for Sustainable Development in 2015.

between politics, industry, and society, connect groups who share the same values and interests, call for action, influence the positions and opinions of key stakeholders, provide input, identify measures and means to support the implementation of both SDGs. While SDG 14 seeks for conservation and sustainable use of the oceans, seas and marine resources, SDG 17 strives for international partnerships with the capacity to support the achievement of the other goals (UN, 2018). In order to reach SDG 14, collective and coordinated actions on national, regional, and global levels are required, i.e. by creating further partnerships and fostering greater integration of stakeholders. Thus, there is a strong tie between the two SDGs. Furthermore, global plastic pollution is strongly related to SDG 15 “Life on Land” that aims to protect, restore and promote sustainable use of terrestrial ecosystems, as the majority of debris is thought to come from land (Jambeck et al., 2015). Other researchers have estimated river litter inputs to the ocean to be up to 2.4 and 4 million tons per year, respectively (Lebreton et al., 2017 and Schmidt et al., 2017). As consequence, there is a development towards including stakeholders with a focus on both solutions to land-based waste management and riverine waste. Furthermore, many natural disasters including floods, heavy rains or hurricanes that contribute to the marine debris problem are directly linked with climate change. Therefore, SDG 13 “Climate Action” should also be considered in order to tackle global plastic pollution. Besides the linkages between SDGs and marine debris mentioned above, overall, the issue of waste touches on all SDGs.

Although a concrete number of existing marine debris networks worldwide is currently not known, six marine debris networks were selected for detailed investigation. During the 6th International Marine Debris Conference (6IMDC) the important and valuable work of these marine debris networks was highlighted. The presented networks cover countries from all over the world. In particular, network managers of four national, one regional and one global marine debris network presented their vision, size and structure, finance and core activities (see Table 1).

Table 1
Profile of marine debris networks.

Australian Marine Debris Initiative (AMDI)	
Country:	Australia
Organizational level:	National
Size and Structure:	Registered charity governed by a board of 6 Directors. An Operational team engages with over 1000 partner organizations
Finance:	Funded through government grants/tenders, fee for service, public donations
Website:	https://www.tangaroablue.org/ Forum https://web.facebook.com/tangaroa.blue/
Vision, structure and core activities	
The AMDI is a national network of community, industry and government partners focused on the removal and prevention of marine debris coordinated by the NGO Tangaroa Blue Foundation. Tangaroa Blue Foundation was established in 2004. The AMDI’s vision is for healthy oceans and waterways and its mission is to inspire, inform and catalyze action, and empower others, to remove and prevent waste entering the marine environment. The AMDI’s approach is firstly to encourage a consistent data collection methodology on a citizen science basis and on a national scale. Second is to engage government and industry partners into the AMDI network to help identify marine debris items and their sources. Third is to use both the AMDI Database and AMDI Network to identify, create, implement and monitor Source Reduction Plans. Core activities:	
<ul style="list-style-type: none"> > Marine debris clean-up activities > data collection and national database hosting, tracking debris items back to the source > engaging relevant stakeholders for the creation of source reduction plans to stop specific items at the source so they don’t escape into the environment > education and awareness > data reporting and consulting on the marine debris issue to network partners 	

The German Round Table Marine Litter

Country:

Germany

Organizational level:

National

Size and Structure:

About 150 experts from relevant sectors

Finance:

Not funded. Managed through the Federal Environmental Agency, the Ministry for the Environment, Energy and Climate Protection, State of Lower Saxony and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and also partly financed through these lead-organizations together with stakeholder involved (mainly in terms of investment of working time and financing of sub work orders)

Website:

www.muell-im-meer.de

Vision, structure and core activities:

The German Round Table Marine Litter was established in 2016 to develop, coordinate and implement activities to combat marine litter in the North and Baltic Sea. Around 150 stakeholders are involved representing the Federal Government, Federal States and various relevant stakeholders inter alia the shipping, fishing, waste, sewage and tourism sectors, the plastics, cosmetic and tire industries, retailers, NGOs, science and other public authorities. The overall aim of this network is that "Marine Litter does not cause harm to the marine and coastal environment" - a goal required by the European Marine Strategy Framework Directive (MSFD - 2008/56/EU) to be achieved by 2020. The Regional Seas Conventions OSPAR and HELCOM have adopted Regional Action Plans on Marine Litter in 2014 and 2015, respectively. The work is carried out in two working groups to address sea- and land based sources of marine litter.

Core activities:

- > implementation of the mandatory national measures under the MSFD as well as the regional actions where Germany has taken the lead, e.g. addressing improved waste management or penalties, sanctions and fines to prevent illegal discharges at sea
- > research on amounts, distribution, top findings and ecological as well as socioeconomic harm
- > develop options for removal, monitoring, outreach and awareness raising activities

Indonesian Waste Platform (IWP)

Country:

Indonesia

Organizational level:

National

Size and Structure:

Association, 18 persons Advisory Board, 4 coordinating persons (director, coordinator for East Nusa Tenggara, stakeholder liaison in Jakarta and coordinator on Bali)

Finance:

Not funded

Website:<http://www.indonesianwaste.org/en/home/>Forum <https://web.facebook.com/groups/210686719277064/>**Vision, structure and core activities:**

IWP evolved from another network in which a database of waste stakeholders was built. That first network was a regional island network in one part of Indonesia. In 2015 it became clear that a national network was needed for structural collaboration across sectors and with support of international parties. IWP follows a Collective Impact Approach and is a framework designed to tackle deeply entrenched and complex social problems. It is an innovative and structured approach to encourage collaboration across government, business, philanthropy, academia, universities, nonprofit organizations and citizens to achieve significant and lasting social change. IWP is not funded which remains a major challenge.

Core activities:

- > capacity building as well as mapping of stakeholders and their programs
- > dissemination of news and (co)-organization of symposia and workshops
- > connecting and engaging people for collaboration, i.e. in the national plan of action

The Portuguese Marine Litter Association (APLM)

Country:

Portugal

Organizational level:

National

Size and Structure:

11 persons; General assembly, management team and representatives of other departments

Finance:

Not funded regularly, occasional small donations

Website:<https://www.aplixomarinho.org/>Forum <https://web.facebook.com/APLIXoMarinho/>**Vision, structure and core activities:**

APLM was founded in November 2013. Its vision is to preserve the environment against the impacts of litter on marine ecosystems, including estuaries and rivers. APLM aims at preventing and reducing marine litter through a combined set of actions at different levels of organization in the private and public sectors. It promotes co-responsibility and behavioral change among stakeholders from government agencies, NGOs, industry, waste and waste water management, fisheries, and consumers. Overall APLMs activities are based on voluntary action as there are no other financial resources. Due to a lack of resources for coordination the involved stakeholders do not act as a group yet.

Core activities:

- > awareness and dissemination actions
- > environmental education for all school levels, i.e. lectures, games, and videos
- > scientific and technical support to formal and informal groups in local and regional projects
- > support to create new partnerships and international cooperation, i.e. with other Portuguese speaking countries including East Timor and Principe Island.

African Marine Waste Network (AMWN)

Region:

Africa

Organizational level:

Regional

Size and Structure:

lead by NGO Sustainable Seas Trust (SST); 8 board members, 5 patrons, an advisory board and an operational team of 12.

Finance:

Funded through governments, the corporate sector (including the plastics industry), multi-lateral donors, foundations and public donations

Website:<https://africanwastenet.org.za/>Forum <https://africanwastenet.org.za/>**Vision, structure and core activities:**

The AMWN was launched in July 2016 as a principal project of the Sustainable Seas Trust (SST) which is a charitable trust, an NGO and Public Benefit Organization which has been tasked with reversing trends in plastic pollution for the continental and island states of Africa. AMWN serves as a multidisciplinary collaboration among various interest groups in order to tackle the growing issue of waste within the oceans, particularly around the continental and island states of Africa. Although the principal network is in South Africa, the AMWN endeavors to serve all countries of Africa. AMWN is funded by international grants, governments, the private sector and philanthropists.

Core activities:

- > research to set baselines and monitor success of mitigation strategies
- > education as well as environmental awareness and research
- > capacity building
- > development of economic incentives and enterprises in impoverished communities
- > multidisciplinary networking

Marine Litter Network (MLN)

Country:

World

Organizational level:

Global

Size and Structure:

UNEP and University of Georgia

Finance:

Funded through UNEP, IMO, FAO, governments, businesses, academia, local authorities, nongovernmental organizations and intergovernmental organizations.

Website:<http://marinelitternetwork.com/>**Vision, structure and core activities:**

The MLN is an initiative by the Global Partnership on Marine Litter (GPML) that was launched in 2012. This is a multi-stakeholder partnership with more than 100 partners around the world with an overall objective to protect human health and the environment by the reduction and management of marine litter. The MLN is a central point for information on marine litter worldwide. MLN is a web platform for global marine litter information with open access. It was designed to track progress on the implementation of the Honolulu Strategy. Users from different fields, inter alia governments, intergovernmental organizations, and industry are able to participate by making commitments to take action, finding and sharing projects and resources, interacting with others through a discussion forum and tracking progress on the implementation of the Honolulu Strategy. Stakeholders collaborate on a voluntary basis. In future this network shall be continuously extended and updated to make the resource even more robust over time.

Core activities:

- > mapping of global projects, action plans and legal issues
- > dissemination of reports, news, educational material, and scientific results

All presented marine debris networks share a common vision, target the relevant land- and sea-based sources of marine debris and aim at preventing and reducing ocean plastic pollution regardless of their organizational level. Since each marine debris network has its specific pool of stakeholders, knowledge and insight, a detailed investigation that considers relevant factors like the size and structure, the finance and core activities is needed.

Comparing the four national marine debris networks it is evident that three of them (AMDI, IWP and APLM) prefer a small group of decision-makers. This operational team engages then with more than thousands of stakeholders. The German Round Table Marine litter should be regarded as an exception as it is a politically driven bringing together representatives of political, economic, and scientific areas to work on joint solutions. Most differences in approaches can be found regarding the core activities of each national marine debris network. This can be explained by the different status in each country. While Germany already started its action in accordance with the Regional Seas Conventions OSPAR (1972) and HELCOM (1974) and the MSFD (2008/56/EC) by developing a monitoring system, which is partly implemented at the current stage and defining environmental targets, they have now entered a new stage of action by implementing actions and measures they have set out in the Regional Action Plans and the national MSFD programme of measures for the Descriptor 10 on marine litter. Due to geographical reasons the need for clean-up activities is especially high in Indonesia for instance, a country with more than 17,000 islands. The same holds true for Australia. However, all have in common that there is a need to provide reliable data and tracking debris items back to the source in order to define effective and quantifiable measures. Environmental education and the support to build new partnerships by bridging stakeholders from different sectors are covered by all national marine debris networks. Actions in schools underline that the members of the national and regional networks are working with people at the grassroots. Two major challenges were mentioned by Indonesia and Portugal. Firstly the lack of funding which limits action and the deployment of personnel. Secondly, a lack of a coordinated body that the group, consisting of staff and volunteers, feels is needed to allow it to act as a group. As a consequence, synergies, commitment and values will be lost and thus, lead to less influence of the network in the political decision-making process.

The regional network is well-structured but suffers from geographical distance to its partners. There are some strong partner countries while others are less involved. This might lead to information asymmetries. As Africa is the second most polluted continent at the moment, and if trends continue unchecked, it could be worse than Asia in about two decades (Lane, 2018), there is the current need to develop a Regional Action Plan on marine debris for Africa. In order to prevent the escalation of Africa becoming the most polluted continent in the world the African Marine Waste Network has embarked upon an ambitious programme to achieve Zero Plastics to the Seas of Africa by 2035.

4. Network comparisons

In comparison to the global marine debris network the role of national and regional networks is both different and complimentary at the same time. The country networks facilitate stakeholders from all relevant sectors within the specific country or region to collaborate on solutions, whereas they are used to working in silos. National or regional networks are in a position to bridge top-down frameworks by connecting policies and developing recommendations from higher level organizations, to a bottom-up structure. In addition national and regional partnerships have an advantage as they could provide

mechanisms through which countries and competent organizations could cooperate towards the harmonized implementation of measures to address sustainability challenges, in particular where these are subject to different legal regimes or call for cross-cutting action (Unger et al., 2017). As the global marine debris network instead addresses researchers, political decision-makers, NGOs, and possibly industry, they are not in touch with all stakeholders on the ground and respectively, there is no direct communication between the global marine debris network and relevant hand-on stakeholders. In summary, the comparison shows that national and regional networks are needed and cannot be substituted by global networks. On the contrary, global networks are in a position to disseminate the objectives of the GPML to 'the man in the street'. National and regional networks can engage and reach out to stakeholders within their country, which would be a challenge for global networks (see Fig. 1).

A remaining question is how national and regional marine debris networks can overcome their obstacles. A global fund might be a key measure. The expectation that collaboration can occur without setting up a coordinating body is one of the most frequent reasons why national and regional marine debris networks may fail. In case of Australia i.e., there would be no connecting platform neither for all the community organizations/individual volunteers to federal government agencies responsible for dealing with marine debris, nor to the industry bodies that impact marine debris without the AMDI platform. Each stakeholder group is coordinating their own programs based on their own priorities. This leads to unavoidable duplication and gaps in both resources and effort. The only way to address this is to have adequate infrastructure that enables engagement of all stakeholders. This includes a central collection point that includes a comprehensive database for not only marine debris data, but of who is doing what and where in the marine debris space. As a consequence, a global network should provide infrastructure as well as human and financial resources. In addition, a central collection point with open access for data for the purpose of source reduction, education and rising awareness, studies and reports, as well as a platform where current news and lessons learned by national and regional networks would be of high value for the further development of reducing marine debris in the environment.

GPML is aware of these needs and has already started new initiatives. Therefore, adequate instruments and measures should be selected in line with the respective organization level.

5. Next steps and future needs

The 6IMDC was a major step forward to create synergies between the various networks and support new networks to emerge. In order to reach millions of people, to positively influence national and international decision-makers, legislation, business and public opinion in the future, the various network representatives at the 6IMDC agreed to collaborate as members of an International Waste Platform. This platform was initiated by 6IMDC participants from the following countries: Indonesia, Portugal, Australia, Africa (regional), USA, Germany, Canada, New Zealand, Taiwan and Ghana. Stakeholders from Philippines, Timor-Leste, Nigeria, Vietnam, Malaysia, Kenya, Russia, Greece, Norway, Japan, and India joined through follow-up communications. A common platform like the International Waste Platform helps to improve approaches of existing and emerging networks in regard to their structure, vision, scope and activities. Members committed themselves to harmonize objectives, to support the implementation of strategies of Ocean Action, Climate Action and UNEP Clean Seas and share best practices, concepts, programs, knowledge and opportunities, including mitigating plastic debris at its source, before it enters rivers and coasts. Furthermore, the networks have submitted a joint Voluntary

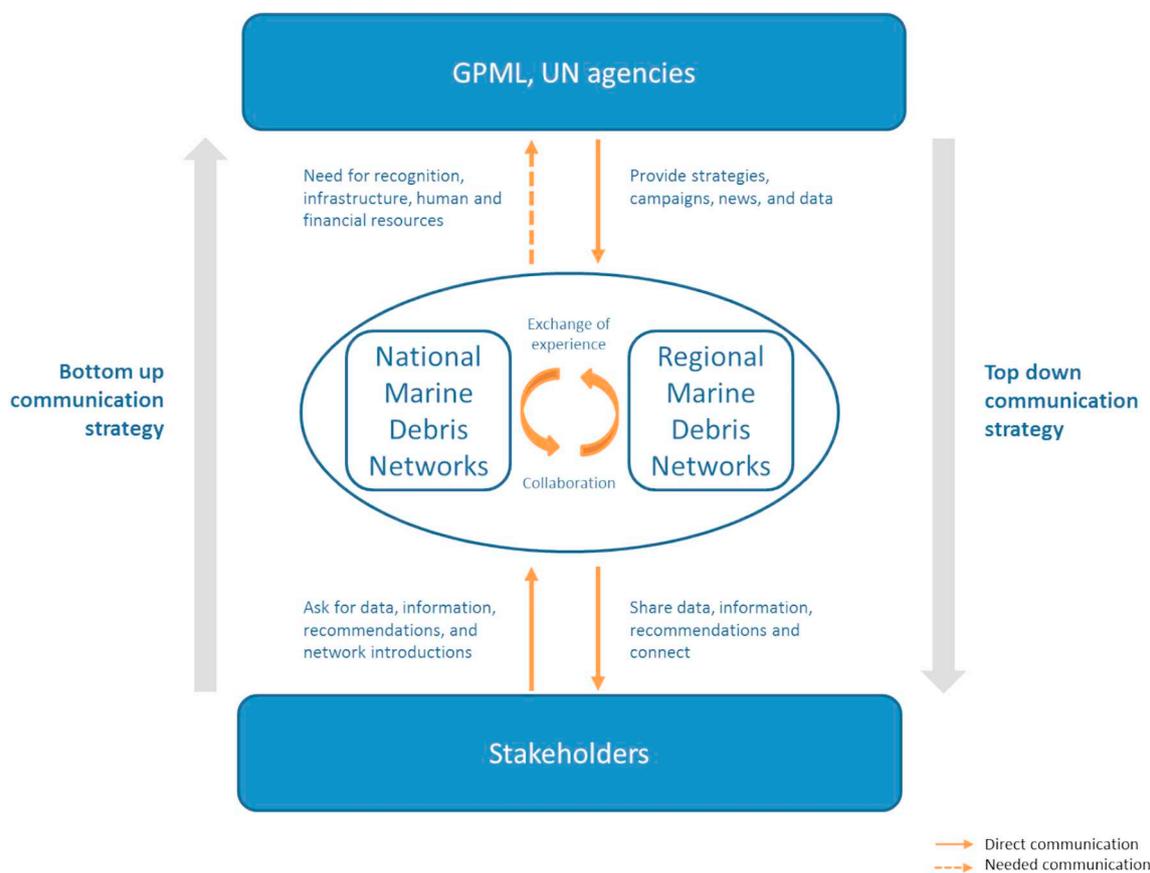


Fig. 1. Connection between national, regional and global marine debris networks.

Commitment at the United Nations Communities of Ocean Action for supporting implementation of SDG 14.⁴ In order to provide an overview on efforts of each national and regional network, a website will be launched by mid-2019. The website will function as a source of information about each connected network, including libraries of available research and learning materials, best practices and information such as connections to available and relevant recycling sectors. Fig. 2 shows all members who joined the International Waste Platform to date (status: November 2018).

The analyzed networks showed that marine debris networks make a difference in societal behavior and environmental politics by providing input and promoting action that aims to find solutions to ocean plastic pollution – solutions that according to Dr. Habib El-Habr, UNEP, “people are hungry for”.⁵

A collective approach is needed to support a generation of new knowledge and solutions, foster capacity-building and the exchange of good practice, as well as celebrating the achievements of first-movers as a stimulus for further action to reverse the decline in the health of oceans and marine resources for people, planet and prosperity. However, a common approach including a common goal is not sufficient to become an effective network. Other relevant factors,

⁴The joint Voluntary Commitment was submitted at <https://oceanconference.un.org/commitments/> and is currently being reviewed prior to publication. Link to the Voluntary Commitment <https://drive.google.com/file/d/1KcHgnxgTGtU6qeqO3VsTmcYDm-syuXBE/view?usp=sharing>.

⁵Habib El-Habr: “I think we’re now at a turning point. There’s a global grasp of the scale of the problem. People are hungry for information. They’re hungry for answers, and they’re hungry for solutions.” Full statement at 6IMDC; San Diego, March 15, 2018.

especially the need for a small leading group to act as a central contact point for the network, open access to information, communication to connect policies and recommendations from the stakeholder organizations from the bottom-up, as well as stable and sufficient sources of funding to maintain its activity are of utmost importance for achieving the targets related to marine debris that have been set. Governments around the world that take seriously the obligations and targets that they commit to reach under international agreements such as the Honolulu Strategy are a fundamental requirement for the attainment of these targets.

Despite the important role and their broad range of activities, marine debris networks still have to overcome local, national, regional and international barriers to success. Given the multitude of challenges marine debris networks are facing, a major step forward is to focus on offering services that are in demand and are needed. In order to be effective, networks need to secure long-term and sufficient resourcing to carry out their work, which is currently a major barrier for most.

Overall, marine debris networks are a key to achieve the prevention and reduction of all kinds of marine pollution (SDG 14.1), foster the establishment of national and international partnerships (SDG 17.16) as well as contribute to enhance environmental management of terrestrial ecosystems (SDG 15) and take action on climate change (SDG 13) in a multi-stakeholder approach.

To enable stronger multi-actor coordination, collection and promotion of activities, the sharing of ideas and experiences, the measurement of effectiveness and efficiency and provision of financial support for further development of marine debris networks, a supporting framework under an umbrella organization, such as the GPML, needs to be analyzed in the future.

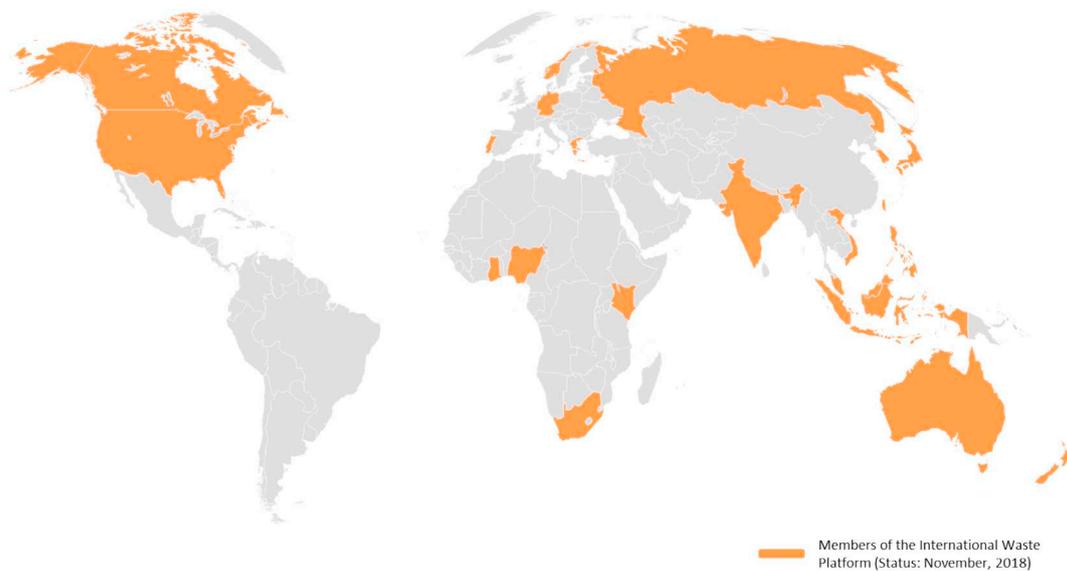


Fig. 2. Members of the International Waste Platform.

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