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**PROGRESS REPORT ON ADDRESSING IMPACTS OF UNDERWATER NOISE AND  
MARINE DEBRIS ON MARINE AND COASTAL BIODIVERSITY**

*Note by the Executive Secretary*

**I. INTRODUCTION**

1. Anthropogenic underwater noise has potentially significant implications for the fitness and survival of various types of marine species. Although knowledge of the impacts of underwater noise is increasing, there is a need for further research to address significant knowledge gaps to inform the development of appropriate policy measures. There is also a need to further develop guidance on measures to mitigate the impacts of underwater noise, building on experience gained thus far.

2. Marine debris is an increasing threat to marine and coastal biodiversity, with potential deleterious implications for marine biodiversity and ecosystems. Entanglement or ingestion by birds, turtles, fish and marine mammals is well documented and has shown to be fatal to a number of species. Analysis of best practices and experiences in mitigating the impacts of marine debris on biodiversity would serve to better inform the development and implementation of necessary policy measures and appropriate responses to this growing threat.

3. Pursuant to decision XI/17, the Executive Secretary has carried out or is currently undertaking a number of activities addressing the adverse impacts of human activities, in particular anthropogenic underwater noise and marine debris, on marine and coastal biodiversity, including:

(a) Organization of an expert workshop, held from 25 to 27 February 2014, with a view to improving and sharing knowledge on underwater noise and its impacts on marine and coastal biodiversity and developing practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise, and the preparation of a background study in support of the workshop discussion; and

(b) Convening an expert workshop, scheduled for 2 to 4 December 2014, to prepare practical guidance on preventing and mitigating the significant adverse impacts of marine debris, and preparation of a background study in support of the workshop discussion through the compilation of information from

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\* UNEP/CBD/SBSTTA/18/1.

Parties, other Governments, relevant organizations and indigenous and local communities on the impacts of marine debris.

4. These activities support the achievement of Aichi Biodiversity Targets 8 and 10 of the Strategic Plan for Biodiversity 2011-2020:

(a) *Target 8:* By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity;

(b) *Target 10:* By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

## **II. ADDRESSING IMPACTS OF ANTHROPOGENIC UNDERWATER NOISE ON MARINE AND COASTAL BIODIVERSITY**

5. Pursuant to paragraph 20 of decision XI/18 A, the Executive Secretary convened, with financial support from the European Commission, an Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity at the headquarters of the International Maritime Organization, London, from 25 to 27 February 2014. This workshop focused on improving and sharing knowledge on underwater noise and its impacts on marine and coastal biodiversity, and discussed practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including marine mammals, in order to assist Parties and other Governments in applying management measures, as appropriate.

6. A background document addressing the development of practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity was prepared to support the workshop discussions (UNEP/CBD/MCB/EM/2014/1/INF/1).

7. The workshop was attended by experts from Argentina, Azerbaijan, Bangladesh, Canada, Costa Rica, Croatia, Democratic Republic of Congo, Japan, Mexico, Republic of Korea, Senegal, Togo, United Kingdom of Great Britain and Northern Ireland, United States of America, International Maritime Organization, ACCOBAMS/ASCOBANS/CMS Noise Working Group,<sup>1</sup> IUCN-Global Marine and Polar Programme, Animal Welfare Institute, BP International, Quiet Oceans, World Ocean Council, and WWF-Canada.

8. The main outcomes of the meeting are provided in the annex below and further details are provided in the full report of the meeting (UNEP/CBD/MCB/EM/2014/1/2).

9. The above-mentioned workshop discussed the state of knowledge of underwater noise and its impacts on marine and coastal biodiversity, including the following:

(a) Underwater sound around a marine species can be called its “soundscape” and provides animals with sensory information about the surrounding marine environment in three dimensions. This information is important for the detection of predators, prey, conspecifics, critical habitats and the environment in general, cues for activities such as navigation and migration, and allowing communication between individuals;

(b) Disrupting the ability of an animal to hear and use the soundscape has the potential to affect the fitness and survival of an individual. If a sufficient number of individuals or significant parts of their habitat are affected, then adverse effects could occur at the population scale;

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<sup>1</sup> ACCOBAMS, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area; ASCOBANS, Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas; CMS, Convention on Migratory Species.

(c) Sources of anthropogenic noise can be divided into two general categories: impulsive and continuous. There is, however, some overlap between the two categories. Impulsive noise can be subdivided into four main groups according to operational activity: seismic surveys (mainly airgun arrays), marine construction (mainly pile driving), naval sonar and other higher frequency sonar (e.g., echosounders, fishfinders, multi-beam sonar), and sounds that accompany explosions;

(d) Cumulative and synergistic impacts are very likely to be important, but are very difficult to measure and assess, particularly as the detail of the sound exposure (and the “recovery” time between exposures) can determine its impact;

(e) There has already been a significant amount of research into the effects of noise on aquatic life over the last decade, but there still remain significant questions that require further study. The largest gaps in knowledge relate to the following taxa: fishes, invertebrates, turtles and birds. Additional knowledge gaps include characteristics of major sound sources, trends in the prevalence and magnitude of underwater noise and on the potential population and ecological impacts of underwater noise, including implications of cumulative and synergistic impacts of multiple sources of noise and other stressors.

10. The above-mentioned workshop also discussed practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, and identified the following needs:

(a) Development of ship identification systems for a broader range of vessels, particularly with regard to:

- (i) Automatic identification systems (AIS) for small vessels so that information on them can feed into more complete shipping noise mapping; and
- (ii) Improved quality of AIS broadcasting by ships and improved coverage by AIS receivers;

(b) Further information on sound characteristics for a greater number of types of vessels within the present merchant fleet;

(c) Standardization of metrics and sound measurements, so that there are similar measures and approaches for all sounds and in all places. Support standards by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO);

(d) With regard to the selection of areas for acoustic mapping, the inclusion of areas that are affected at different levels of sound in order to build a coherent and complete picture of the spatial and temporal distribution of sound;

(e) With regard to spatial risk assessments, the combination of acoustic mapping with habitat mapping of species of concern in order to identify areas where particular species are at risk from noise impacts. For example, existing work under the Convention on Biological Diversity (CBD) on the description of ecologically or biologically significant marine areas (EBSAs) and the work of the International Maritime Organization on Particularly Sensitive Sea Areas (PSSAs) can provide useful scientific information for States or competent intergovernmental organizations to identify areas of priority concern, with regard to linking relevant scientific information on the impacts of underwater noise;

(f) Building of capacity in developing regions where the awareness and scientific capacity to address this issue has yet to be strengthened;

(g) Engagement of industry when developing guidelines in order to increase their ownership and participation in the implementation of the guidelines;

(h) Encouragement of collaboration and communication among relevant international bodies for synergies in addressing this issue.

11. Pursuant to paragraph 19 of decision XI/18 A, the Secretariat of the Convention on Biological Diversity will continue to collaborate with Parties, other Governments and relevant organizations to prepare, subject to availability of financial resources, a draft set of consistent terminology, noting existing work, as indicated by the above-mentioned workshop participants, including, *inter alia*:

(a) Work by the International Maritime Organization (IMO)<sup>2</sup> and the International Organization for Standardization (ISO);<sup>3</sup>

(b) Work by ACCOBAMS;<sup>4</sup>

(c) European Marine Strategy Framework Directive Good Environmental Status (MSFD-GES) Report of the Technical Subgroup on Underwater Noise and other forms of energy, 27 February 2012 (refer to glossary on page 61);<sup>5</sup> and

(d) Report of the BOEM (Bureau of Ocean Energy Management) Quieting Technologies for Reducing Noise During Seismic Surveying and Pile Driving Workshop (refer to glossary on page A47).<sup>6</sup>

### III. ADDRESSING IMPACTS OF MARINE DEBRIS ON MARINE AND COASTAL BIODIVERSITY

12. In decision XI/18, the Conference of the Parties requested the Executive Secretary, in collaboration with Parties, other Governments, relevant organizations and indigenous and local communities, subject to the availability of financial resources, to:

(a) Invite Parties, other Governments and relevant organizations, including the Convention on Migratory Species, to submit information on the impacts of marine debris on marine and coastal biodiversity and habitats;

(b) Compile and synthesize submissions by Parties, other Governments and relevant organizations, along with additional scientific and technical information, as input to an expert workshop; and

(c) Organize an expert workshop to prepare practical guidance on preventing and mitigating the significant adverse impacts of marine debris on marine and coastal biodiversity and habitats that can be applied by Parties and other Governments in their implementation of the programme of work on marine and coastal biodiversity.

13. Pursuant to these requests, the Executive Secretary issued notification 2014-042 (Ref. no. SCBD/SAM/DC/JL/JA/JMQ/83342) on 20 March 2014 requesting information from Parties, relevant organizations (including the Convention on Migratory Species), and indigenous and local communities on the impacts of marine debris on marine and coastal biodiversity and habitats. The submissions received in response to this notification will be compiled and synthesized, and will serve as an input to a forthcoming expert workshop to prepare practical guidance on preventing and mitigating the significant adverse impacts of marine debris on marine and coastal biodiversity and habitats.

14. A background document addressing the development of practical guidance on preventing and mitigating the significant adverse impacts of marine debris on marine and coastal biodiversity and habitats, including an update of the existing CBD synthesis document on the impacts of marine debris on marine and coastal biodiversity (CBD Technical Series 67—Impacts of Marine Debris on Biodiversity: Current Status and Potential Solutions) is being prepared to support the workshop discussions.

<sup>2</sup> <http://www.cbd.int/doc/meetings/mar/mcbem-2014-01/other/mcbem-2014-01-submission-imo-02-en.pdf>.

<sup>3</sup> [http://www.iso.org/iso/home/store/catalogue\\_tc/catalogue\\_tc\\_browse.htm?commid=653046](http://www.iso.org/iso/home/store/catalogue_tc/catalogue_tc_browse.htm?commid=653046).

<sup>4</sup> [http://accobams.org/images/stories/Activities/Noise/en\\_guide%20complet.pdf](http://accobams.org/images/stories/Activities/Noise/en_guide%20complet.pdf).

<sup>5</sup> [http://ec.europa.eu/environment/marine/pdf/MSFD\\_reportTSG\\_Noise.pdf](http://ec.europa.eu/environment/marine/pdf/MSFD_reportTSG_Noise.pdf).

<sup>6</sup> [https://www.infinityconferences.com/InfiniBase/Templates/183779/Workshop\\_Summary\\_Report\\_Final.pdf](https://www.infinityconferences.com/InfiniBase/Templates/183779/Workshop_Summary_Report_Final.pdf).

15. The Executive Secretary is also convening an expert workshop to prepare practical guidance on preventing and mitigating the significant adverse impacts of marine debris on marine and coastal biodiversity and habitats, to be hosted in the United States of America at Baltimore, from 2 to 4 December 2014. Notification 2014-059 (Ref. no. SCBD/SAM/DC/JL/JA/JG/83469) was issued on 23 April 2014 to request submission of nominations by Parties, other Governments and relevant organizations. The background document and synthesis of submissions on the impacts of marine debris on marine and coastal biodiversity and habitats, as noted above, will serve as inputs to inform the discussions of the expert workshop.

#### IV. SUGGESTED RECOMMENDATION

16. The Subsidiary Body on Scientific, Technical and Technological Advice may wish to recommend that the Conference of the Parties, at its twelfth meeting, adopt a decision along the following lines:

##### *Impacts of anthropogenic underwater noise on marine and coastal biodiversity*

###### *The Conference of the Parties*

1. *Expresses its gratitude* to the European Commission for providing financial resources for, the Government of the United Kingdom of Great Britain and Northern Ireland for hosting, and International Maritime Organization for collaborating in the organization of the Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity (IMO Headquarters, London, from 25 to 27 February 2014), and *welcomes* the workshop report (UNEP/CBD/MCB/EM/2014/1/2);

2. *Takes note* that there has already been a significant amount of research into the effects of noise on aquatic life over the last decade, but there still remain significant questions that require further study, with the largest gaps in knowledge relating to fishes, invertebrates, turtles and birds, and additional knowledge gaps on characteristics of major sound sources, trends in the prevalence and magnitude of underwater noise and on the potential population and ecological impacts of underwater noise, including implications of cumulative and synergistic impacts of multiple sources of noise and other stressors;

3. *Encourages* Parties, other Governments and competent organizations, including the International Maritime Organization, the Convention on Migratory Species, the International Whaling Commission, indigenous and local communities, and other relevant stakeholders, to further enhance their collaboration on the development of practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including through, *inter alia*:

- (a) Development of ship identification systems for a broader range of vessels;
- (b) Further information on sound characteristics for a greater number of types of vessels within the present merchant fleet;
- (c) Standardization of metrics and sound measurements so that there are similar measures and approaches for all sounds and in all places;
- (d) With regard to the selection of areas for acoustic mapping, the inclusion of areas that are affected at different levels of sound in order to build a coherent and complete picture of the spatial and temporal distribution of sound;
- (e) With regard to spatial risk assessments, the combination of acoustic mapping with habitat mapping of species of concern in order to identify areas where particular species are at risk from noise impacts;
- (f) Building of capacity in developing regions where the awareness and scientific capacity to address this issue has yet to be strengthened;

(g) Engagement of industry when developing guidelines in order to increase their ownership and participation in the implementation of the guidelines;

(h) Encouragement of collaboration and communication among relevant international bodies for synergies in addressing this issue.

4. *Requests* the Executive Secretary to further facilitate collaboration among Parties, other Governments and relevant organizations, as referred to in paragraph 3 above, through the compilation and synthesis of relevant scientific and technical work by Parties, other Governments and relevant organizations concerning the elements specified in paragraph 3, and to make this compilation available as information for a future meeting of the Subsidiary Body prior to the thirteenth meeting of the Conference of the Parties to the Convention.

*Annex*<sup>7</sup>

**KEY CONCLUSIONS OF THE EXPERT WORKSHOP ON UNDERWATER NOISE AND ITS IMPACTS ON MARINE AND COASTAL BIODIVERSITY**

**I. Summary of discussion on improving and sharing knowledge on underwater noise and its impacts on marine and coastal biodiversity<sup>8</sup>**

*Under agenda item 3, the workshop discussed the role of sound in the behaviour and well-being of marine species and ecosystems, major sources and trends in the prevalence and magnitude of underwater noise, impacts of underwater noise on marine and coastal biodiversity (including implications of cumulative impacts of multiple sources of noise), and major knowledge gaps regarding the short- and long-term consequences for marine organisms and other biota in the marine environment.*

*With regard to these topics, the workshop noted the following:*

***Role of sound in the behaviour and well-being of marine species and ecosystems***

1. Underwater sound around marine species can be called their “soundscape” and provides animals with sensory information about the surrounding marine environment in three dimensions. This information is important for the detection of predators, prey, conspecifics, critical habitats and the environment in general, cues for activities such as navigation and migration, and allowing communication between individuals. Sound is particularly important since it provides information from distances well beyond any visual range. Disrupting the ability to hear and use the soundscape has the potential to affect the fitness and survival of an individual. If a sufficient number of individuals or significant parts of their habitat are affected, then adverse effects could occur at the population scale.

2. As well as detecting sounds, the ability to use information about the soundscape also requires that an organism is able to discriminate among acoustic signals, determine the location of the sound source (localisation), and perceive biologically important sounds in the presence of “masking sounds.” Although communication among organisms is an important use of sound, detection of the overall soundscape is of great importance. Indeed, while marine mammals use sound for communication among individuals of species, according to present knowledge most fishes and invertebrates do not. However, sound is still important to fishes and invertebrates for gleaned environmental information.

3. Sounds that are not perceived by an organism cannot affect them behaviourally. However, sounds that are not perceived by an organism may still have a physiological impact. The complexity of terminology related to underwater acoustics, as well as recognition of the differences between some of the terms (e.g., source level vs. received level) was noted as being important to understanding the relationship between sound and potential impacts.

***Major sources and trends in the prevalence and magnitude of underwater noise***

4. Underwater sound could be conceived as comprising three components:

- Geophony—sounds produced by the physical environment (e.g., wind, waves, tidal actions, ice, lightning strikes, earthquakes);

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<sup>7</sup> This annex contains the entire texts, with necessary modifications in the footnotes, from annexes III and VI to the report of the Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity at the headquarters of the International Maritime Organization, London, United Kingdom of Great Britain and Northern Ireland, from 25 to 27 February 2014, as contained in document UNEP/CBD/MCB/EM/2014/1/2.

<sup>8</sup> In this summary of the workshop report, the words “noise” and “sound” are used interchangeably, unless defined otherwise. “Noise” may or may not have a detrimental effect. There were various views at the meeting regarding the use of these terms.

- Biophony—sounds produced by non-human organisms (e.g., fishes, marine mammals, invertebrates); and
- Anthropony—sounds that result from human activity (or produced by humans).

5. There are no baseline datasets for noise levels in the marine environment before humans affected soundscapes, although estimates of natural ambient soundscapes as they may have been prior to human activity have been undertaken in some areas. The dramatic reduction in large whale populations caused by whaling could potentially have reduced the biophony from these animals greatly.

6. Sources for anthropogenic noise can be divided into two general categories: *impulsive* and *continuous*. There is, however, some overlap between the two categories. A given sound field in any region can be comprised of continuous and originally impulsive sounds that have stretched over time due to complex sound propagation patterns. Sounds also attenuate with distance. For example, the repetition of impulsive sounds from seismic surveys can be low-level continuous at several thousand kilometres.

7. Impulsive noise should be subdivided into four main groups according to operational activity: seismic surveys (mainly airgun arrays), marine construction (mainly pile driving), naval sonar and other higher frequency sonar (e.g., echo sounders, fish finders, multi-beam sonar), and sounds that accompany explosions. This subdivision will aid management activities. For each of these subcategories, there was a discussion on past (within the last decade) and possible future trends in noise emissions by these activities:

- **Seismic surveys (mainly airgun arrays):** In some regions, seismic surveys have increased, while in others they have decreased. There are distinct seasonal patterns of seismic surveys in some regions but not in others. If more seismic data-sharing occurred, there would likely be a reduction in the amount of surveys needed. Seismic surveys occur predominantly in waters less than 200 m deep, but also in deeper waters up to 2000 m. A future upward trend in noise emissions was also suggested for the Arctic region, given the predicted increase in future hydrocarbon exploration.
- **Marine construction (mainly pile driving):** Construction in coastal (e.g., port construction) and offshore waters less than 50 m deep for marine renewables has increased in some areas and is likely to continue to do so.
- **Military low- and mid-frequency sonar:** Sonar use is concentrated in naval ranges and exercise areas.
- **Higher frequency sonars** (e.g., navigation echo sounders, fish finders, multi-beam and oceanographic survey sonar): These sonars are predominantly used in coastal areas. In some parts of Europe, heavily used by recreational craft, echo sounders can comprise a notable portion of the soundscape at the frequencies at which they operate. Trends in recreational usage seem likely to be increasing. Higher frequency sonar is also routinely used for many industrial activities for initial research investigations prior to the construction/operational phase.

8. Trends in continuous noise emissions:

- **Commercial Shipping:** Although individual ships represent point sources, the primary concern is likely to be the overall contributions of many vessels to increasing background noise. While there is no comprehensive data on trends for noise emissions from ships, some data on low-frequency shipping noise that was measured in the Northeast Pacific Ocean show a gradual increase in background levels of approximately 19 dB (decibels *re* 1  $\mu\text{Pa}^2/\text{Hz}$ ) during the period 1950–2007.<sup>9</sup> A study along the North American West Coast suggests that

<sup>9</sup> Frisk, G.V., 2012. Noiseconomics: The relationship between ambient noise levels in the sea and global economic trends, Scientific Reports. 2012; 2.



since 2000 a leveling off (or even a decrease at some locations) in noise levels has occurred.<sup>10</sup> This may be explained by the fact that newer ships are often constructed to higher standards for energy efficiency, and a by-product of that are technical advances such as better propeller design, better routing and optimal choice of speed may all contribute to reducing the average sound footprint of individual vessels.

With regard to shipping trends, the world commercial fleet has doubled since 2001 and had reached 1.63 billion dead-weight tons by January 2013.<sup>11</sup> The growth in the fleet for the next decade is difficult to project as a turning point in the shipbuilding cycle occurred recently as a result of deteriorating economic conditions. This is evidenced by declining orders for new builds from 2009 onwards with the current schedule providing output of close to recent levels for 2013 and a little less for 2014. The amount of cargo carried increased from 2000 to 2013 from approximately 6000 to 9165 million tons loaded.<sup>12</sup> Trends in shipping volume for the future are likely to be closely tied into economic trends, with wide regional variation. An increase in shipping in the Arctic region is likely as sea ice in this region continues to decrease, opening up potential shipping routes.

- **Drilling** was also mentioned briefly as a source of continuous sound but general trends were not discussed. The major source of noise associated with drilling operations is a result of using a ship-based drill platform equipped with a bow thruster.

*Impacts of underwater noise on marine and coastal biodiversity, including implications of cumulative impacts of multiple sources of noise*

9. The functional hearing groups devised for marine mammals and those proposed for fish can be used to separate out impacts on marine species. In the past, the focus has been on the physical impacts of underwater noise, but it is now widely perceived that behavioural impacts of underwater noise could be as important or more so, noting that some behavioural changes can lead to physical impacts and mortality. Physical injury caused by noise is rare but the effects on the overall population will be greater for a species that has fewer individuals.

10. Cumulative and synergistic impacts are very likely to be important, but are very difficult to measure and assess at this time, particularly as the detail of the sound exposure (and the “recovery” time between exposures) can determine its impact. Longer gaps between exposures can result in tissue recovery and decrease the degree of masking experienced by an organism.

11. The degree of cumulative effects will also depend on the mobility of marine organisms (and also of the sound source). Highly mobile species may be able to avoid stationary sounds, while more sedentary or sessile species will not be able to move away from a stationary sound source. Migratory species may be subjected to multiple impacts along their migration route.

12. It is possible to model and calculate cumulative sound exposure, although it is still difficult to identify cumulative acoustic impacts. When there are multiple sources, it is important to identify the dominant noise contributor, as this may have the greatest impact on the species of concern.

13. The behavioural context of the organism also needs to be considered with respect to cumulative effects, as this can affect the type of behavioural response to the noise.

<sup>10</sup> Andrew R. K., Howe B. M. & Mercer J., 2011. Long-time trends in ship traffic noise for four sites off the North American West Coast. *J. Acoust. Soc. Am.* 129, 642–651 (2011).

<sup>11</sup> UNCTAD, 2013 - Review of Maritime Transport 2013 - Trade Logistics Branch of the Division on Technology and Logistics, UNCTAD.

<sup>12</sup> *Ibid.*

14. The cumulative and synergistic impacts of multiple noise sources and other stressors (e.g., habitat loss, pollution, bycatch, illegal, unregulated, and unreported fishing, ocean acidification) on marine animals in a given area need to be considered.

15. Detection of long-term consequences of noise impacts on marine organisms may require systematic studies of populations, noise characteristics, and other environmental effects acting upon them over decades.

***Major knowledge gaps regarding the short- and long-term consequences for marine organisms and other biota in the marine environment***

16. There has already been a significant amount of research into the effects of noise on aquatic life over the last decade. There still remain significant questions that require further study. The largest gaps in knowledge relate to the following taxa: fishes, invertebrates, turtles and birds. Additional knowledge gaps include characteristics of major sound sources, trends in the prevalence and magnitude of underwater noise and on the potential population and ecological impacts of underwater noise, including implications of cumulative and synergistic impacts of multiple sources of noise and other stressors. Specific areas of research are further discussed in documents UNEP/CBD/SBSTTA/16/INF/12 and UNEP/CBD/MCB/EM/2014/1/INF/1.

**II. Summary of discussion on developing practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including marine mammals, in order to assist Parties and other Governments in applying management measures**

*Under agenda item 4, the workshop discussed practical guidance and toolkits to minimize and mitigate the significant adverse impacts of anthropogenic underwater noise on marine and coastal biodiversity, including marine mammals, in order to assist Parties and other Governments in applying management measures and focused on the following topics, in particular:*

***Gaps and limitations in existing guidelines, including the need to update them in the light of improving scientific knowledge, and recognizing a range of complementary initiatives under way***

1. The workshop did not consider this item in detail. The workshop also noted gaps and limitations described in the background document (UNEP/CBD/SBSTTA/16/INF/12), suggesting that this document needs to be updated. Monitoring and mitigation measures are in place at the national level, sometimes regional, and globally via best practices for certain industries. There is variation in the application of these measures, and a need for more information on their effectiveness.

***Development of acoustic mapping in priority areas***

*With regard to this topic, the workshop identified the following needs:*

2. The key need for standardization and harmonization of research outputs so that results can be compared.
3. The need for ship identification systems for a broader range of vessels was addressed, particularly with regard to:
  - Automatic identification systems (AISs) that could be extended to small vessels so that information on them can feed into more complete shipping noise mapping; and
  - The need for improved quality of AIS broadcasting by ships and improved coverage by AIS receivers.

4. Further information is needed on sound characteristics for a greater number of types of vessels within the present merchant fleet. Standards to measure source levels of ships based on opportunistic observation are also needed. The workshop noted that IMO is considering further work in this area.
5. With regard to the selection of areas for acoustic mapping, the inclusion of areas that are affected at different levels of sound in order to build a coherent and complete picture of the spatial and temporal distribution of sound.
6. In spatial risk assessments, acoustic mapping should be combined with habitat mapping of species of concern to identify areas where particular species are at risk from noise impacts.
  - Existing work under the Convention on Biological Diversity (CBD) on the description of ecologically or biologically significant marine areas (EBSAs) and IMO's work on Particularly Sensitive Sea Areas (PSSAs) can provide useful scientific information (e.g., feeding, breeding, spawning and nursery habitats, and migratory routes) for States or competent intergovernmental organizations to identify areas of priority concern, with regard to linking relevant scientific information on the impacts of underwater noise.
7. There is a need to consider appropriate time and geographic scales on which to monitor, taking into account the length of time the organism is exposed to the sound and based on biological processes (e.g., migration) to be able to determine if there is no noise effect.

***Means to promote research with a view to further improving understanding of the issue***

*With regard to this topic, the workshop noted the following:*

8. Issues related to underwater noise and biodiversity are subject to prioritization against other important issues on biodiversity conservation and sustainable use.
9. Building political awareness and understanding is essential to inform prioritization and build support for research.
10. Building national-level political awareness and policy commitment to address this issue would be a prerequisite to tap into any possible international or regional funding initiatives.
11. Potential means to promote research and awareness-building of the issue are include, among others:
  - Knowledge exchange;
  - Workshops at the national and regional level;
  - Web-based tools;
  - Policy briefs drawing upon scientific syntheses or other relevant technical documents, and made available in United Nations languages;
  - Noting that awareness on the issues of underwater noise is low in some regions; and
  - Noting that major research funds have been provided by some, but not all industries, and encouraging other industries and companies to work together to support common research needs.

***Means to promote awareness of the issue among relevant stakeholders, both nationally and regionally***

*With regard to this topic, the workshop identified the need to undertake the following:*

12. Provide scientific advice to relevant international and regional organizations, national governments, scientific groups, and industry organizations to ensure that the relevant scientific information is distributed widely and in ways that will help these stakeholders understand such scientific information and advice.

13. Engage industry, particularly the international construction industry and recreation industry, to increase awareness of noise issues and enable them to develop a feeling of ownership so that they appreciate the importance of addressing this issue within the context of their responsible business practices, in collaboration with relevant scientific and technical partners and other stakeholders.

14. Facilitate the use of online awareness-building activities; develop social media for communicating information on this issue; engage scholarly societies in communicating more broadly about the issues of sound and biodiversity; and develop an information portal web site where all scientific materials can be placed, and perhaps additional materials on regulation and related topics, regarding the impacts of anthropogenic underwater noise on aquatic life, so as to make this material widely and easily available.

***Potential measures, as appropriate, to minimize the significant adverse impacts of anthropogenic underwater noise on marine biodiversity, including the full range of best available technologies and best environmental practices where appropriate and needed, drawing upon existing guidance***

*With regard to this topic, the workshop noted the following:*

15. This issue was well-covered by the 2013 United States Bureau of Ocean Energy Management (BOEM) mitigation and quieting workshops for shipping, seismic surveys, and pile driving.<sup>13</sup> Other industries were not covered in the BOEM workshop report, but should be addressed in future workshops. In summary, quieter technologies presently exist or are under development for airguns and pile driving. Ship quieting measures are also promising. Regulators have an important role in incentivizing such development.

16. In addition, the ACCOBAMS/ASCOBANS/CMS Noise Working Group has developed guidelines for mitigation approaches for marine mammals.<sup>14</sup> This could serve as a toolbox for what is available to mitigate sound. The measures can be applied dependent on the sensitivity of the area. Similar approaches might be taken for fishes, turtles, and invertebrates. The meeting suggested making the summary available to the eighteenth meeting of CBD SBSTTA.

17. The cost of various mitigation methods (cost-effectiveness approach) should be taken into consideration along with all other issues. The costs are considered in the BOEM workshop report for each of the various mitigation methods. Cost effectiveness is not considered in the ACCOBAMS ASCOBANS/CMS Noise Working Group guidelines.

18. There is a need to compile various toolboxes developed in different countries, and tailor them for countries that are just starting to address noise issues, considering their socio-economic and cultural contexts as well as available scientific and technical capabilities. This ensures that the toolboxes, while generally standardized, fit the needs and capabilities of each place using them.

19. The idea of developing marine protected areas with appropriate buffer zones for addressing the impacts of anthropogenic noise on key species groups using known locations during critical life cycle stages (e.g., migration corridors) was discussed. However, there was no agreement that this is the most effective approach since many of the participants thought that it would be very hard to develop areas protected from sound since sound propagates so far and so well that no area can be pristine from sound. This is an area that needs further study and consideration in the future.

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<sup>13</sup> Report of the BOEM Quieting Technologies for Reducing Noise During Seismic Surveying and Pile Driving Workshop is available at [https://www.infinityconferences.com/InfiniBase/Templates/183779/Workshop\\_Summary\\_Report\\_Final.pdf](https://www.infinityconferences.com/InfiniBase/Templates/183779/Workshop_Summary_Report_Final.pdf)

<sup>14</sup> These guidelines will be made available to the eighteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice. These guidelines are available at: [http://accobams.org/images/stories/MOP/MOP4/Resolutions/res%204.17\\_guidelines%20to%20address%20the%20impact%20of%20anthropogenic%20noise%20on%20cetaceans%20in%20the%20accobams%20area.pdf](http://accobams.org/images/stories/MOP/MOP4/Resolutions/res%204.17_guidelines%20to%20address%20the%20impact%20of%20anthropogenic%20noise%20on%20cetaceans%20in%20the%20accobams%20area.pdf)

20. Existing marine protected areas might have a noise consideration added to the management plan. However, the same challenges of controlling sounds getting into the areas exist. Areas that are particularly critical for a short period of time can be protected from underwater noise spatially and/or temporally. Such areas might include a spawning site for haddock or seasonal feeding site for whales. During these sensitive periods, efforts should be made to lower anthropogenic noise and to avoid interference with the organisms. These spatial and temporal tools for specific situations may be used at different times and places to accommodate different events.

21. Guidelines for fish and turtles will be released by mid-2014 from the Standards Working Group of the Acoustical Society of America.<sup>15</sup> There are no guidelines or criteria for invertebrates. Developing such material will need far more research information on these organisms than exists at present. The IMO is drawing up the “Guidelines for the Reduction of Underwater Noise from Commercial Shipping.”<sup>16</sup> This work will culminate in April 2014, when the IMO’s Marine Environment Protection Committee (MEPC) will consider draft guidelines for minimizing underwater noise from commercial ships with a view to approval and dissemination as an MEPC circular. Based on this progress made by the IMO, the group acknowledges that the IMO, as the recognized competent body for international commercial shipping, is the appropriate forum to address the reduction of underwater noise from commercial shipping. But this is only a first step, and it is envisaged that the scope and timing of future work will also be considered, such as progress on quantifying and understanding in advance the impact of noise on marine species; identifying the types of areas and situations where waterborne noise is most disruptive for marine life and setting specific noise-reduction targets; and setting operating guidelines for sensitive marine areas, to name a few possible issues.

***Indicators and frameworks for monitoring underwater noise for the conservation and sustainable use of marine biodiversity***

*With regard to this topic, the workshop noted the following:*

22. The EU Marine Strategy Framework Directive (MSFD) provides the only known statutory indicators and framework for underwater sound, in its Descriptor 11.

23. The indicators for underwater noise under MSFD cover only low- and mid-frequency impulsive sounds, and low frequency continuous sounds (see UNEP/CBD/MCB/EM/2014/1/INF/1 for precise definitions).

24. MSFD monitoring of these sounds will be international, at the regional sea scale, which is appropriate for such sound.

25. Further development to understand and measure/model the impact of the sounds at the population level is in progress.

26. Consideration is being given to adding further indicators, for example for higher frequency impulsive sounds.

***Best management practices and capacity-building needs, particularly in data-poor regions***

*With regard to this topic, the workshop identified the need to undertake the following:*

27. Build capacity in developing regions where the awareness and scientific capacity on addressing this issue are yet to be strengthened and, in particular:

(a) Increase awareness on EIAs and related guidelines in countries/regions where relevant legislations and/or guidelines addressing this issue are not available;

<sup>15</sup> These guidelines will be made available to the eighteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice.

<sup>16</sup> *Ibid.*

(b) Guidance can be provided through the Convention, building upon its existing work on voluntary guidelines on biodiversity-inclusive EIA/SEA, on how to undertake impact assessment and/or take advantage of existing training material on impact assessments. Additional guidelines on marine mammals are reviewed in the background document produced for this workshop;

(c) Assist developing countries to set in place a mechanism to require industries to help them build local capacity to understand and control anthropogenic noise;

(d) Countries can require industries to involve their academic or research institutions in their processes of addressing noise, in order to help build in-country capacity; and

(e) Engage NGOs and other civil society organizations, as appropriate, to help build local capacity to address underwater noise issues.

28. Make relevant training or information documents available in different United Nations languages.

29. Encourage organizations to develop academic courses that can deliver information and train people so that they learn the complex knowledge associated with anthropogenic underwater noise, its impacts and appropriate management measures.

30. Develop best management practices (BMPs), while also making sure to:

(a) Recognize that industries have their own best practices;

(b) Recognize that BMPs can differ from country to country, depending on the legislation in the countries; and

(c) Be cognizant that industries often have best practices across different countries, which depend on legislation within each country.

31. Engage industry when developing guidelines to increase their ownership and participation in the implementation of the guidelines. Develop incentives for minimizing the impacts of noise at the sources, such as rewarding programmes for lowering noise levels. This could include reducing fees for minimizing the production of anthropogenic noise.

32. Develop approaches to standardization of metrics and sound measurements, so that there are similar measures and approaches for all sounds and in all places. Support standards by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO).

33. Encourage collaboration and communication among relevant international bodies for synergies in addressing this issue.

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