Article

Short Comments on the Application of Criteria for Identifying Ecologically or Biologically Significant Marine Areas (EBSAs)

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Abstract: In 2008, the Convention on Biological Diversity adopted seven criteria for identifying ecologically or biologically significant marine areas (EBSAs) for biodiversity conservation. Nine international workshops were held in which 209 areas and 38 potential areas were identified as meeting the EBSA criteria. This study analyzes the 209 identified areas and reveals that the use of the seven criteria in different workshops differed, so their scores are therefore not quantifiable. Furthermore, descriptions specific to criteria regarding areas having “special importance for the life-history stages of species” accounted for only 1.44% of the overall descriptions. Most descriptions regarding “vulnerability, fragility, sensitivity, or slow recovery” were almost contributed by the “importance of threatened, endangered, or declining species and/or habitats”. These three criteria were based on scientific evidences and have been widely accepted by the public. Therefore, we would suggest the criteria of “special importance for the life-history stages of species” and the criteria of “vulnerability, fragility, sensitivity, or slow recovery” need further investigation for biodiversity conservation.

Keywords: ecologically or biologically significant marine areas (EBSAs); criteria; Convention on Biological Diversity (CBD)

1. Introduction

The United Nations (UN) Convention on Biological Diversity (CBD) defines biodiversity as “the variability among living organisms from all sources including inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within species, between species, and of ecosystems” [1]. The Intergovernmental Panel on Climate Change (2002) defines the diversity of life at three levels: genetic, species, and ecosystem.

Human activities are changing biodiversity all over the world, thus imperiling the entire ecosystem [2]. The impacts of human activities are both direct and indirect. Many species are threatened with extinction due to the loss of available resources, and this situation is becoming increasingly serious [3–6]. There is growing concern about threats to biodiversity caused by climate crisis and overexploitation [7].

Sustainable use is defined as the use of resources in a way and at a rate that does not lead to their long-term decline but allows their potential to be maintained to meet the needs of present and

future generations [8]. The sustainable use of marine biodiversity has been called for in a number of international conferences, such as the World Summit on Sustainable Development 2002, the UN General Assembly Resolution 57/141, CBD Aichi Target 11 and the UN Conference on Environment and Development (UNED) Rio+20 and Sustainable Development Goal 14.

The need for the conservation and sustainable use of biodiversity beyond national jurisdiction (BBNJ) is attracting increasing international attention, and the General Assembly decided to convene an Intergovernmental Conference (IGC) established by the resolution 72/249 which would require the establishment of an international legally binding instrument under the UN Convention on the Law of the Sea for the conservation and sustainable use of BBNJ. The first, second, and third sessions of the IGC of the BBNJ discussed area-based management tools (ABMTs), including marine protected areas (MPAs), and proposed 21 criteria for area designation such as “uniqueness” and “rarity” and so on. The participants concluded that the criteria failed to meet MPA requirements and that more restrictive protection measures are required.

The CBD signature commitment at the UNED in June 1992 indicated that the CBD will strive to ensure the sustainability of marine biodiversity [9]. It established a set of scientific criteria for identifying ecologically or biologically significant areas (EBSAs) that are considered to be priority areas to be conserved. An EBSA is an area of special importance with respect to its ecological or biological characteristics, which include all seabed habitats from the coast to deep ocean trenches, and any area of the water column from the surface to the abyss [10]. EBSAs are established based on seven criteria, including “uniqueness or rarity”, “special importance for life-history stages of species”, “importance for threatened, endangered or declining species and/or habitats”, “vulnerability, fragility, sensitivity, or slow recovery”, “biological productivity”, “biological diversity”, and “naturalness”. Table 1 provides the details of the seven criteria.

Table 1. Seven criteria for an ecologically or biologically significant area (EBSA) [11].

Number	Criteria	Definition
C1	Uniqueness or rarity	The area contains either (i) unique (the only one of its kind), rare (occurs only in few locations) or endemic species, populations or communities; and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphologic or oceanographic features.
C2	Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.
C3	Importance for threatened, endangered or declining species and/or habitats	Areas containing habitats for the survival and recovery of endangered, threatened or declining species or areas with significant assemblages of such species.
C4	Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.
C5	Biological productivity	Areas containing species, populations or communities with comparatively higher natural biological productivity.
C6	Biological diversity	Areas containing comparatively higher diversity of ecosystems, habitats, communities or species, or has higher genetic diversity.
C7	Naturalness	Areas with a comparatively higher degree of naturalness as a result of the lack of, or low level of, human-induced disturbance or degradation.

In this paper, we analyze the EBSAs criteria used by the CBD to describe areas that meet one or more of the seven criteria in the marine environment. Based on these seven EBSA criteria, a very large percentage of the oceans in the world have been defined by intergovernmental workshops as meeting the requirements [12]. Yet the EBSAs only represent the marine areas and their surroundings that are considered by the international community to be of greater importance for biodiversity conservation [13]. Here, we present the results of our analysis of the nine intergovernmental workshops in which 209 EBSAs were defined [14–22]. These results indicate that more knowledge is needed about the criteria of “special importance for life-history stages of species” and the criteria of “vulnerability, fragility, sensitivity, or slow recovery”.

2. Development of EBSA Criteria

The CBD, the UN Food and Agriculture Organization (FAO), and the International Maritime Organization (IMO) have established a set of criteria for identifying areas for urgent protection in their respective fields [23]. However, the CBD used these criteria to identify areas suitable for designation as MPAs or part of an MPA networks [24], while the FAO and IMO applied these criteria to protect areas in which human activities might diminish biodiversity. A review of these criteria provides key information for establishing criteria for the identification of EBSAs on the high seas. This was the focus of the first expert workshop in which participants systematically discussed ecologically and biologically significant areas beyond national jurisdiction (ABNJ) [24]. From this review, six criteria were defined, including “uniqueness”, “life history stages”, “vulnerability”, “productivity”, “biological diversity”, and “naturalness”.

In 2006, the 8th Conference of Parties (COP 8) was held in Montecatini, Italy, where participants discussed the CBD’s role regarding ABNJ. It was suggested that the EBSA criteria need to be improved by taking into consideration the ecosystem and a precautionary approach [25]. EBSAs were identified as a part of expert processes, which may result in biased results depending on the dialogues and actions carried out. COP 8 called for an expert workshop to establish a consolidated set of EBSA criteria [26]. When the CBD expert workshop was held in the Azores in 2007, the EBSA criteria were reviewed and refined to seven criteria, including “uniqueness or rarity”, “special importance for the life-history of species”, “importance for threatened, endangered or declining species and/or habitats”, “vulnerability, fragility, sensitivity, or slow recovery”, “biological productivity”, “biological diversity”, and “naturalness”.

A marine protected area (MPA) network is a network of marine protected areas or marine reserves. A marine protected area network can be defined as “a collection of individual MPAs or reserves operating cooperatively and synergistically, at various spatial scales, and with a range of protection levels that are designed to meet objectives that a single reserve cannot achieve” [27]. The criteria for the MPA network were discussed during the CBD 2007 expert workshop held in the Azores, and five scientific criteria were defined for the MPA network that included EBSAs. The five criteria are representativity, connectivity, replicated ecological features, and adequate and viable sites [28]. However, this does not mean that all EBSAs or extensions of established EBSAs can become MPAs. Rather, these are just the factors contributing to the MPA candidature.

The 9th COP was held in Germany in 2008, during which the seven EBSA criteria and five MPA network criteria were adopted by the CBD in Decision IX/20. This means that the EBSA criteria may now be applied in practice. These criteria can guide the identification of marine areas in need of protection in open-sea and deep-sea habitats [29]. A follow-up CBD expert workshop held in Ottawa in 2009 called for providing technical guidance for identifying areas in need of protection [30]. This expert workshop focused on the areas identified as being in need of protection, especially in ABNJ, although these criteria have some similarity with those of other inter-governmental organizations (IGOs) [31–33] and non-governmental organizations (NGOs) [34,35]. The criteria applied by these organizations consider special factors such as species vulnerability to specific human activities [36].

3. Areas that Meet EBSA Criteria

The CBD's 10th COP hosted by Japan adopted Aichi Biodiversity Targets such as target 6 (i.e., to achieve sustainable fisheries by 2020) and target 11 (i.e., to protect at least 10% of the coast and ABNJ by 2020), which replaces the goal of protecting 10% of the CBD MPAs by 2012 [37,38]. To achieve these goals, the CBD organized nine regional EBSA workshops to describe areas that meet the EBSA criteria. From 2012 to 2014, these nine regional EBSA workshops have fully described 209 areas that meet the EBSA criteria (Table 2). All the original reports came from the nine regional EBSA workshops' final reports [14–22].

Table 2. EBSAs described by Convention on Biological Diversity (CBD) regional workshop.

Regional Workshop on EBSAs	Data Started	Number of EBSAs Described	Host City	Reference
North Pacific Ocean	25 February 2013	20	Moscow	[14]
Western South Pacific Ocean	30 April 2012	26	Montreal	[15]
Eastern Tropical and Temperate Pacific	28 August 2012	21	Galapagos Islands	[16]
Southern Indian Ocean	31 July 2012	39	Mauritius	[17]
Arctic Region	3 March 2014	12	Helsinki	[18]
Mediterranean Region	7 April 2014	17	Málaga	[19]
South-eastern Atlantic	8 April 2013	45	Swakopmund	[20]
Wider Caribbean and Western Mid-Atlantic	30 April 2012	22	Montreal	[21]
North-west Atlantic	24 March 2014	7	Montreal	[22]

The South Indian Ocean has 39 areas that meet the EBSAs criteria, whereas the Northwest Atlantic has just seven areas (Table 2). All the information pertaining to the seven EBSAs criteria was reviewed during the regional workshops against each of the EBSAs criteria and classified as either high (H, the highest rating), medium (M, the medium rating), low (L, the lowest rating), or gap (gap, without the knowledge). And all the classified EBSAs criteria were judged by the regional workshop. Traditional knowledge contributed to the assessments regarding the seven EBSAs criteria, as did scientific information. The percentages of the H, M, L, and gap classifications varied between the different criteria and regions (Table 3). In the North Pacific Ocean region workshop (Table 3), for instance, the percentage of H for C5 was 0.85, whereas it was 0.40 for C7, which indicated that the North Pacific Ocean region workshop paid much more attention to the conservation of biological productivity [39]. Overall, the H classification for C1 ranges from 0.450 to 0.857, with a mean of 0.632, and the means for C2, C3, C4, C5, C6, and C7 are 0.679, 0.574, 0.464, 0.517, 0.498, and 0.297, respectively (Table 4).

The authors compared the descriptions by the regional workshop under the CBD with the criteria definitions provided by the CBD. When the description meets its definition, we judged it as specifically described for the criterion. When its description meets a part of the definition, and a part meets other criterion, we judged it as a partial description for its criterion. When its description did not meet with its definition, but meets with another criterion, we judged it as mainly described by another criterion. When its description did not meet its definition, and did not meet with any other criterion, we judged that it did not meet its criterion. We judged a description lacking any information as an information gap.

However, the knowledge of C2, C3, and C4 differ (Table 4). More than 80% of C2 is described by C3 (Table 5); for example, the aggregation area of the Northeastern Pacific White Shark is described in C2 as follows: *Area appears to exhibit gender-based behaviors for its mating, and feeds on squid. In C3, this species is described as follows: White sharks have been listed for international protection under the Convention on International Trade in Endangered Species (CITES) and the International Union for the Conservation of Nature (IUCN), and these areas are significant for the Northeastern Pacific population's aggregation.* We consider C2 to be mainly described by C3. Furthermore, 10% of its descriptions did not match its own requirements. For instance, the Juan de Fuca Ridge hydrothermal vents (North Pacific Ocean) are described as having special importance for the life-history stages of species as follows: *Production based on chemosynthesis provides food resources for the specialized fauna associated with hydrothermal vents, which indicates that sulfur-related metabolism is crucial to vent ecosystems,* which we categorize as not meeting C2.

Table 3. Data analysis for nine regions.

Region	Level	Uniqueness or Rarity	Special Importance for Life-History Stages of Species	Importance for Threatened, Endangered or Declining Species and/or Habitats	Vulnerability, Fragility, Sensitivity, or Slow Recovery	Biological Productivity	Biological Diversity	Naturalness
North Pacific Ocean [14]	H	9	14	13	12	17	13	8
	M	5	5	1	6	3	5	7
	L	5	1	3	2	0	2	5
	Gap	1	0	3	0	0	0	0
Western South Pacific [15]	H	13	14	10	9	8	10	9
	M	10	3	11	9	10	8	10
	L	2	3	1	1	4	5	2
	Gap	1	6	4	7	4	3	5
Eastern Tropical and Temperate Pacific [16]	H	17	19	12	7	13	10	2
	M	3	1	7	9	5	7	10
	L	1	1	1	3	1	1	5
	Gap	0	0	1	2	2	3	4
Southern Indian Ocean [17]	H	25	24	19	14	20	19	13
	M	12	11	14	20	9	12	11
	L	1	1	1	3	4	1	12
	Gap	1	3	5	2	6	7	3
Arctic Region [18]	H	6	11	5	10	10	4	8
	M	6	1	6	2	1	4	4
	L	0	0	0	0	1	2	0
	Gap	0	0	1	0	0	2	0
Mediterranean Region [19]	H	12	14	15	12	8	10	2
	M	5	3	2	4	5	5	8
	L	0	0	0	1	1	0	4
	Gap	0	0	0	0	2	5	3
South-eastern Atlantic [20]	H	29	28	27	15	21	16	8
	M	11	14	14	27	20	23	19
	L	5	1	2	1	1	3	12
	Gap	0	2	2	2	3	3	6
Wider Caribbean and Western Mid-Atlantic [21]	H	15	14	17	15	9	17	10
	M	6	5	4	7	8	3	9
	L	1	0	1	0	2	2	3
	Gap	0	3	0	0	3	0	0
North-west Atlantic [22]	H	6	4	2	3	2	5	2
	M	1	2	1	4	2	1	4
	L	0	0	0	0	2	1	1
	Gap	0	1	4	0	1	0	0

Table 4. Classification of all 209 areas with respect to EBSA criteria.

Level	Uniqueness or Rarity	Special Importance for Life-History Stages of Species	Importance for Threatened, Endangered or Declining Species and/or Habitats	Vulnerability, Fragility, Sensitivity, or Slow Recovery	Biological Productivity	Biological Diversity	Naturalness
H	132	142	120	97	108	104	62
M	59	45	60	88	63	68	82
L	15	7	9	11	16	17	44
Gap	3	15	20	13	22	20	21
H Ratio	0.632 (0.450, 0.857)	0.679 (0.538, 0.917)	0.574 (0.286, 0.882)	0.464 (0.333, 0.833)	0.517 (0.286, 0.850)	0.498 (0.333, 0.773)	0.297 (0.095, 0.667)

Table 5. Data analysis for criteria C2 and C3.

Criteria Description	Number	Ratio
C2 mainly described by C3	85	0.4067
C2 partly described by C3	86	0.4163
Does not meet C2	19	0.0909
Gap	15	0.0718
Specifically describes C2	3	0.0144
Total	208	1.0000

Similarly, we counted the number of detailed descriptions and adoption frequency of this indicator in the 209 EBSAs and found that about 39.9% of C4 was mainly described by C3 (Table 6). For example, the Guaymas Basin hydrothermal vents are described in C3 as follows: *Hydrothermal vents in the Guaymas Basin are important to abyssal species, and commercial activities would threaten these species. In C4, they are described as follows: Hydrothermal-vent metazoan species are a long-lived, low-productivity species, which makes them vulnerable to deep sea fishery activities in this region.* We therefore categorized C4 as being described by C3. The knowledge of C2 and C4 are poorly known, and “threatened, endangered or declining species and/or habitats” yielded more information. The description of these criteria included information of “threatened, endangered or declining species and/or habitats”.

Table 6. Data analysis for the C3 and C4.

Criteria Description	Number	Ratio
C4 mainly described by C3	83	0.3990
C4 partly described by C3	34	0.1635
Does not meet C4	56	0.2692
Gap	14	0.0673
Specifically describes C4	21	0.1010
Total	208	1.0000

4. Discussion

4.1. Relationship with Other IGOs/NGOs/Processes

Currently, many IGOs and environmental NGOs have put forward criteria for areas that need enhanced management or conservation. However, different IGOs and environmental NGOs have been established for different purposes and are playing different roles. The FAO, for instance, focused its criteria on the identification of vulnerable marine ecosystem (VMEs) to prevent vulnerable habitats and ecosystems on the sea floor from bottom fishing activities [31]. The IUCN established its criteria with respect to key biodiversity areas (KBAs) for the protection of areas that contribute significantly to the global persistence of biodiversity, including terrestrial, freshwater, and marine ecosystems [40]. The IMO seeks to protect vulnerable marine areas within a nation’s or state’s exclusive economic zone (referred to as particularly sensitive sea areas (PSSAs)) from damage by international maritime activities [41]. Important bird and biodiversity areas (IBAs) are those identified by BirdLife International for the protection of bird populations and general global biodiversity [42].

The CBD adopted its seven criteria to identify EBSAs for the conservation of biodiversity, firstly applied within the exclusive economic zone, but with the hopes of extending its areas to the high seas and deep sea. The sustainability of the marine biological diversity of ABNJs has become a hot topic of debate by members of the UN and NGOs. The issue of ABMTs that addresses marine protected areas (ABMT/MPAs) has become contentious regarding the terms “uniqueness”, “rarity”, “special importance for life-history stage of species”, “importance for threatened, endangered or declining species and/or habitats”, “vulnerability”, “fragility”, “sensitivity, or slow recovery”, “productivity”, “biodiversity”, “naturalness”, “representativeness”, and “dependency”, as well as “connectivity”,

“environmental processes” and “economic and social factors”. These criteria are matters of debate in many organizations (Table 7). The objective of ABMT/MPAs is the conservation and the sustainable use of BBNJ, which is very similar to the objective of EBSAs. Yet inevitably some of the EBSA criteria were mixed up when applied in practice.

Table 7. Correspondence between the CBD criteria and the criteria used by inter-governmental organizations (IGOs) and environmental non-governmental organizations (NGOs).

Organizations	UN	CBD	FAO	IUCN	IMO	BirdLife
Site criteria	ABMTs (MPA)	EBSAs	VMEs	KBAs	PSSAs	IBA
Uniqueness	✓	✓	✓	✓	✓	✓
Rarity	✓	✓	✓	✓	✓	✓
Special importance for life-history stage of species	✓	✓	✓	✓	✓	✓
Importance for threatened, endangered or declining species and/or habitats	✓	✓	✓	✓	✓	✓
Vulnerability,	✓	✓	✓	✓	✓	
fragility,	✓	✓	✓	✓	✓	
sensitivity, or slow recovery	✓	✓	✓	✓	✓	
Productivity	✓	✓			✓	
Biodiversity	✓	✓		✓	✓	
Naturalness	✓	✓			✓	
Representativeness	✓			✓	✓	
Dependency	✓				✓	

Abbreviations: UN, United Nations; CBD, Convention on Biological Diversity; FAO, food and agriculture organization; IUCN, International Union for the Conservation of Nature; IMO, International Maritime Organization; ABMTs, area-based management tools; MPA, marine protected areas; VMEs, vulnerable marine ecosystem; KBAs, key biodiversity areas; PSSAs, particularly sensitive sea areas.

4.2. Application of Criteria of “Special Importance for Life-History Stages of Species”

The definition of an area of special importance for life-history stages of species is one that is required for a population to survive and thrive [11]. The criteria originally established for biodiversity conservation within exclusive economic zones were well defined, and the scientific biodiversity surveys for a nation or state’s exclusive economic zone were well conducted. As such, many factors of special importance for the life-history stages of species have been well studied. However, this includes most species of high economic value or those that are threatened, endangered or in decline. Species with less economic value and by-catch species are of less concern, so it presented that C2 mainly described by C3 had a high ratio of 40.67% (Table 5). Scientific management measures were based on the protected objective, and the benefits of protected areas depend on its compliance, and its protection goals, such as no-trawling areas would be beneficial for the recovery of fishery stocks [43,44]. However, Adriatic areas not only protect marine mammals and seabirds, but also protect the critical benthic habitats for their specific goals, well known data, and approaches in the selected areas [45]. In addition, Adriatic areas are beyond the current EBSAs suggested by the CBD [46,47]. The conservation of specific goals would be protecting its ecosystem so as to achieve a better management result [44]. Thus, some species that have no economic value may still play important roles in the ecosystem, such as secondary producers or small fishes, and the ratio of their specific description was as low as 1.44% (Table 5).

The effective determination of factors of special importance for the life-history stages of species will require extensive and in-depth surveys and data collection to support the conclusions drawn. Threatened, endangered or declining species are of key concern to marine protected species, thus information about these species is well known. To address the lack of knowledge about most species, the description of areas that meet the EBSA criteria is mostly included in the criteria of “importance for threatened, endangered or declining species and/or habitats” (Table 5). Therefore, the application of the criteria of “special importance for life-history stages of species” seems much less practical. Shall we

then pay less attention to these criteria until we learn more about what constitutes special importance for the life-history stages of most species?

4.3. Application of the Criteria “Importance for Threatened, Endangered or Declining Species and/or Habitats”

The definition of an area of importance for threatened, endangered or declining species and/or habitats is one that serves as a habitat for the survival and recovery of endangered, threatened or declining species or an area with significant assemblages of such species. Threatened, endangered or declining species and/or habitats easily become extinct and/or disappear under human activities, and their need for protection is urgent. At the international level, the IUCN’s Red List of threatened species includes more than 500 species that require urgent protection. At the national level, many levels of marine protection areas have been established. China is a country rich in biodiversity, with a global biodiversity ranking of eight. At the same time, China’s biodiversity is under serious threat [48]. As such, the government of China keeps a watchful eye on marine biodiversity protection. The “List of Wildlife Under Special State Protection”, “China’s Red Book on Endangered Animals”, and “The Red List of Chinese Species” provide details of the species that need protection. Furthermore, an increasing number of MPAs have been assessed to enable the protection of marine biodiversity and habitats. In China, marine species protection is being addressed at the local, provincial, and national levels. Species protected at the national level include all those identified at the provincial and local levels, and the protection of most native species is restricted to the provincial and local levels. After long and hard work, threatened, endangered and declining species and/or habitats are now well protected and species that were in decline have begun to recover.

4.4. Application of the Criteria “Vulnerability, Fragility, Sensitivity, or Slow Recovery”

The definition of areas characterized by vulnerability, fragility, sensitivity, or slow recovery are those that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or prone to slow recovery [49]. This definition emphasizes the resilience of species or habitats to physical, chemical or biological perturbations. Cold-water coral reefs are slow to recover and are highly sensitive to bottom trawling as well as the benthic ecosystem [31]. These criteria have been well assessed under the FAO’s VME designations, which specify the need to protect benthic ecosystems and cold-water coral reefs. First, the areas suitable for the growth of cold coral reefs are small. Second, our knowledge of benthic ecosystems should be based on extensive and in-depth surveys. In this regard, bottom fishery logs have been well recorded by various countries along the North Pacific Ocean; the biology of marine fisheries and their environments have also been well studied, and an annual VME technical workshop has been attended by a range of international experts. As a result, there has been an accumulation of knowledge of benthic ecosystems that provides a scientific basis for VME protection. Scientists and marine managers have focused much attention on cold coral reefs and long-live species that are threatened, endangered or declining. However, with the exception of coral reefs, the relationship of biodiversity to vulnerability, fragility, sensitivity, or slow recovery is poorly known. A statistical analysis indicated that C4 mainly described by C3 could have a ratio as high as 39.90% (Table 6). In deep-sea, new species increased with the sampling frequency, proving it to have a rich biodiversity but low productive area [50]. For the scientific community in the near-shore, information on benthic assemblages is always achieved from bottom trawling and dredges. So, the studies on these samples offer irreplaceable taxonomic data but often these data are wasted owing to the lack of adequate taxonomic competences and few details are recorded about species interactions. As such, descriptions of these criteria for EBSAs are mostly addressed by the criterion “importance for threatened, endangered or declining species and/or habitats”. To effectively guide the selection of EBSAs, this criterion has yet to be adequately defined and we would not consider it to be an effective criterion until we obtain greater knowledge of the relationship between vulnerability, fragility, sensitivity, or slow recovery and biodiversity.

5. Conclusions

In this study, we analyzed 209 areas that meet the EBSA requirements, as defined in nine CBD workshops. The results revealed that the use of the seven criteria in the different workshops was not consistent, so their scores could not be quantified for use in an index. Furthermore, descriptions of the criteria of special importance for the life-history stages of species account for only 1.44% of specific descriptions for the knowledge of this information. Therefore, more than 80% of C2 being described by C3, and about 39.9% of C4 being described by C3. C2 and C4 may benefit from biodiversity conservation, but to our knowledge, C2 and C4 are so poor that we would recommend paying much more attention to the “special importance for life history of species” and the “vulnerability, fragility, sensitivity, slow recovery”. In addition, the marine protected experts calling the marine protected areas network to instead the signal marine protected area that it would be much more effective. Marine protected areas network required to identify the areas which not only protected the “importance for threatened, endangered or declining species and/or habitats” but also protected the “special importance for life history of species” (some valueless species) and the “vulnerability, fragility, sensitivity, or slow recovery” (e.g., benthic assemblages). In the short term, all of these criteria are significant for biodiversity protection which is based on the best available scientific information, such that a quantifiable index is needed to assess their relative importance.

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