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| RESEARCH ARTICLE

Lessons from Management of Antarctic Marine Protected Areas

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| ABSTRACT
This article reviews the current implementation status of conservation measures in established Antarctic marine protected areas, the progress of research and monitoring plans, and the research reports on marine protected areas in member countries. This article also provides an in-depth analysis of the reasons for the unsatisfactory conservation performance of Antarctic marine protected areas from the perspectives of institutional, regulatory, and stakeholder participation. It finds that there is a lack of specialized management institutions, uneven participation of member states, and a lack of research and monitoring plans. Finally, lessons were drawn from improving the institutional structure of CCAMLR, developing research and monitoring plans, and ensuring full stakeholder participation.

| KEYWORDS
Antarctic Marine Protected Area, CCAMLR, Management, Research and Monitoring plan.

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1. Introduction

The core issue in the implementation of conservation measures in marine protected areas is how to properly enforce legal norms, which is essentially a common problem of international law. Without enforcement, a law is equivalent to a piece of paper. The management of marine protected areas refers to conducting research and monitoring activities in accordance with the research and monitoring plans, and using the scientific data and monitoring results collected from it to evaluate the degree of achievement of conservation objectives in marine protected areas. To verify whether the conservation objectives of marine protected areas are still relevant and being achieved, ensuring the implementation of the conservation effects of marine protected areas. At present, there are few research and monitoring activities within the established Antarctic Marine Protected Area, and the lack of monitoring data makes it impossible to evaluate the conservation effectiveness of the marine protected area.

2. Overview

2.1 South Orkney Islands Southern Shelf Marine Protected Area

The South Orkney Islands Southern Shelf Marine Protected Area（hereafter SOISSMPA）was established without a management plan and research and monitoring plan, making its implementation and effectiveness extremely challenging. In the fifteen years since the establishment of SOISSMPA, the implementation of conservation measures has been poor and the protection effect has not been obvious. Article 9 of CM91-03 provides that CCAMLR will review this conservation measure at its annual meeting in 2014 and every five years thereafter, based on the advice of the scientific committee. SOISSMPA has conducted two reviews in 2014 and 2019, but CCAMLR has not adopted its review reports.

In the first review in 2014, the EU submitted a SOISSMPA report and developed a draft research and monitoring plan. The EU stated that no member state has presented scientific evidence to suggest that the marine ecosystem of SOISSMPA has undergone

changes. Since CM91-03 did not provide any objective evaluation criteria, clear implementation standards and review reporting mechanisms, Russia considered the performance evaluation of SOISSMPA in the first five years to be quite negative. China also pointed out that the structure of the report was appropriate from a scientific point of view but problematic from a legal point of view. In the absence of a research and monitoring plan, the scientific research described in the report was not carried out in accordance with any research and monitoring plan. The data obtained from it can only serve as a reference for the committee's review, not a scientific basis. As a result, CCAMLR was unable to review the conservation performance of marine protected areas based on this report.

The second review in 2019 aimed to provide scientific recommendations on the degree of achievement of SOISSMPA objectives but was not carried out due to the lack of research and monitoring plans, evaluation criteria and indicators, as well as monitoring data. The EU submitted a revised draft research and monitoring plan but it has yet to be approved by CCAMLR. Currently, the draft research and monitoring plan of SOISSMPA does not include scientifically based monitoring indicators and comprehensive evaluation criteria, which is insufficient to monitor changes in ecosystem structure and function. More comprehensive research and monitoring work is needed within SOISSMPA to identify these standards and indicators.

2.2 Ross Sea region Marine Protected Area

In April 2017, a workshop on the Ross Sea Region Marine Protected Area（hereafter RSRMPA）research and monitoring plan was held in Rome, Italy. Subsequently, the scientific committee developed and approved an RSRMPA research and monitoring plan. The research and monitoring plan is intended to be a "living" document, regularly reviewed and updated by the scientific committee in accordance with CM91-05. But to date, CCAMLR has not yet approved the RSRMPA research and monitoring plan. In 2019, China submitted a proposal on improving the draft RSRMPA research and monitoring plan (SC-CAMLR-38/21), which made specific recommendations on how to improve the draft RSRMPA research and monitoring plan, urge the proponent states to update the draft as soon as possible to set a good precedent for other Antarctic marine protected areas. In 2023, the United States and Italy revised the draft RSRMPA research and monitoring plan using specific, measurable, achievable, relevant, and time bound (SMART) standards. In this regard, China considered it is necessary to further improve baseline data and use indicators related to fishing activities, ecosystem status, and scientific research results. It is important to focus on the link between specific management measures and changes in indicators of ecosystem condition to assess the extent to which marine protected area objectives have been achieved. (Jabour, J. and Smith, D., 2018) Moreover, the threshold set is far below the baseline conditions for most indicators of marine protected area objectives and is inconsistent with the objectives and principles of the CAMLR Convention.

Even though CCAMLR has not yet approved the draft research and monitoring plan for RSRMPA, several member states have conducted extensive scientific research in accordance with the RSRMPA research and monitoring plan draft. Article 15 of CM91-05 provides that member states shall submit to the secretariat every five years a report on their activities under or related to the marine protected area research and monitoring plan, including any preliminary results for review by the scientific committee. In the first reporting period in 2022, only the US, New Zealand, Italy and South Korea submitted reports on RSRMPA research and monitoring activities.

The report of the US used a literature review method to catalog over 150 papers published in peer-reviewed journals since 2016, with at least one American author, and included data collected from scientific research funded by the US government in RSRMPA. The report is divided into three parts: preliminary results of research conducted in the Ross Sea region, expectations for future changes, and ongoing research.

New Zealand reiterates the specific objectives outlined in Article 3 of CM91-05 and expanded in Annex B, which are divided into three categories: representativeness, threat mitigation, and scientific reference areas, serving as the background for the New Zealand RSRMPA report. Summarize existing research under ten headings, including natural chemical environment, biota, carrying capacity, and key species, and introduce future research plans, including New Zealand's next research voyage to the Ross Sea region scheduled for early 2025. The report concludes that New Zealand has been developing a scientific and strategic research plan for the next five years to contribute to the ten-year review of RSRMPA in 2027.

3. Lessons

3.1 Improving the Institutional Structure of CCAMLR

The establishment, management, and operation of Antarctic marine protected areas are all carried out by CCAMLR. The institutional structure of CCAMLR is relatively backward, lacking a department fully dedicated to the management of marine protected areas. (Brooks, C. M., Bloom, E., Kavanagh, A., Nocito, E. S., Watters, G. M., and Weller, J., 2021) There is no scientific committee working group whose scope of authority is dedicated to managing marine protected areas, nor are there any personnel specifically engaged

in marine protected area management activities. Since the first Antarctic marine protected area was established in 2009, the WG-EMM has taken on most of the responsibilities of marine protected area management, but it is unable to invest sufficient time and resources in this area because its scope of authority covers many other businesses. Moreover, the secretariat concentrated on administrative work and did not provide member states with the necessary technical assistance and financial support in the areas of research and monitoring of the marine protected area.

Implementing a more standardized organizational structure will be beneficial for improving the management effectiveness of marine protected areas. CCAMLR should strengthen its organizational construction and establish a flat management structure led by the central management department, supported by scientific research consulting, management consulting, technical consulting, and service consulting. In fact, the scientific committee provides the most appropriate forum for evaluating and reviewing the implementation of research and monitoring plans, and advises the Committee on the effectiveness of marine protected areas in achieving their specific goals and promoting the overall objectives of the Convention. For the purpose of improving its internal organizational structure, CCAMLR should establish a formal working group for the management of marine protected areas. The scientific committee should explicitly authorize this working group to further develop guidelines on scientific standards, threat assessment, research, and monitoring plans. This working group is specifically responsible for implementing and reviewing research and monitoring plans, recording and evaluating monitoring results of marine protected areas. Additionally, it is necessary to consider establishing a dedicated position in the Secretariat responsible for the management of marine protected areas, and CCAMLR should allocate funds for the Secretariat to hire excellent staff. To assist the marine protected area working group and member states in their research and monitoring activities by facilitating data sharing, organizing intersessional meetings, and coordinating the development of research and monitoring plans.

3.2 Developing Research and Monitoring Plans

As the legal basis for the construction of Antarctic marine protected areas, CM91-04 does not clearly specify the specific content of research and monitoring plans, the methods for developing evaluation standards and indicators, the format of marine protected area research reports, and the scientific standards to be met, nor does it emphasize the importance of adaptive management methods. (Jiang, R., and Guo, P., 2023) If a research and monitoring plan is developed after the establishment of a marine protected area, there will be a time lag between the establishment of the marine protected area and the implementation of the research and monitoring plan. In the process of developing research and monitoring plans, marine protected areas are not managed and are in a state of "paper park". Post management methods make it difficult for member states to determine the feasibility of conservation measures for marine protected areas, which can easily lead to inconsistencies in specific objectives and research and monitoring activities. The simultaneous development of research and monitoring plans and proposals for marine protected areas can help adjust the boundaries and scale of marine protected areas, making their restrictions on fisheries and other human activities more reasonable. Therefore, research and monitoring plans should be developed in conjunction with proposals for marine protected areas, shortening the time interval and helping to clarify the intended conservation goals of marine protected areas, in order to improve the effectiveness of performance evaluation.

At the third special meeting of CCAMLR, held in Santiago, Chile from June 19 to 23, 2023, all member states reached a consensus that once the research and monitoring plan is included in the proposal for marine protected areas, there will be no obstacles to its adoption. The research and monitoring plan should be an essential element of the draft marine protected area conservation measures and a prerequisite for the adoption of the marine protected area proposals under consideration. Currently, there is an urgent need for CCAMLR to discuss the framework for the design of the research and monitoring plan, with a unified methodology for the development and operation of the research and monitoring plan annexed to CM91-04.

3.3 Ensuring the Universal Participation of Stakeholders

As can be seen from the management practices of these Antarctic marine protected areas, proponent states tend to be more active in management activities. For example, the UK is leading the management activities of SOISSMPA, while the US and New Zealand are leading the management activities of the RSRMPA. These countries are often developed countries and traditional maritime powers. Moreover, the remoteness and scale of the Antarctic marine protected area and the difficulty of accessing it due to harsh weather conditions pose challenges for continuous research and regular monitoring, as well as high management costs and logistical difficulties. The staff capacity and budget of CCAMLR cannot meet basic management needs, and the costs and personnel of marine protected area research and monitoring activities are ultimately borne by the participating member states themselves. (Scott, K. N., 2021) However, many developing countries lack knowledge, high levels of science and technology, adequate financial support and the ability to conduct research and monitoring activities on their own. There is a serious imbalance between the active and inactive member states, leading to a lack of equitable participation in Antarctic marine protected area management practices.

Stakeholder participation, public participation and transparency of information are critical to the successful management of marine protected area. The universal participation of stakeholders can ensure fair decision-making, meet the needs of diverse stakeholders,

and improve the quality of sustainable management of marine protected areas. (Relano, V. and Pauly, D., 2023) CCAMLR should develop a stakeholder engagement plan that institutionalize stakeholder engagement and ensures that all stakeholders are involved as early as possible in marine protected area planning, implementation and evaluation. The implementation of the research and monitoring plan is a joint project of all member states, which requires the support of their national Antarctic policies to be realized. Therefore, international cooperation should be widely carried out among member states, and capacity building and technology transfer are important measures to ensure that developing countries can participate fairly in the management of marine protected areas. In addition, CCAMLR should build a monitoring data-sharing platform that makes some marine protected area documents and fisheries data publicly available to improve transparency.

4. Conclusion

Establishment is only a phase of marine protected area construction and does not guarantee the achievement of marine protected area conservation objectives. To promote the construction of a representative system for future Antarctic marine protected areas, scientific management must be carried out to demonstrate the effectiveness of marine protected areas in achieving their conservation objectives. Well-designed and effectively managed marine protected areas can increase the resilience of ecosystems to the impacts of climate change, provide shelter for living marine resources, and allow fisheries to benefit from spillover effects. In summary, CCAMLR should improve its institutional structure, discuss the development of research and monitoring plans, while ensuring full and transparent participation of stakeholders.

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