Casting the first BRICS: Towards an interpretation of the Ramsar Convention favoring citizen science in the Multilateral Environmental Agreement for wetland management

Analizando a los BRICS: hacia una interpretación de la Convención de Ramsar que favorezca la ciencia ciudadana en el Acuerdo Ambiental Multilateral para la gestión de humedales

Bramley Jemain Lemine[1]* and Mahabubur Rahman Chowdhury[1]

1 Functional Material Research Unit (FMRU), Faculty of Engineering and the Built Environment, Cape Peninsula University of Technology. Bellville, South Africa.

SOUTH SUSTAINABILITY

Citar como: Lemine, B. and Chowdhury, M. (2024). «Casting the first BRICS: Towards an interpretation of the Ramsar Convention favoring citizen science in the Multilateral Environmental Agreement for wetland management». *South Sustainability*, 5(1), e095.
DOI: 10.21142/SS-0501-2024-e095

Article received: 29/12/2023
Revisado por pares
Article approved: 29/2/2024

* Corresponding author email: lemineb@cput.ac.za

ABSTRACT

The BRICS countries have agreed to focus on promoting wetland protection, restoration and wise use in their multilateral environmental agreement (MEA), under the agenda of *Advancing environmental cooperation amongst BRICS towards the attainment of the 2030 Agenda for Sustainable Development*. In this article, we will present the argument that the MEA must incorporate citizen science (CS) measures, in order to achieve the agenda's aspirations and comply with the Ramsar Convention, specifically with a view to wetland management and the law. There is no express provision or obligation to exercise or consider CS in the wording of the Ramsar Convention. To prevent a blanket statement of «no express provision», Article 31 of the Vienna Convention on the Law of Treaties 1969 (VC) makes provision for the «Interpretation of Treaties». Interpretative measures include, among others, «object and purpose», «any agreement relating to the treaty», and «any rules of international law». Therefore, to demonstrate the merit of our position, this contribution applies Article 31 of the VC provisions, in order to show that (1) there exists an integral relationship between CS and wetland protection; (2) that the «object and purpose» of the Ramsar Convention promotes CS; (3) there is evidence of CS in terms of «any agreement relating to the treaty»; and that (4) the «any rules of international law» wording, relative to the Ramsar Convention, is geared towards CS. Our findings offer sufficient evidence to demonstrate that the Ramsar Convention supports an interpretation in favor of CS, albeit in its 1971 form. New MEAs, such as that initiated by the BRICS countries, create an opportunity for rejuvenating previous MEAs, by incorporating factors such as CS, as a way of establishing legal certainty.

Keywords: *BRICS, Citizen Science, Multilateral Environmental Agreement, Ramsar Convention*

RESUMEN

Los denominados BRICS han acordado centrarse en promover la protección, la restauración y el uso racional de los humedales en su acuerdo ambiental multilateral (MEA, por sus siglas en inglés) bajo su agenda de «Avanzar en la cooperación ambiental entre los BRICS hacia el logro de la Agenda 2030 para el Desarrollo Sostenible». Este artículo presenta el argumento de que el MEA debe incorporar medidas de ciencia ciudadana para alcanzar las aspiraciones de la agenda y cumplir con la Convención de Ramsar, específicamente con una visión que incorpore el manejo de los humedales y la ley. No existe ninguna disposición u obligación expresa de ejercer o considerar la CS en la redacción de la Convención de Ramsar. Para evitar una declaración general de «no disposición expresa», el artículo 31 de la Convención de Viena sobre el Derecho de los Tratados de 1969 (CV) prevé la «Interpretación de los Tratados». Las medidas interpretativas incluyen, entre otras, «objeto y fin», «cualquier acuerdo relacionado con el tratado» y «cualquier norma de derecho internacional». Por lo tanto, para probar la hipótesis, esta contribución aplica el artículo 31 de las disposiciones de la CV para mostrar que (1) existe una relación integral entre la CS y la protección de los humedales; (2) que el «objeto y fin» de la Convención de Ramsar promueve la CS; (3) hay evidencia de CS en términos de «cualquier acuerdo relacionado con el tratado»; y que (4) «cualquier norma de derecho internacional» relativa a la Convención de Ramsar está orientada a la CS. Los hallazgos muestran evidencia suficiente de que la Convención de Ramsar apoya una interpretación a favor de la CS, aunque sea antigua (1971). Los nuevos MEA creado por los BRICS crean la oportunidad de reevaluarlos al incluir factores como la CS para establecer seguridad jurídica.

Palabras clave: *BRICS, ciencia ciudadana, Acuerdo Ambiental Multilateral, Convención Ramsar*

1. Introduction

The degradation and loss of wetlands have featured on the agenda of a number of wetland forums. Urrego (the former Secretary General of the Ramsar Convention) maintained that «we are losing wetlands three times faster than forests» (Ramsar Secretariat, 2018), and that, without them, sustainable development cannot be achieved (Ramsar Convention on Wetlands, 2018). This concern is reiterated in the Global Wetland Outlook special edition (Ramsar Convention on Wetlands, 2021), which also highlights the link between biodiversity loss and climate change. These two aspects are regulated by, among others, the 1992 Convention on Biological Diversity (CBD) (United Nations, 1992a), the 1963 Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1963), the 1979 Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention; CMS) (CMS Secretariat, 2020), and the 1992 United Nations Framework Convention on Climate Change (UNFCCC) (United Nations, 1992b). The relevance to, and the interconnectedness of these conventions with, the Ramsar Convention will be clarified in due course as part of this article; however, suffice to say that the concerns raised by the Ramsar Secretariat are concerns shared by the broader wetland scientific field, and this is read to include citizen scientists.

Citizen science (CS) has accelerated efforts to promote environmental management more broadly. Evidence has been advanced to support the findings of hydrological science (Njue *et al*., 2019), biological invasions (Encarnação *et al*., 2021), water quality monitoring (Capdevila *et al*., 2020), the status and trends of waterfowl (Amano *et al*., 2018), and biodiversity management (Pescott *et al*., 2015), demonstrating the existing relevance and application of CS in the field of environmental management in general, which at the same time is related specifically to wetland management.

Seen from an overall perspective, we maintain that there is evidence of the application of CS in wetland management in BRICS countries: Brazil introduced the Pantanal Wetland initiative (Chiaravalloti *et al*., 2022); CS has been incorporated into the Wusuli River Basin, between Russia and China (Lu *et al*., 2019); in India, following training, the local community and school children began monitoring the water quality of Lake Pashan (Yardi *et al*., 2019); in China, a toolkit (encompassing the established life cycle of citizen science practice) was developed to enable biodiversity monitoring by ordinary citizens (Zhang *et al*., 2023); and in South Africa, CS has been incorporated through the Coordinated Waterbird Counts project (CWAC), the Southern Bird Atlas project (SANBI.org), and the Wetland Assessment Tool (Water Wheel, 2018). This evidence of the application of CS in BRICS countries in order to improve the protection and conservation of wetland habitats evidences the window of opportunity for promoting the multilateral environmental agreement (MEA) as part of Agenda 2030, through compliance with the enabling provisions of the Ramsar Convention (as discussed in detail, in subsection 3.2, below); however, the aim of this article is to demonstrate the achievement and inclusion of the above through the lens of the Ramsar Convention, through its *interpretation*.

The 1969 Vienna Convention on the Law of Treaties (VC) (United Nations, 2005) regulates the interpretation of treaties. Section 3, Articles 31-33, deals specifically with the *«Interpretation of Treaties»*. Of the BRICS nations, South Africa and India are not signatories to the VC (treaties.un.org/doc/Publication); however, the terms of the VC have been crystallized into customary international law (treaties.un.org/doc/Publication), making them binding. Article 31 is titled, *«General Rule of Interpretation», Article 32 is titled, «Supplementary Means of Interpretation», and Article 33 is titled, «Interpretation of treaties authenticated in two or more languages»*. This article focuses only on certain provisions of Article 31, which provides unequivocally that:

> 1. A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given
> to the terms of the treaty in their context and in the light of its object and purpose.
> 2. The context for the purpose of the interpretation of a treaty shall comprise, in addition to the
> text, including its preamble and annexes:
> (a) any agreement relating to the treaty which was made between all the parties in connection with
> the conclusion of the treaty;
> (b) any instrument which was made by one or more parties in connection with the conclusion of the
> treaty and accepted by the other parties as an instrument related to the treaty.
> 3. There shall be taken into account, together with the context:
> (a) any subsequent agreement between the parties regarding the interpretation of the treaty or the
> application of its provisions;
> (b) any subsequent practice in the application of the treaty which establishes the agreement of the
> parties regarding its interpretation;
> (c) any relevant rules of international law applicable in the relations between the parties.
> 4. A special meaning shall be given to a term if it is established that the parties so intended.

Article 31 of the VC has been instrumental in guiding and resolving legal (environmental) disputes. In the case of *The 2002 Cartagena Protocol on Biosafety (Opinion 2/00)*, the European Court of Justice, after applying Article 31, issued their opinion in favor of the Cartagena Protocol on Biosafety, pursuant to the 1992 Convention on Biological Diversity (Paragraph 26). In the case of *Haida Salmon Restoration Corporation versus Environment Canada 2014 BCSC*, the applicant corporation sought to have a search warrant set aside which was based

 DOI: 10.21142/SS-0501-2024-e095

on the belief that they had dumped iron products into the ocean environment. Among other arguments, the applicant corporation contended that certain provisions of the 1999 Canadian Environmental Protection Act, ostensibly intended to protect the environment, are vague and, therefore, void (Paragraph 52). However, the presiding officer submitted that consideration must be given to the London Convention, the London Protocol, as well as the two Resolutions of 2008 and 2010, which, in essence, prohibit dumping in the ocean (Paragraphs 5 and 52). Articles 31(2) and 31(3)(a) of the VC were cited in the rationale for the conclusion, which rejected the applicant organization's plea. In the dispute *Argentina versus Uruguay 2010 («Pulp Mills on the River Uruguay»)*, the International Court of Justice (2010) applied Article 31(3)(c) of the VC, which led it to consider internationally accepted principles of international law outside the scope of the 1975 Statute of the River Uruguay. Stephen *et al*. (2019) refer to Article 31(3)(c) as a «harmonized interpretation of systemic interpretation». Clearly, Article 31 of the VC is a powerful tool, providing a broader, holistic approach to interpretation, as illustrated above, in favor of environmental protection and conservation.

However, our aim here is to demonstrate the legal validity of CS rather than its moral validity, and therefore we will focus on ascertaining the framing within which CS occurs.

2. Material and methods

2.1. Material and data collection

In order to adequately address the issue, the material must be relevant and the sources of acquisition must be reliable. Thus, the conventions were accessed via the home websites of the respective secretariats. The case law underpinning Article 31 of the VC was accessed by searching for «Article 31 of VC» on Westlaw and Wiley Online. For a further analysis beyond case law, two textbooks on International Law were used as referencing sources.

The data was collected online through Google Scholar and an A-Z UWC database search using the search terms «citizen science definition», «citizen science and wetlands», and «citizen science and wetlands Brazil/Russia/India/China/South Africa», and in most cases the search term «the year 2019 onwards» was selected.

2.2 Methods

This secondary data was analyzed using different techniques, including doctrinal legal analysis, documentary analysis and content analysis. The doctrinal legal analysis laid the foundation for this study, but where articles related to legislative underpinning were used, content analysis was applied in their interpretation. To advance arguments supporting global and BRICS practices, policy and so forth, related to CS, several documents were analyzed in order to form this basis.

3. Results and discussions

3.1. Definition of Citizen Science

There is no universally accepted definition for CS, which in essence exists as a set of ideals. Irwin (1995) submits that CS «conveys both senses of the relationship between science and citizens», a «science for the people, by the people». Bonney (1996) submits that it is a «scientific project in which amateurs provide observational data for scientists and acquire new scientific skills in return». Strasser *et al*. (2018, citing Socientize (2013), maintain that the latter defined CS in a manner that suggests its purpose is to educate people. McKinley *et al*. (2017) submit that CS «is the practice of engaging the public in a scientific project —a project that produces reliable data and information usable by scientists, decision-makers, or the public, that is open to the same system of peer review that applies to conventional science». For their part, Walker *et al*. (2020) offer the following definition: «scientific activities in which the general public participate to some degree in data collection, analysis, and dissemination». The overall takeaway is that, collectively, CS is a blanket term for the efforts made by citizens, applying themselves to the goal of advancing science, by providing information for consideration. However, «citizens» in «science» should not be read so narrowly as to exclude the idea that qualified scientists may have contributed to the information gathered, as well as persons from scientific fields other than the field in question.

3.2. Application to the Ramsar Convention of Article 31 of the Vienna Convention

3.2.1. Citizen Science in wetland environment management: Global and BRICS perspectives

The incorporation of CS into the field of environmental management provides insights into mechanisms for inclusion in policy and practice. In this section, we focus specifically on CS from a global perspective. An overview of efforts by BRICS countries in wetland management which translates to their protection, wise use and restoration, has already been provided above. Here, we address Article 31(3)(b) of the VC as the policy recommendation flowing from practice, and the demonstration of practice as a standalone provides insights into Article 31(3)(b) of the VC; however, contracting parties are not performing these practices and recommending policies for protecting, conserving and restoring wetlands, which is the Ramsar Convention's aim.

In terms of global CS-wetland management, recommendations are provided for incorporating CS efforts into biodiversity policy (Lee *et al*., 2021; Masto *et al*., 2022) and national wetland strategies (Flower *et al*., 2019; Martinou *et al*., 2020). Poisson *et al*. (2019) reveal the

valuable contribution of CS in data collection for broad-scale ecological databases and how this can support policy. Rather than merely recommending policy, Wijewardhana *et al*. (2022) argue for the vital role of CS in conservation, by linking this argument to the fact that «updated, reliable and comparable biodiversity data is necessary to implement international conservation policy». The argument advanced here is that countries which aim to promote wetland protection and conservation, and which are party to the Ramsar Convention and the 1992 Convention on Biological Diversity (the international legal instrument for conservation policy), must incorporate CS into their approaches, particularly where the practice contributes to the protection, wise use and restoration of wetlands.

From a practical perspective, there is further evidence for CS inclusion in wetland management programs. In a mixed case study by Chiaravalloti *et al*. (2022), local people in Kenya gathered data with their phones using Sapelli Collector for increasing the number of medicinal plants in the buffer zone of the Serengeti-Mara savannah ecosystem. Nasruddin *et al*. (2020) have, through a quantitative method of primary and secondary data, gone a step further by demonstrating the role of the community in Bangladesh in contributing to addressing the present and future climate change issue through wetland management. Martinou *et al*. (2020), while focusing on health and well-being as well as the maintenance of wetland conservation goals, designed a strategy, in line with existing environmental legislation, for managing mosquitos in European wetlands. Part of their recommended guidelines for practice was the inclusion of a CS approach to collecting georeferenced data (Martinou *et al*., 2020). In Mexico City, a local non-government organization monitors the water quality in the Xochimilco peri-urban wetland, which is faced with accelerated urbanization (Pérez-Belmont *et al*., 2019), in an initiative that feeds into the aspirational aims of the Wetland City Accreditation (Resolution XII.10, XIV.10). CS practice, therefore, contributes to the addressing of current issues, and existing laws can be used to pave the way for creating such initiatives; also, with an eye on future management, where the law is amended, new legal frameworks must not lose sight of the potential of CS, and where CS recommends ideas for the future, these ought to be incorporated.

3.2.2. Global and BRICS perspectives: Article 31.1 of the VC and the Ramsar Convention

Global wetland loss is an international issue, and in 2018 the then Secretary General of the Ramsar Convention highlighted the rate of loss (Ramsar Convention on Wetlands, 2018). In the face of climate change, and given the role of wetlands in climate mitigation and adaptation, this rapid loss serves to aggravate the disaster. In this context, greater insight is required into the potential contributions of CS inclusiveness, in order to demonstrate the deeper meaning of the Ramsar Convention through interpretation, employing the provisions of Article 31 of the VC.

The obligations of contracting parties under the terms of the Ramsar Convention are not merely moral, but also legal. The purpose of the Ramsar Convention is to «stem the progressive encroachment on and loss of wetlands now and in the future». Having said this, no Article in the Ramsar Convention creates the impression that obligations, whether by positive or negative action, can cause the loss or destruction of this resource, and this position dovetails with the meaning of Article 31(1) of the VC, whereby interpretations favoring CS speak to the core of the Ramsar Convention's overarching purpose. Thus, it falls to the contracting parties to discharge their duty by implementing the provisions of the Ramsar Convention for the protection and conservation of wetlands.

In order to implement the provisions of the Ramsar Convention, contracting parties are required to incorporate those measures into their national laws (Ramsar Secretariat, 2010 and 2021). This requires that legal systems design strategies and adapt their laws and policies with a view to promoting the goals of the Ramsar Convention (Ramsar Secretariat, 2010), and such implementation would also bolster the «practice element» advocated in Article 31(2)(b).

The BRICS countries are all signatories to the Ramsar Convention. Brazil entered into the agreement on September 24 1993 and boasts 27 sites designated as Wetlands of International Importance, with a surface area of 26,744,455 hectares (Ramsar.org). Russia joined on February 11 1977 and boasts 35 sites containing Wetlands of International Importance, with a surface area of 10,323,767 hectares (Ramsar.org). India, which became a contracting party on February 1 1982, has 75 sites with Wetlands of International Importance, with a surface area of 1,326,677 hectares (Ramsar.org). China, which joined on July 31 1992, has 82 Wetlands of International Importance, with a surface area of 7,647,895 hectares (Ramsar.org). Finally, South Africa, which joined on December 21 1975, boasts 29 sites with Wetlands of International Importance, with a surface area of 572,762 hectares (Ramsar.org). Therefore, total wetland surface area in the BRICS countries is 46,615,556 hectares, and the obligation calling for the wise use of wetlands contained in Article 3.1 of the Ramsar Convention applies to them all. Nevertheless, this duty appears to have remained dormant, and not only in individual government departments but across all parties, with scant attention paid to the potential offered by CS in the collecting, analyzing or disseminating of data. At the same time, smaller wetlands are not included in the aforementioned hectare counts, and given their contribution to Sustainable Development Goals (SDGs), smaller wetland area conservation and management

 DOI: 10.21142/SS-0501-2024-e095

actions require specific attention, as posited by the Ramsar Secretariat (Resolution, XIII.21).

There is no evidence of reservations raised by BRICS countries regarding any of the Articles, and therefore all 12 Articles are equally applicable (Ramsar.org). Article 3.1 of the Ramsar Convention requires the wise use of all wetlands under a state's jurisdiction. McInnes *et al*. (2020) described how different local community observation measures may contribute to the wise use of wetlands. Contributions in knowledge and research must be shared *inter-partes*, as set out in Article 4.3 of the Ramsar Convention, which states unequivocally that «Contracting Parties shall encourage research and the exchange of data and publications regarding wetlands and their flora and fauna». Thus, as parties to the Ramsar Convention, BRICS countries have an obligation to utilize and share their research and the lessons learned, in order to address and resolve issues of common interest in the context of wetland management and conservation, including those advances achieved through CS, as demonstrated by the successes of CS outlined above.

We argue that the Ramsar Convention allows for the potential for achievements through CS. Article 4.4 provides that «the Contracting Parties shall endeavor through management to increase waterfowl populations on appropriate wetlands». CS can directly or indirectly contribute to this goal through processes or activities that support the protecting and conserving of wetland habitats (including the habitats of waterfowl). While «management» is not clearly defined, it should not be labeled to mean only work done by qualified professionals or governmental departments, which is limited when compared to the potential of more «participatory», «integrated» and «adaptive» management.

In addition to the potential for achievements through CS, the authors believe that Article 4.5 of the Ramsar Convention creates an obligation that can only be truly achieved through CS; in other words, without CS, the provisions of Article 4.5 cannot be achieved. Article 4.5 itself supports this view, in that it obligates Contracting Parties to train personnel competent in the fields of wetland research, management and custodianship. Regarding the Walker *et al*. (2020) definition of CS, which includes the collecting, analyzing and disseminating of data by the general public on the one hand, and the achieving of the Ramsar Convention's goals through CS and wetland management as set out here in Paragraph 3.1, on the other, it is clear that in addition to citizens contributing to research, management and the custodianship of wetlands, they must also be trained –or better yet, upskilled- through education.

3.2.3 BRICS countries and wetland management: Article 31(2)(a) of the VC and SDGs (Agenda, 2030), Biodiversity Convention (Kunming-Montreal, 2030), and UNFCCC (Glasgow Climate Pact, 2021)

The Contracting Parties to the Ramsar Convention and other ancillary international instruments are obligated to implement the Articles contained therein. At the same time, related treaties between state parties aid in the contextual interpretation of one agreement, where another agreement may be unclear (Strydom *et al*., 2011), as embraced by Article 31(2)(a) of the VC. Therefore, consideration of «any agreement» through the SDGs, CBD's Kunming-Montreal Goals 2030 (Kunming-Montreal Goals, 2020), and UNFCCC's Glasgow Climate Pact 2021 (Glasgow Climate Pact, 2022), provide a basis, according to the terms of Article 31(2)(b). The BRICS countries are contracting parties to the CBD and UNFCCC.

It must be noted here that the SDGs are not a formal agreement with which states must comply, while the Ramsar Convention is binding. The Fourth Ramsar Strategic Plan 2016-2024 (the Plan) serves as a guide for implementing the enabling provisions of the Ramsar Convention (Ramsar Convention Secretariat, 2016), and it contains four strategic goals and 19 targets. However, research published by the Ramsar Secretariat reveals the synergies between the Plan and the SDGs. While these synergies between the Ramsar Convention and the SDGs are apparent, it is still necessary to determine the compliance of CS with the SDGs, and the latter's contribution.

Regarding where CS and SDGs interact, specifically where there is an overlap with SDGs and wetland management goals and targets, Skarlatidou *et al*. (2021), while focusing on extreme citizen science, submit that CS already contributes to 33% of SDG indicators. Furthermore, without specifying the targets, they posit that the greatest contribution is to environmental SDG indicators (SDG 15, 11, 3 and 6) (Skarlatidou *et al*., 2021). However, CS is not only about observing or monitoring SDGs, but also about the direct achievement of those goals (Parkinson *et al*., 2022), and specific reference is made to SDG 6 through the FreshWater Watch and indicators 6.3.2 and 6.b. Fraisl *et al*. (2022) show how the global Picture Pile CS tool contributes to goals and indicators 1 (1.1.1, 1.2.1, 1.5.1, 1.5.2), 2 (2.4.1), 11 (11.1.1), 13 (13.1.1), 14 (14.1.1b), and 15 (15.1.1, 15.2, 15.2.1, 15.4.2), but more importantly, how, through modification of the tool, it can contribute to SDGs related to ecosystem health. There are synergies between CS, SDG goals and indicators and wetland management. At the same time, any absence of synchronisms should not be taken as an undermining of this article's premise, but rather as an indicator of the need for the conducting of further research. While states are sovereign and empowered to implement measures as they deem fit, in many cases MEAs attempt to get states on the same page.

The evidence available strengthens the case for the inclusion of CS through the Kunming-Montreal Global Biodiversity Framework's Global targets for 2030. This set of goals flows from parties to the CBD –to which all BRICS members are a party (cbd.int/information/parties.shtml). The various roles of local communities (through CS) are expressed under the slogan *«Reducing the threats to biodiversity»*, with the goal of working in cooperation with governments (Target 19f practices and technologies, Target 21), as well as taking part in decision-making and sharing in access to information (Target 22). The multiplicity of functions of CS in this framework expresses its power to deal with biodiversity threats if accepted internationally as a practice.

The authors maintain that local communities have a role in cutting global warming by 1.5 degrees. Provision is made for cooperative action by local communities and civil society in the preamble, the role of local communities in addressing climate change issues (Goal 62), and the exchange of knowledge (Goal 93). In Section 3.1, we have already touched upon the role of wetlands in climate change mitigation and adaptation, and the role and functions of local communities under the Kunming-Montreal Global Biodiversity Framework and Glasgow Climate Pact 2021 are similar, and a clear demonstration of the interrelatedness of the subject matter (wetlands).

Together, the SDG, Kunming-Montreal 2030 and Glasgow Climate Pact 2021 form a solid basis for reliance on an interpretation in favor of CS through the lens of Article 31(2)(a), and intersect on many points.

3.2.4. Article 31(2)(c) of the VC and Citizen Science for wetland management

The principles or rules of international law play a role in giving meaning to an interpretation that favors CS. This is confirmed in Article 31(2)(c) and the Argentina v Uruguay 2010 («Pulp Mills on the River Uruguay») (International Court of Justice, 2010) case mentioned above. In this section, we focus on two theories or international rules underpinning CS with regard to wetland management: integrated water resources management and wise use. They are intentionally separated from the topics addressed above (Ramsar and other instruments), for the purposes of discussion as a rule under Article 31(2)(c).

Integrated water resources management (IWRM) can offer unique insights for the use of CS in managing water resources, from legal frameworks to practice. The Global Water Partnership defines IWRM as «a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare [...]». This is supported by the 1992 Dublin Principles (Global Water Partnership.org). Principle 2 states that: «Water development and management should be based on a participatory approach, involving users, planners and policymakers, at all levels». In Nepal, an action item speaks to promoting citizen science in hydro-meteorological monitoring (Water and Energy Secretariat, Nepal, 2022). Thornhill *et al*. (2019) used FreshWater Watch (CS program) data to monitor water quality across Shanghai, Hong Kong and Guangzhou. And so we see that, through the lens of Article 31(2)(c), there is scope for demonstrating the rules/principles and how they can be applied in practice as comparatives, and that the reading of «all levels» is a demonstration of not limiting who may be included. In 2018, Everard (2018) maintained that IWRM is embedded in the theory of wise use.

The notion of wise use is contained in Article 3.1 of the Ramsar Convention, and is defined as «maintenance of the ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development». This obligation has a direct bearing on wetlands. McInnes *et al*. (2020) submit that there is an integral link between wise use and CS, and efforts have been made to develop wetland tools that local people in South Africa can utilize to better understand wetlands management (Dumakude and Graham, 2017). These efforts have the potential to bolster and maintain the ecological integrity of wetlands.

The IWRM and wise use are not meant to be perceived as a closed list of international rules; other accepted principles such as transboundary water cooperation (specifically between China and India, and Russia and China) can also find an application.

3.3 Summary

Correlations are often made between CS programs and the need for policies, but also the need for policies to cater for CS programs. Policies that provide wetland management programs ought to incorporate these, to the degree that they are recommended by the legal system and through other administrative measures.

Regarding the application of Article 31(3)(b) of the VC to CS-wetland management, the latter breathes life into the former by way of practice of policy and practice by practice. States within and outside the BRICS intergovernmental organization are not merely performing these functions out of morality or clout, but rather with the principal goal of protecting, conserving, and, where applicable, restoring and rehabilitating wetlands. This is further supported by –in some cases- the adoption of efforts into national strategies. In general, the aims of the practice of policy/strategies and practice by practice align with the goals of the Ramsar Convention, and this is precisely what an interpretation in terms of Article 31(3)(b) of the VC seeks to achieve. The Ramsar Convention is a MEA, too (Dugard, 2011), but new MEAs, such as the one envisaged for the BRICS countries, may act as a catalyst for older ones, by providing clarity and being more specific, while including substantive and operational requirements and guidelines for CS.

 DOI: 10.21142/SS-0501-2024-e095

The BRICS countries have entered into other related agreements that dovetail with the Ramsar Convention post-1971. The SDGs (non-binding soft law tool), Kunming-Montreal Goals, and Glasgow Climate Pact 2021 are linked to conventions other than the Ramsar Convention, while also, at the same time, lending their weight to the objectives of the Ramsar Convention. However, the authors submit here that Article 31(1) and Article 31(2)(a) cannot be separated by «related agreements», because they speak directly to the «object and purpose» of the Ramsar Convention. Thus, what we are left with is a double interpretative reading in favor of CS.

Rules of international law that are found in the Ramsar Convention, for example, the wise use in Article 3.1, have roots in other, later theories of law, such as IWRM (Everard, 2018), but also in Dublin Principle 2. Both these provisions relay into practice, which includes CS. One could make the claim that without CS, they cannot exist.

4. Conclusion

There is ample evidence to show that the Ramsar Convention, when interpreted through Article 31 of the VC, makes adequate provision for CS. CS is critical in implementing measures to protect, restore and conserve wetlands. CS on the level discussed here is elevated to co-citizen science, which is CS shared among the BRICS countries –where states are separated geographically but drawn together through shared CS. CS on the agenda ensures that there is attention focused on it, rather than it simply remaining in the background. Each party is obliged to share research and data under the provisions of the Ramsar Convention anyway, and by placing CS on their MEA Agenda, their experiences can be shared and aid the BRICS countries in achieving the Agenda. Thus, the results of co-citizen science implemented by BRICS countries translate into a realization of their social, economic and environmental goals. CS should not be limited only to issues associated with wetlands, but be incorporated also into other environmental aspirations.

A recommendation might read as follows: Co-citizen science for BRICS countries: *In realizing the aspirations to achieve social, economic and environmental prosperity, the parties shall endeavor to implement CS as far as is reasonably possible and practically sound under their respective legislation, regulations, policies and strategies. Furthermore, they shall share their data and progress, and demonstrate how similar tools may be developed*. To this end, further research will be required in order to ascertain the status of the BRICS (plus) countries' respective national legislations, policies and strategies regarding CS and wetlands (or in general), and to establish the legal basis in each country.

Acknowledgements

We wish to extend our heartfelt gratitude to the CPUT Research Development Unit, for the invaluable opportunity and generous space provided in order to conduct and complete this research. Your support has been instrumental in the success of this endeavor.

Funding

No funding was acquired for the conducting of this research.

Conflict of interest

The authors have no conflicts of interest to declare.

Bibliographical references

Amano, T., Székely, T., Sandel, B., Nagy, S., Mundkur, T., Langendoen, T., Blanco, D., Vesk, P. A. and Sutherland, W. J. (2018). «Successful conservation of global waterbird populations depends on effective governance». *Nature*, 553(7687), pp. 199-202. Available at: https://doi.org/10.1038/nature25139

Bonney, R. (1996). «Citizen science: A lab tradition». *Living Bird*, 15(4), pp. 7-15.

Capdevila, A. S. L., Kokimova, A., Sinha Ray, S., Avellán, T., Kim, J. and Kirschke, S. (2020). «Success factors for citizen science projects in water quality monitoring». *Science of the Total Environment*, 728, 137843.

Chiaravalloti, R. M., Skarlatidou, A., Hoyte, S. and Moreu Badia, M. (2022). «Extreme citizen science: Lessons learned from initiatives around the globe». *Conservation Science and Practice*, 4(2), e577. Available at: https://10.1111/csp2.577

CITES. (1963). Convention on the International Trade in Endangered Species of Wild Fauna and Flora. Available at: https://cites.org/eng/disc/text.php

CMS Secretariat. (2020). *1979 Conservation of Migratory Species of Wild Animals*, United Nations Environment Programme. Available at: https://www.cms.int/

Dugard, J. (2011). *International Law: A South African Perspective*. (4th ed.). Cape Town: Juta.

Dumakude, N. and Graham, M. (2017). «Assessing wetland health using a newly developed land cover Citizen Science tool for use by local people who are not wetland specialists». *Southern African Journal of Environmental Education*, 33, pp. 71-83. Available at: https://10.4314/sajee.v.33i1.6

Encarnação, J., Teodósio, M. A. and Morais, P. (2021). «Citizen Science and biological invasions: A review». *Frontiers in Environmental Science*, 8, pp. 1-13. Available at: https://10.3389/fenvs.2020.602980

Everard, M. (2018). «Management of provisioning services: Overview». In C. Finlayson, M. Everard, K. Irvine, R. McInnes, B. Middleton, A. Van Dam and N. Davidson (eds.), *The Wetland Book, Vol. I: Structure and function, management and methods*. Netherlands: Springer. Available at: https://10.1007/978-90-481-9659-3_193

Flower, B., Amerasinghe, P. and Miranda, R. (2019). *Governing urban wetlands for green growth in the Western Region Megapolis of Sri Lanka*. Discussion Brief Paper. International Water Management Institute.

Fraisl, D., See, L., Sturn, T., MacFeely, S., Bowser, A., Campbell, J., Moorthy, I., Danylo, O., McCallum, I. and Fritz, S. (2022). «Demonstrating the potential of Picture Pile as a Citizen Science tool for SDG monitoring». *Environmental Science and Policy*, 128, pp. 81-93.

Haida Salmon Restoration Corporation versus Environment Canada. (2014). BCSC.

Hecker, S., Wicke, N., Haklay, M. and Bonn, A. (2019). «How does policy conceptualise citizen science? A qualitative content analysis of international policy documents». *Citizen Science: Theory and Practice*, 4(1), Art 32. Available at: https://10.5334/cstp.230

In The Cartagena Protocol on Biosafety. (2002). Opinion 2/00.

International Court of Justice. (2010). *Pulp Mills on the River Uruguay (Argentina v Uruguay): Summary of the Judgement of April 20 2010*. Unofficial Press Release. Available at: https://www.icj-cij.org/sites/default/files/case-related/135/15895.pdf

Irwin, A. (1995). *Citizen science. A study of people, expertise and sustainable development*. London: Routledge.

Lee, T. S., Kahal, N. L., Kinas, H. L., Randall, L. A., Baker, T. M., Carney, V. A., Kendell, K., Sanderson, K. and Duke, D. (2021). «Advancing amphibian conservation through Citizen Science in urban municipalities». *Diversity*, 13(5), p. 211. Available at: https://10.3390/d13050211.

Lu, C., Ren, C., Wang, Z., Zhang, B., Man, W., Yu, H., Gao, Y. and Liu, M. (2019). «Monitoring and assessment of wetland loss and fragmentation in the cross-boundary protected area: A case study of Wusuli River basin». *Remote Sensing*, 11(21), p. 2581. Available at: https://10.3390/rs11212581

Martinou, A. F., Schäfer, S. M., Mari, R. B., Angelidou, I., Erguler, K., Fawcett, J., Ferraguti, M., Foussadier, R., Gkotsi, T. V., Martinos, C. F., Schäfer, M., Schaffner, F., Peyton, J. M., Purse, B. V., Wright, D. J. and Roy, H. E. (2020). «A call to arms: Setting the framework for a code of practice for mosquito management in European wetlands». *Journal of Applied Ecology*, 57(6), pp. 1012-1019. Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.13631

Masto, N. M., Robinson, O. J., Brasher, M. G., Keever, A. C., Blake-Bradshaw, A. G., Highway, C. J., Feddersen, J. C., Hagy, H. M., Osborne, D. C., Combs, D. L. and Cohen, B. S. (2022). «Citizen science reveals waterfowl responses to extreme winter weather». *Global Change Biology*, 28, pp. 5469-5479. Available at: https://10.1111/gcb.16288

McGreavy, B., Calhoun, A. J. K., Jansujwicz, J. and Levesque, V. (2016). «Citizen science and natural resource governance: Program design for vernal pool policy innovation». *Ecology and Society*, 21(2), 48. Available at: https://www.jstor.org/stable/26270395

McInnes, R. J., Davidson, N. C., Rostron, C.P ., Simpson, M. and Finlayson, C. M. (2020). «A citizen science state of the world's wetlands survey». *Wetlands*, 40, pp. 1577-1593.

McKinley, D. C., Miller-Rushing, A. J., Ballard, H. L., Bonney, R., Brown, H., Cook-Patton, S. C., Evans, D. M., French, R. A., Parrish, J. K., Phillips, T. B., Ryan, S. F., Shanley, L. A., Shirk, J. L., Stepenuck, K. F., Weltzin, J. F., Wiggins, A., Boyle, O. D., Briggs, R. D., Chapin III, S. F., Hewitt, D. A., Preuss, P. W. and Soukup, M. A. (2017). «Citizen science can improve conservation science, natural resource management, and environmental protection». *Biological Conservation*, 208, pp. 15-28.

Nasruddin, Kumalawati, R., Syaharuddin, A., Yuliarti, A. and Rajiani, I. (2020). «Community participation in the Village Climate Program to anticipate future climate change in wetlands». *IOP Conference Series Earth and Environmental Science*, 499(1), 012024. Available at: https://iopscience.iop.org/article/10.1088/1755-1315/499/1/012024

Njue, N., Stenfert Kroese, J., Gräf, J., Jacobs, S. R., Weeser, B., Breuer, L. and Rufino, M. C. (2019). «Citizen science in hydrological monitoring and ecosystem services management: State of the art and future prospects». *Science of the Total Environment*, 693, 133531.

Parkinson, S., Woods, S. M., Sprinks, J. and Ceccaroni, L. (2022). «A practical approach to assessing the impact of citizen science towards the sustainable development goals». *Sustainability*, 14(8), 4676. Available at: https://www.mdpi.com/2071-1050/14/8/4676

Pérez-Belmont, P., Alvarado, J., Vázquez-Salvador, N., Rodríguez, E., Valiente, E. and Díaz, J. (2019). «Water quality monitoring in the Xochimilco peri-urban wetland: Experiences engaging in citizen science». *Freshwater Science*, 38(2), pp. 342-351. Available at: https://www.journals.uchicago.edu/doi/abs/10.1086/703395?journalCode=fws

Pescott, O. L., Walker, K. J., Pocock, M. J. O., Jitlal, M., Outhwaite, C. L., Cheffings, C. M., Harris, F. and Roy, D. B. (2015). «Ecological monitoring with citizen science: The design and implementation of schemes for recording plants in Britain and Ireland». *Biological Journal of the Linnean Society*, 115(3), pp. 505-521. Available at: https://academic.oup.com/biolinnean/article/115/3/505/2440547

Poisson, A. C., McCullough, I. M., Cheruvelil, K. S., Elliott, K. C., Latimore, J. A. and Soranno, P. A. (2019). «Quantifying the contribution of citizen science to broad-scale ecological databases». *Frontiers in Ecology and the Environment, Research Communications*, 18(1), pp 19-26. Available at: https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/fee.2128

Ramsar Convention on Wetlands. (2018). *Global wetland outlook: State of the world's wetlands and their services to people*. Gland: Ramsar Convention Secretariat.

Ramsar Convention on Wetlands. (2021). *Global wetland outlook: Special edition 2021*. Gland: Secretariat of the Convention on Wetlands.

Ramsar Convention Secretariat. (2010). *National Wetland Policies: Developing and implementing National Wetland Policies*. Ramsar handbooks for the wise use of wetland. Vol. 2. (4th ed.). Gland: Ramsar Convention Secretariat.

Ramsar Convention Secretariat. (2010). *Wise use of wetlands: Concepts and approaches for the wise use of wetlands*. Ramsar handbooks for the wise use of wetlands. Vol. 1. (4th ed.). Gland: Ramsar Convention Secretariat.

Ramsar Convention Secretariat. (2016). *The Fourth Ramsar Strategic Plan 2016-2024*. Ramsar handbooks for the wise use of wetlands. Vol. 2. (5th ed.). Gland: Ramsar Convention Secretariat.

Resolution XIII.21. Conservation and management of small wetlands.

Skarlatidou, A., Fraisl, D., Wu, Y., See, L. and Haklay, M. (2022). «Correction to: Extreme citizen science contributions to the sustainable development goals: Challenges and opportunities for a human-centered design approach». In: C. Ardito *et al.*, *Sense, feel, design* (pp. 20-35). INTERACT 2021. Lecture Notes in Computer Science, Vol. 13198. Cham: Springer. Available at: https://dl.acm.org/doi/abs/10.1007/978-3-030-98388-8_46

Socientize. (2013). *Green Paper on Citizen Science*. Available at: http://www.sciencedirect.com/science/article/pii/S0301421500001427

Strasser, B. J., Baudry, J., Mahr, D. and Tancoigne, E. (2018). «"Citizen Science"? Rethinking science and public participation». *Science and Technology Studies*, 32(2), pp. 52-76. Available at: https://infoscience.epfl.ch/record/271012

Strydom, H. (2016). *International Law Cape Town*. Cape Town: Oxford University Press.

The Water Wheel. (2018). *Protecting our Vulnerable Wetlands*. Volume 17(1).

Thornhill, I., Loiselle, S., Clymans, W. and Van Noordwijk, C. G. E. (2019). «How citizen scientists can enrich freshwater science as contributors, collaborators, and co-creators». *Freshwater Science*, 38(2), pp. 231-235. Available at: https://www.journals.uchicago.edu/doi/abs/10.1086/703378

United Nations. (1992a). *1992 Convention on Biological Diversity*. United Nations Environment Programme. Available at: https://www.cbd.int/convention/

United Nations. (1992b). *1992 United Nations Framework Convention on Climate Change*. Available at: https://unfccc.int/resource/docs/convkp/conveng.pdf

United Nations. (2005). 1969 Vienna Convention on the Law of Treaties. Available at: https://legal.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf

United Nations. (2022). Available at: https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf

United Nations. (2022). Available at: https://www.cbd.int/doc/c/e6d3/cd1d/daf663719a03902a9b116c34/cop-15-l-25-en.pdf

Walker, D. W., Smigaj, M and Tani, M. (2020). «The benefits and negative impacts of citizen science applications to water as experienced by participants and communities». *WIREs Water*, 8(1), e1488. Available at: https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wat2.1488

Water and Energy Commission Secretariat, Government of Nepal. (September 4, 2022). «Inquiry and Request for Information». Letter. Singha Durbar, Kathmandu, Nepal.

Wetland City Accreditation (Resolution XII.10, XIV.10). Available at: https://www.ramsar.org/sites/default/files/documents/library/xiv.10_wetland_city_accreditation_e.pdf

Wijewardhana, U. A., Apputhurai, P., Jayawardana, M. and Meyer, D. (2022). «Effectiveness of the conservation areas on the Mornington Peninsula for the common resident shorebird species using citizen science data». *PLoS ONE*, 17(5), e0267203. Available at: https://pubmed.ncbi.nlm.nih.gov/35507597/

Yardi, K., Bharucha, E. and Girade, S. (2019). «Post-restoration monitoring of water quality and avifaunal diversity of Pashan Lake, Pune, India using a citizen science approach». *Freshwater Science*, 38(2). Available at: https://www.semanticscholar.org/paper/Post-restoration-monitoring-of-water-quality-and-of-Yardi-Bharucha/465dc0547769b23e4033442cd1c3efffe49cbeb3

Zafeiriou, E., Andrea, V., Tampakis, S. and Karanikola, P. (2020). «Wetlands management in Northern Greece: An empirical survey». *Water*, 12(11).

Zhang, H., Yang, J., Zhang, L., Gu, X. and Zhang, X. (2023). «Citizen science meets eDNA: A new boom in research exploring urban wetland biodiversity». *Environmental Science and Ecotechnology*, 16. 100275. Available at: https://pubmed.ncbi.nlm.nih.gov/37213810/