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Implementing the debt-for-nature swaps for marine protected areas: case studies from Seychelles and Belize

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As a financing method providing financial support for environmental protection, debt-for-nature swaps (DFNS) have been implemented for nearly forty years. DFNS have covered marine protected areas (MPAs) in four countries since 2015. Although extensive literature discusses the various issues surrounding DFNS, only some researchers have connected the topics of DFNS and MPAs to evaluate the performance of implementing DFNS for financing MPAs. This paper contributes to filling this gap by analyzing the performance of the DFNS for financing MPAs from economic, legal, and environmental aspects by case studies from Seychelles and Belize. It aims to find an answer to the research question of whether the implementation of DFNS is a viable option for financing MPAs by exploring the current performance and discussing the future development of implementing the DFNS for MPAs. The DFNS has played a positive role in establishing MPAs in Seychelles and Belize by providing stable financial support for MPAs and improving the debt sustainability of debtor countries to some extent. However, there are various barriers from a legal perspective in reaching a swap agreement, ensuring the effective implementation of the agreement, and improving the transparency construction. With the trend of increasing scale and amount of debt relief and funding, the DFNS is expected to play an important role in promoting the establishment of MPAs, realizing the economic benefits, and having a satisfactory performance by legal measures. It concludes that with the transparency construction of information disclosure, special legislation on DFNS, an appropriate scale of debt for conversion determined by considering the debt sustainability, an adaptation to the innovation of the contractual approach of sovereign debt restructuring, and complementary assistance from different levels, the implementation of DFNS can be a viable option for financing MPAs.

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Introduction

The debt-for-nature swap (DFNS) is referred to as “the cancellation of part of the external debt of a country in exchange for the debtor government’s commitment to making payments in local currency to environmental projects in the country on terms agreed upon with creditors” (Burand, 1989; Post, 1990; Zimmerman, 1992; OECD, 2007). After realizing the tendency that the debt crisis and the problem of the environment are interlinked, Dr. Thomas E. Lovejoy, the then Vice-President of the World Wildlife Fund, proposed converting debt into support for conservation activities in 1984. The idea was designed to allow debtor countries to use the cancellation of external debt in exchange for local currency to finance conservation or environmental protection projects (OECD, 2007).

Since its inception, the DFNS has been implemented for environmental protection in developing countries, especially in tropical rainforest protection actions in South America and Southeast Asia (Shandra et al. 2011; Sommer et al. 2020; Essers et al. 2021). DFNS have covered marine protected areas (MPAs) since 2015. The MPA has been recognized as one of the most effective and important tools for conserving marine habitat and biodiversity and managing fisheries (Islam et al. 2017). MPAs will likely encounter the “paper parks” dilemma without adequate financial investment. Facing this situation, the DFNS is expected to assist countries lacking funds in establishing MPAs with its sustainable financial support. DFNS have been implemented for MPAs in Belize, Seychelles, Barbados, and Ecuador. Given over eight years of implementing DFNS for MPAs, evaluating the performance and analyzing further development is necessary. Thus, this paper raises the research question of whether implementing DFNS is a viable option for financing MPAs.

Extensive literature discusses the various issues surrounding DFNS and MPAs, respectively. In terms of the DFNS, financial structure (Burand, 1989; Post, 1990), categorization (Hansen, 1989), preconditions of the sign of the transaction agreement (Burand, 1989; Post, 1990), functions (Shandra et al. 2011; Essers et al. 2021) and effects (IMF, 2015) are widely discussed. In addition, most studies evaluate the performance of DFNS from an economic perspective by combining a specific environmental target with debt relief to determine the impacts of DFNS (Simmons et al. 2021; Nedopil et al. 2023). DFNS are generally considered to play a positive role in funding environmental projects. Besides, the functions (Islam et al. 2017) and funding sources for MPAs (De Santo, 2012) are also discussed. It is agreed that the establishment of MPAs requires a variety of financing measures. Despite the extensive literature, only some researchers have connected the two topics of DFNS and MPAs to evaluate the performance of implementing DFNS for financing MPAs.

Accordingly, there is a gap between the viability of DFNS for financing MPAs and the current literature. This paper contributes to filling this gap by analyzing the performance of the DFNS for financing MPAs from economic, legal, and environmental aspects by case studies from Seychelles and Belize. It aims to discover whether the implementation of DFNS is a viable option for financing MPAs by exploring the current performance and discussing the future development of implementing the DFNS for MPAs.

The rest of the paper is divided into four sections to answer the research question and achieve the research aim. Section 2 explores the practices of implementing the DFNS for MPAs in Seychelles and Belize, respectively. Section 3 evaluates the performance of implementing the DFNS for MPAs through analyzing economic factors, legal issues, and environmental protection. Section 4 discusses the further development of applying the DFNS for MPAs. The final section provides concluding remarks and future research directions.

Current practices of implementing the DFNS for MPAs in the Seychelles and Belize

The DFNS have been implemented to provide financial assistance in establishing MPAs in Belize, Seychelles, Barbados, and Ecuador. The DFNS implemented for MPAs in Seychelles and Belize are representative. Even though Seychelles and Belize are both island-developing countries with weak debt sustainability, and both apply the DFNS to provide financing assistance for MPAs, their practices have distinctive features.

Loan-type DFNS in Seychelles. The practice of DFNS in Seychelles is the first debt conversion case to help establish MPAs. The debts to be converted are all premised on the existing Paris Club restructuring arrangement. Based on the type of debt to be converted, this practice can be referred to as a loan-type DFNS. The practice of DFNS in the Seychelles is bound by the terms of the Paris Club’s preexisting agreement. Before implementing this type of DFNS, the debtor country needs to negotiate further with official creditors, and the amount of debt relief is generally lower than other debt restructuring options.

Early in 2011, NatureVest and the Government of Seychelles (GoS) began working together to design the transaction. A large part of Seychelles’ external public debt was to creditors subject to a Paris Club restructuring (Convergence, 2017). Therefore, some Paris Club creditors were identified as potentially willing sellers, and negotiations began to convert up to USD 80 million of Seychelles’ debt with an average tenor of eight years (Convergence, 2017). After a lengthy negotiation, a debt swap with Belgium, France, Italy, and the United Kingdom for USD 21.6 million was reached. This amount was discounted to USD 20.2 million at 93.5 cents per dollar (Convergence, 2017).

In the practice of Seychelles (see Fig. 1), the involved parties include Paris Club creditors, the GoS, The Nature Conservancy (TNC), grant providers, and the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT). The operating procedures are as follows: (1) TNC funds the SeyCCAT in Seychelles through its resources and additional grants raised from donors; (2) the SeyCCAT lends the funds to the GoS, which then proceeds with the Paris Club buyback; (3) the GoS agrees to repay the SeyCCAT at face value of the claims over an extended period, partly in local currency; (4) a marine conservation initiative is funded with these regular payments, with a fraction set aside to establish an endowment dedicated to funding the project permanently (IMF, 2015). The GoS stated some commitments, the most important one of which is that “Seychelles would increase MPAs in its territorial waters from 1% to 30%, which is scheduled to be completed by the end of 2020”, and that “half of these new MPAs would be designated as ‘no-take’ zone” (National Assembly of Seychelles, 2015). Until now, the goals promised by the GoS have been fully realized, and the SeyCCAT continues to provide a permanent funding stream for ongoing climate adaptation and marine conservation activities.

Mixed-type DFNS in 2021 in Belize. The practice in Belize is the first case of debt conversion refinancing based on credit enhancement and newly issued bonds. This practice may also be referred to as a mixed-type DFNS. Its novelty lies in the addition of political risk insurance and parametric catastrophe insurance, thus targeting the climate change sensitivity of island developing countries and stabilizing the funds for marine conservation. Moreover, due to the refinancing after the issuance of new bonds based on credit enhancement, the upper limit of this kind of debt relief is extremely high, which has a strong financing potential.

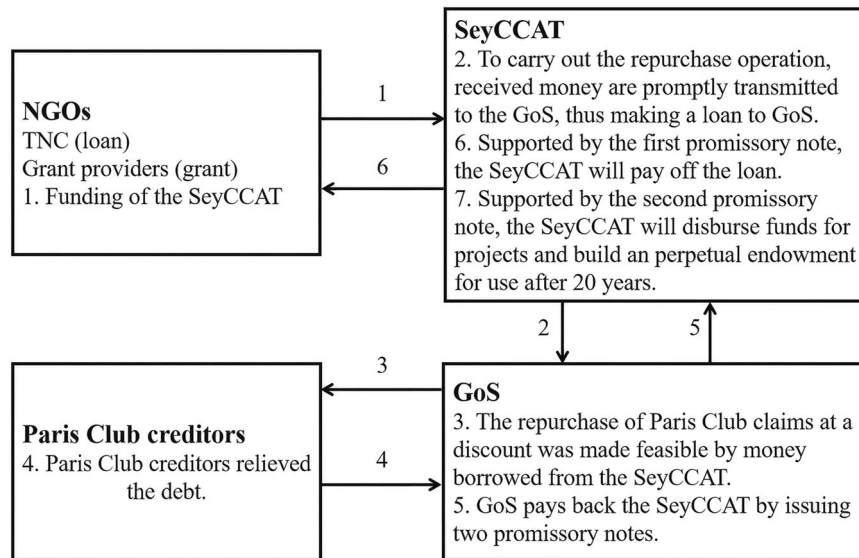


Fig. 1 Seychelles' DFNS mechanism.

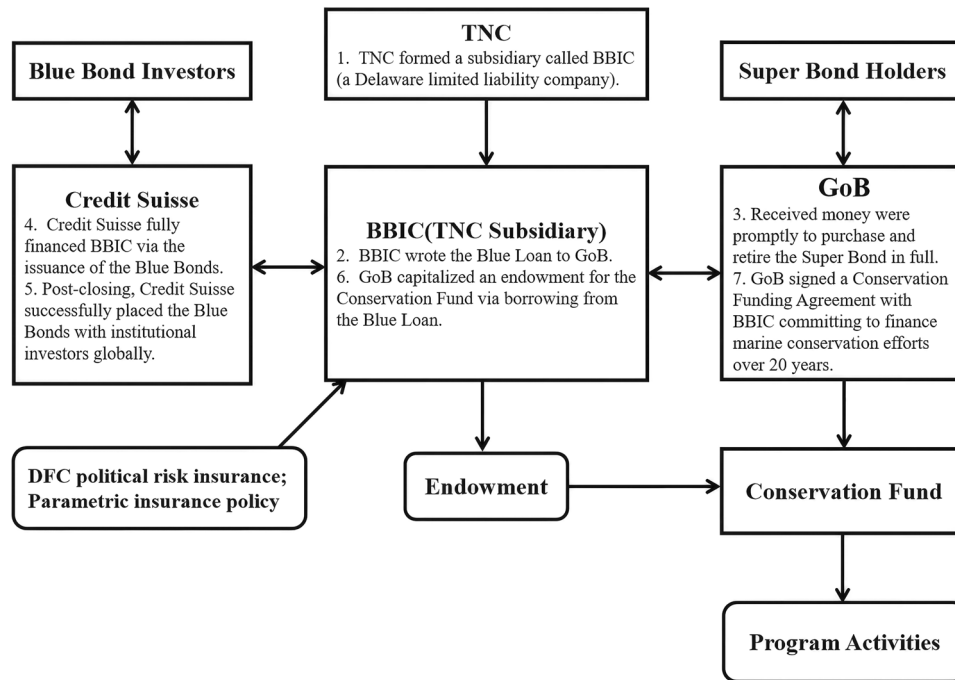


Fig. 2 Belize's DFNS mechanism.

Unlike Seychelles, Belize released the content of the *Blue Loan Agreement* and the *Conservation Funding Agreement* in the form of domestic legislation, providing more details of the DFNS transaction. The involved parties in Belize are diverse, including old bondholders, new bond issuers, the Government of Belize (GoB), TNC, subsidiaries of TNC, insurance companies, and the conservation fund. Belize completed a debt swap with TNC in November 2021, reducing its public debt by 12% of GDP in 2021 and enhancing the protection of the marine environment going forward.

Under the debt swap in Belize (see Fig. 2), a subsidiary of TNC lends funds to Belize to buy back its Super Bond (debt with private external creditors totaling USD 553 million or 30% of GDP) at a discounted price of 55 cents per dollar (IMF, 2022).

The U.S. Development Finance Corporation provides political risk insurance, allowing loans to have low-interest rates, a grace period of 10 years, and a maturity of 19 years (IMF, 2022). In exchange, Belize commits to allocate USD 4.2 million per year for marine conservation until 2041 and expands its Biodiversity Protection Zones from 15.9% of ocean area to 30% by 2026. It also creates an endowment fund of USD 23.5 million to finance marine conservation after 2041 (IMF, 2022). The transaction has become the world's second-biggest debt refinancing for ocean conservation to date (TNC, 2022). Belize agrees to ocean protection commitments, the two most important ones of which include (1) an increase in Biodiversity Protection Zones from 15.9% to 30% of ocean area by 2026—half in high protection areas (Replenishment Zones) and half in medium protection

areas (Multi-use Zones), and (2) completion of a Marine Spatial Plan by 2026 (initiated in 2022).

Performance of implementing the DFNS for MPAs

As the DFNS is proposed and implemented against the background of debt crisis and environmental challenge, it, in nature, has dual mandates to address financial problems and protect the environment. First and foremost, the DFNS is designed to provide sustainable and continuous financial support for environmental protection, thus causing environmental impacts. Moreover, as an “additional measure” to alleviate the unsustainable debt of the debtor country, the DFNS are expected to realize debt reduction, which has multiple impacts on the economy. Besides, the implementation of DFNS is based on debt swap agreements among the debtor countries, creditor countries, and NGOs. In this sense, various legal issues surrounding DFNS influence its performance. Accordingly, the overall evaluation of the performance of DFNS for MPAs is carried out from the perspectives of economic, legal, and environmental impacts.

Performance of DFNS on marine conservation

Promoting the establishment of MPAs. As the last link of the entire DFNS mechanism chain, the establishment of MPAs also determines the performance of DFNS to some extent. Whether the MPAs are well developed to a certain degree can be assessed from data such as how many MPAs have been built and how many square kilometers the current MPAs have increased. According to the GoS, by March 2020, 13 MPAs had been legally designated, totaling more than 410,000 sq. km (SMSP, 2022). The protected areas are split into two zones. High Biodiversity Protection Areas (Zone 1) allow almost no extractive human activities (SMSP, 2022). Zone 1 areas include one of the world’s most ecologically important habitats, the waters around the Aldabra Group (SMSP, 2022). Medium Biodiversity Protection and Sustainable Use Areas (Zone 2) are also designed to conserve natural ecosystems while allowing some economic activities. Thereinto, there are five Zone 1 areas designated as Marine National Parks totaling 203,071 sq. km and eight Zone 1 areas, totaling 238,442 sq. km, two of which are expanded and redesigned (SMSP, 2022). In addition, the DFNS has provided some funds to support the implementation of the marine spatial plan (MSP), which is a comprehensive, public, and participatory process to plan for sustainable development and integrate large-scale marine conservation in the context of a changing climate that is also likely to ensure ecological protection for years to come, including expanding, designing and redesigning the MPAs (SMSP, 2022).

Like the practice in Seychelles, the progress of Belize’s new MPA construction plan under the DFNS is open to the public. The MSP of Belize was launched in 2022, which continues to complement the Belize Blue Economy Development Policy and Strategy (2022-2027) and Maritime Economy Plan and advance other MSP approaches currently used in Belize, such as MPAs (GoB, 2022). According to the situation that the GoB initiated the MSP on time, one year after signing the Conservation Funding Agreement, up to 20.53% of the ocean of Belize has already been designated in Biodiversity Protection as promised (House of Representatives and Senate of Belize, 2021).

Coordination of the DFNS with the environmental protection strategy of the debtor country. As a way to fund marine conservation, DFNS need to be “localized” in debtor countries. The debtor country tends to coordinate the DFNS with its overall environmental protection strategy to realize the conservation objectives. For example, the GoS first had expansion objectives on MPAs, the MSP, etc., and then sought to use the DFNS to obtain

financing through debt conversion (GoS, 2015). In the Belize practice in 2021, the government simultaneously considered protected area planning and debt sustainability. Through the combined use of the DFNS and sovereign blue bond/loan, not only can a considerable amount of financing be obtained, but also the overall environmental protection strategy of the country can be effectively implemented.

The way to provide funding for marine conservation through the DFNS has two steps: the first step is for the debtor country to make marine conservation commitments under the DFNS agreement; the second step is to manage the DFNS transactions through trust funds established under the national laws, which generates incomes to invest in marine conservation. The marine conservation commitments made by the debtor country’s government are reflected in the content of the debtor country’s environmental protection strategy.

Specifically, the debtor country has enacted legislation for issues such as DFNS transactions, fund establishment, and conservation commitments and described in detail the implementation measures of the DFNS at the economic, legal, and policy levels. For instance, the *Conservation and Climate Adaption Trust of Seychelles Act 2015* (see National Assembly of Seychelles, 2015) provides that the annual budget of the SeyCCAT “sets forth the costs of monitoring and evaluating the Seychelles system of protected areas” and that the object of the SeyCCAT “shall be to administer the assets of the Trust, intended to provide a sustainable flow of funds...to support the long-term management and expansion of the Seychelles system of protected areas and other activities...through consultations with stakeholders”. The *Blue Bonds Loan Act 2021* (see House of Representatives and Senate of Belize, 2021) stipulates that the Conservation Fund shall be “an entity devoted to support conservation activities in Belize focused on marine and marine-related activities” and that the obligations of GoB include to “use any grant it may receive from the Conservation Fund to supplement funds allocated by Belize in its budget or otherwise for conservation activities” and to “complete a legally enforceable MSP and designate up to 30% of its Ocean in Biodiversity Protection Zones”. These acts legislated the DFNS transactions into the debtor country’s environmental protection strategy, effectively solving the “localization” of the DFNS to better promote the environmental protection in debtor countries.

Financial support and economic impacts under the DFNS

Implications of the DFNS for addressing debt crisis. Although its implications for addressing the debt crisis vary according to different conditions, the DFNS plays a decisive role in achieving direct debt relief for debtor countries. Moreover, the DFNS does not change the debt sustainability of debtor countries. As for debt relief, the success of the DFNS’s debt relief directly depends on the discount rate of its sovereign debt on the secondary market. The theory of realizing debt reduction of the DFNS is based on the comparatively high discount rate of its sovereign debt in the secondary market. The amount of the reduction increases as the discount rate increases; inversely, the amount decreases as the discount rate falls. In practice, Seychelles’ debt was discounted at 93.5 cents per dollar in 2015, making the reduction small. Belize’s debt was discounted at 55 cents per dollar in 2021, and the overall amount is enormous, making the reduction quite large.

In addition, the DFNS may favorably impact the debt sustainability of debtor countries. A debt is “sustainable if it satisfies the present value budget constraint without a major correction in the balance of income and expenditure given the costs of financing it faces in the market” (IMF, 2002). Seychelles’ debt sustainability is unchanged following the implementation of

DFNS. While the total external debt has decreased, the overall debt amount has not fundamentally decreased due to the need to pay back the promissory note to SeyCCAT in local currency (IMF, 2015). Belize's practice in 2021 is different. The DFNS is considered one of the two key reasons Belize made "significant progress towards restoring debt sustainability in 2021," the debt conversion reduced the public debt by 12% of GDP (IMF, 2022). The debt swap also would reduce Belize's debt service payments to a small extent during Fiscal Year 2022-34 (IMF, 2022). However, according to follow-up data, Belize's debt has become sustainable (IMF, 2023). That should be the favorable impact of the DFNS. So, given the practices of Seychelles and Belize, debt sustainability improves when implementing the DFNS, which may be considered a satisfactory debt instrument for changing the country's debt sustainability.

Availability of the income from DFNS. The debt buyback between debtor countries and creditor countries generally generates income from DFNS. This income is often used for investment in conservation. From the existing practices and rationale of funding MPAs, DFNS can provide a long-term and stable conservation funding source. Often, debtor countries willing to use DFNS need long-term and stable funding for conservation plans because a comparatively low discount rate indicates that a debtor country's debt repayment ability is not optimistic, reflecting the economy of the debtor country less stable. Generally, a permanent trust fund is built into the DFNS legal structure to manage the funding. And, in the practices of Seychelles and Belize, whether holding long-term promissory notes or regularly acquiring income under the agreement, the period for which the trust fund gets income is very long. That makes the income long-term available. Moreover, the stability of the income from DFNS often relies on trust funds, mainstream currency bonds with stable yields, and local currency payments. Also, the stability of funds of the DFNS in Belize in 2021 is stronger due to political risk insurance and commercial sovereign debt catastrophe insurance for covering the Blue Loan, so repayment expectations are unaffected even though the country is more vulnerable to natural factors like climate change affecting its economic activities.

Legal issues surrounding the DFNS mechanism

Challenges to reaching a DFNS agreement. Reaching a DFNS agreement tends to encounter challenges in both form and substance. Formally, the DFNS agreement must be agreed upon by all creditors and debtor countries through long-term negotiation, which is time-consuming before the final formation of the DFNS agreement. In essence, the DFNS agreement must be conditioned on the terms of a preexisting loan or bond agreement. This process requires a constant balancing of the interests of various stakeholders.

In the practice of Seychelles, the debts available for transformation are debts that have been restructured under the umbrella of the Paris Club in 2009. The debt swap provision (Paris Club, 2015) of the Paris Club has been included in the debt restructuring agreement since 2015, providing an opportunity to sign the DFNS agreement in Seychelles. The Paris Club has six principles to underlie their work, among which the principles of "solidarity" and "consensus" make all members need to act as a group in their dealings with a given debtor country. Because all of Seychelles' Paris Club creditors agreed with the debt swap provision, which is stated in the previous debt restructuring agreement, the new debt swap agreement to convert some or all of the debts can be made among all or some of Seychelles' creditors. It also means that the debt swap transaction can proceed even if only part of the creditor countries agree to

implement the DFNS. Moreover, Seychelles' DFNS plan took more than five years from the beginning of the negotiation to its completion (Convergence, 2017).

The 2021 Belize practice differs from Seychelles in that the Belize sovereign bond, or "Super Bond", is subject to debt conversion because of the CACs in the prior bond. It requires that the implementation of the sovereign debt restructuring program only needs to be approved by a certain majority of creditors to bind all creditors. All debts were finally restructured after more than 85% of the bondholders agreed to execute debt swap agreements (Chamon et al. 2022). In conclusion, for the DFNS agreement to be signed, it must be done to uphold the conditions of the prior agreement, and a successful consensus between the debtor country and the creditors must be established. Moreover, debt conversion negotiations in Belize took longer than those in Seychelles, and there was a pause around late 2020 (TNC, 2022). To conclude, the DFNS deal does have some challenges. But as far as the practices of Seychelles and Belize are concerned, it only needs the ambition of protection actions and the time cost of negotiations.

Binding force of the DFNS agreement. A binding force is a force that can bind the agreement to be obeyed or carried out. The DFNS agreement is complex, and its nature is different from a general treaty. In traditional international law governed by the *Vienna Convention on the Law of Treaties* (VCLT), the DFNS agreement is not a treaty because it involves more than just creditor countries or debtor countries. However, the VCLT governs the content between creditor countries and debtor countries. Nevertheless, it does not mean that the DFNS agreement is not legally binding.

By the nature of the DFNS agreement, it can be considered a contractual approach to sovereign debt restructuring, and its legally binding force may show the same relative weakness as its superordinate concept. The reason is that sovereign states are still effectively free to "default" if they no longer obtain financing from international capital markets. Moreover, the lessons of the sovereign default cases of Argentina and Greece showed that the possibility of sovereign debt default still exists, and debtor countries can even choose to default on their own. It also showed that the agreement with default clauses is not "binding" enough in essence. But in the end, debtor countries often choose to get back on track, reach debt restructuring agreements with creditors, and repay the debts. That demonstrates that the legally binding force of the sovereign debt restructuring agreement is relatively "weak."

The legally binding force of the DFNS agreement is divided into two levels to discuss: the international level and the domestic level. Internationally, as a kind of credit agreement, the DFNS agreement affects the certainty and predictability of the implementation. Such binding force also has implications for the behaviors of debtor countries and creditors. From the civil law perspective, an agreement's binding force requires moral restraints or other forces to guarantee. Nevertheless, for agreements made by countries, the situation is slightly different. The fundamental cause is the absence of a "supranational" organization to guarantee the agreement's execution. Nonetheless, debt agreements are often fulfilled in a timely way when the debtor country can fulfill its obligations or when it has the capability to do so, as there would be a significant "cost" if the debtor country decided to default.

Although the legally binding force is "weak," in practice, such "weak" force has no impact on its practical execution. In fact, according to the long-term observation of international credit, it can be found that debtor countries rarely defaulted on their own initiative, and they often had the willingness to perform when they were able to perform. Similarly, creditors tended not to break

their loans and continued to provide loans to debtor countries for a long time. The deeper reason may require other disciplines' theories to answer. From the perspective of the International Political Economy, the "structural power" (see Strange, 1992; Brown, 1999; Roos, 2019) of finance makes it difficult for both parties to cut off debt repayment or loans easily (Strange, 1992). Other critics also used the "repeated prisoner's dilemma" of Game Theory to explore the reasons for the long-term existence of credit, showing that "...to international lending, where legal enforcement of loan contracts is impossible, so that implicit-contract enforcement becomes essential", and "a party who violates an internal implicit contract typically loses the opportunity to cooperate with its current partner; a party who violates an external implicit contract loses the opportunity to cooperate with some or all potential partners as well" (Crawford, 1987). In this way, the loss of current and potential cooperation opportunities makes it lose the opportunity to obtain funds again in the international credit market, creating a "quasi-binding force". In fact, this seems as "concessions" offered by countries that lack access to financing. But now, based on environmental goals, implementing DFNS for MPAs may bring a win-win situation for debtor countries and creditors. To a certain degree, the implementation of DFNS in Seychelles and Belize was initiated by their national governments, which shows a positive attitude of debtor countries towards DFNS.

Moreover, default clauses and the "waiver of sovereign immunity clause" in Belize's *Blue Loan Agreement* enhance such "binding force". In this way, if the GoB defaults, it can be arbitrated in New York, New York, USA, in accordance with the Rules of Arbitration of the International Chamber of Commerce entered into force on January 1, 2021. The GoB "hereby unconditionally and irrevocably waives and agrees not to assert...any such immunity from jurisdiction, from suit or arbitration" (House of Representatives & Senate of Belize, 2021).

In addition, at the domestic level, surrounding issues of the DFNS agreement, the laws and regulations of the debtor countries also enhance such "binding force" of the DFNS agreement. At least, in the debtor country, the act can guarantee the fulfillment of the debtor country's commitments. Both Seychelles and Belize have enacted acts on the DFNS to ensure that the DFNS mechanism can be effectively implemented, which demonstrates the confidence of the two countries in the execution of the DFNS agreement and their ambition to achieve environmental protection goals.

Potential barriers to implementing the DFNS agreement. There are many potential barriers to implementing the DFNS agreement because the DFNS agreement has the connotation of imposing responsibilities on other parties. Although the parties of the agreement do not include domestic residents, marine conservation commitments and changes in the country's external debt are likely to affect domestic residents. Moreover, the rationale basis of the agreement itself may be based on "subsidy" or "aid". Given this, it appears that the DFNS agreement has three problems, including the lack of transparency in the pre-signing consultation procedure, the absence of explicit prior consent from the residents whom the protected areas would impact, and the conformity of the DFNS to the Polluter Pays Principle (PPP).

The first barrier is mainly reflected in the lack of transparency in the negotiations between the debtor and creditor countries. The public is unable to grasp what has been accomplished in these deals and how much money firms are receiving due to this lack of transparency. Some argued it is against the *Voluntary Guidelines for Debt Transparency* agreed by the Institute for International Finance (IIF) and the OECD's *Debt Transparency Initiative* (CADTM, 2022). However, this phenomenon was

greatly improved in Belize's practice in 2021 because the GoB made all DFNS agreements open to the public in the form of legislation. In this way, although the negotiation stage is not transparent enough, at least the people can know what effect the DFNS transaction can produce.

The second one primarily has a possible negative effect on those whose primary means of life are related to the environment, such as local fishermen. Some critics are concerned that the DFNS may affect the residents and thus believe that the prior consent of the affected residents should be obtained before signing such a debt swap agreement (CADTM, 2022). The reason for thinking this way may be that an agreement that imposes obligations on a third party requires the third party's consent. However, the international agreement signed by states may be another logic; even if it is based on the doctrine of privity of contract, the agreement is established and takes effect. Although the debtor countries' commitments were stated in the DFNS agreement, the establishment of MPAs that the debtor country promised to complete is its internal affairs. According to the doctrine of privity of contract, inter-state agreements can be established and take effect without the prior and informed consent of the affected residents. Suppose the government of the debtor country has caused a loss of rights and interests to the residents that may be affected during administration. In that case, the compensation should be made in accordance with its domestic laws.

The last one is about the relationship between the PPP and the DFNS. The establishment of DFNS is based on certain legal and economic relationships. The relationship between its financial support for environmental protection in debtor countries and the connotation of the PPP can lead to the DFNS' lack of legally binding force. The reason is that the DFNS is a counterexample of the PPP. Some concluded that DFNS made creditors relieve the debt in exchange for the debtor country agreeing not to engage in environmentally destructive practices (Knicley, 2012). The DFNS is, in fact, a kind of "subsidy" or "international aid" for developing countries, thus making creditor countries not responsible for relieving the debt. That also shows, in fact, that the creditors are in the dominant position in the DFNS negotiations.

Further development of DFNS

According to the current development of DFNS, the scale and amount of its debt relief and funding are likely to increase. However, some factors, such as excessive local currency issuance after debt conversion, may impact its performance. For the DFNS to continue to make its unique contribution, discussions for the further development of DFNS can be made from environmental, economic, and legal aspects.

Promoting the establishment of MPAs. The DFNS influences the development of MPAs in two ways: first, most debtor countries may use DFNS to support MSP, making overall plans for the establishment of MPAs; second, countries lacking funds may learn from Belize's practice of using DFNS as a "credit enhancement tool" to determine the feasibility of establishing MPAs in time to address climate change.

The DFNS will likely play a unique role in providing funds to establish the MPAs using the MSP. As one of the ocean protection commitments made by debtor countries, establishing MPAs is basically the main reason creditor countries plan to cancel the debts, thus reflecting the economic and environmental complementarity between creditor countries and debtor countries to achieve a win-win situation. To some extent, the financial support of DFNS is not all for establishing MPAs; other related

nature protection activities are also based on debts through DFNS transactions. Then, as a more appropriate ecosystem-based, sea use management is needed to integrate all marine protection activities. Seychelles and Belize both used the MSP to do so. After all, in the further development of DFNS, it is bound to manage the establishment of MPAs by supporting the MSP.

Moreover, the DFNS tends to help those countries lacking funds to deal with climate change in time. The performance of DFNS has already reflected the embodiment of international cooperation in international environmental protection and debt crisis management. Compared with many measures based on the UNFCCC, the DFNS has provided “additional measures” to protect the oceans. DFNS are not based on principles such as “common but differentiated responsibilities” (UN, 1992) or the PPP. However, with the international community’s acceptance of intragenerational and intergenerational fairness (Weiss, 1992), the 17 sustainable development goals proposed in *the 2030 Agenda for Sustainable Development* (UN, 2015) have pointed out the direction of protection activities and the time pressure. Outside the UNFCCC’s track, DFNS can raise funds for environmental protection for those lacking funds.

Realizing the economic benefits generated by DFNS. The economic benefits are likely to be realized from the following three points: first, the amount of debt relief continues to expand; second, the financing structure becomes more flexible and diverse; third, the debt sustainability of the debtor country needs to be taken into account if implementing DFNS.

Firstly, the scale of DFNS becomes increasingly more prominent, expanding the amount of debt relief. For example, the largest debt refinancing for ocean conservation to date is Ecuador’s DFNS, completed on May 9, 2023 (see Reuters, 2023). The DFNS helped Ecuador’s government repurchase approximately USD 1.6 billion worth of Ecuador’s bonds at a 60% discount. The operation will save Ecuador USD 1.1 billion in debt service repayments over the next 17 years, with USD 450 million invested in conservation and sustainable activities. The amount of debt relief has increased considerably compared to the practices in Seychelles and Belize.

Secondly, during the development process of DFNS, the measures have become flexible and diverse. The main reason is to adapt to the national conditions of debtor countries and to have better risk resistance capabilities. Compared with the Seychelles’ practice, Belize has a more complex structure and provides political risk insurance and parametric catastrophe insurance, ensuring funds’ sustainability and making DFNS more suitable for the climate-sensitive debtor country. However, the current practices of DFNS are usually denominated in U.S. dollars as the currency. In the next step of developing DFNS, it seems possible to denominate it in other currencies, and its financing structure will become more flexible.

Thirdly, debt sustainability is a primary consideration in implementing the DFNS regardless of national conditions. Whether the debt is sustained or not is likely to play a decisive role in fulfilling the debtor country’s subsequent nature protection commitments. After implementing the DFNS, Belize’s debt service payments are predicted to be reduced to a small extent during Fiscal Year 2022-34. Nevertheless, its subsequent impact is unpredictable for such a large-scale debt conversion in Belize (Essers et al. 2021). Before implementing the DFNS in Belize, the GoB considered debt sustainability. The good news is that subsequent IMF reports support the idea that the DFNS has improved Belize’s debt sustainability. That further strengthens the hypothesis that the debt sustainability of the debtor country must be considered before implementing the DFNS.

Further development from a legal aspect. Given the practices in Seychelles and Belize, the focus of the next step in developing the DFNS is ensuring its satisfactory performance as a kind of blended finance that relieves debt and provides funds for environmental protection actions. According to the previous analysis, the satisfactory performance of DFNS is likely to be carried out from following four points from a legal aspect: first, the construction of transparency continues to be strengthened, of which the main content is the public disclosure of information; second, debtor countries continue to make the special legislation on DFNS to provide a legal basis for the domestic implementation of environmental protection commitments; third, a consensus becomes more straightforward to reach an agreement, which reduces the cost of negotiations; fourth, there is the complementary long-term assistance provided by external parties to the DFNS.

Firstly, to make the performance of DFNS satisfactory, the construction of transparency, including the public disclosure of information, is essential. As one of the basic principles of international governance, transparency construction has always been the most basic and broadest requirement for governance in all aspects. In terms of global debt governance, there are the OECD’s *Debt Transparency Initiative* (OECD, 2022) and *Voluntary Principles for Debt Transparency* (IIF, 2019) agreed by the IIF, as mentioned before, as well as the *G20 Operational Guidelines for Sustainable Financing* (G20, 2017); In terms of global institutional administration, the transparency of institutional management has its principles (UNESCO, 2018). Specifically, the mediation before the signing, the cash flow, and the project announcement of DFNS are all inseparable from transparency capacity building. Building transparency capabilities seems to clarify the purpose and effect of debt swap transactions and enable credible management of debt swap transaction revenue.

Secondly, to ensure that DFNS can be effectively implemented in debtor countries, special legislation on DFNS should be introduced. In terms of international credit, an agreement’s binding force is not only due to its existence but also due to political or economic factors. At least, this agreement can be legally binding within the debtor country’s borders through special domestic legislation. By enacting domestic laws on the DFNS mechanism, the implementation of DFNS can be satisfactory in debtor countries.

Thirdly, a consensus between creditors and the debtor country to reach the DFNS agreement will likely be more facile. As a contractual approach, or an “extension” of the contractual approach, various clauses in the DFNS agreement synchronize with various changes in the contractual approach. Any changes in the contractual approach of sovereign debt restructuring are bound to affect the further development of DFNS. As a debtor country, it has always hoped to reduce the difficulty of reaching a consensus to quickly reach a debt restructuring agreement. The emergence of single-limb CACs (European Parliament, 2019) in 2014 has affected the conditions under which sovereign debt restructuring can occur. This clause can significantly reduce the difficulty of reaching an agreement. However, the single-limb CAC has not shown a dominant position in sovereign debt restructuring. But as far as the current trend is concerned, the use of this clause is on the rise yearly. That reduces the difficulty of reaching a DFNS agreement.

Fourthly, the complementary assistance provided by external parties to DFNS can significantly expand the influence of DFNS and help the implementation of DFNS to be satisfactory. Consistent support and assistance from the international financial institutions are essential. Dealing with the sovereign debt crisis and international environmental protection are critical

international issues. International financial institutions such as the IMF and the W.B. have listed the above issues as the top priority. As a financial solution that can affect the above two issues simultaneously, the continuous promotion and assistance of international financial institutions to DFNS has enabled DFNS to continue to expand the scope of application and influence and maintain long-term vitality in the future.

The support of NGOs can also make the implementation of DFNS more efficient and planned. However, sometimes its status seems a bit too important. As one of the links in participating in global environmental governance, NGOs have unique influences, and even their influences in environmental governance financing have become similar to some kind of “structural power”. As for the positioning of NGOs, limiting their “power” may be necessary. Some criticized the use of DFNS for its global coverage and excessive debt conversion amount (CADTM, 2022). Moreover, the Seychelles Act also shows that NGOs can participate in the operation of conservation trust funds as investors and managers. In this case, the positioning of NGOs should be weakening.

The emerging creditor countries will likely play a specific role in implementing DFNS. The reason is that the international status of emerging creditor countries has improved year by year as their enthusiasm for participating in international affairs has increased. At the same time, the creditor’s rights can provide potential conditions for implementing DFNS. If emerging creditor countries are willing to implement the DFNS, the international rules of DFNS can be further optimized. Furthermore, this profoundly affects the follow-up development of DFNS to obtain a more satisfactory implementation.

Conclusions and future research directions

Conclusions. The Seychelles and Belize governments and their creditors completed the construction of the DFNS legal structure with two different types of debt conversion, showing the positive role that DFNS can play in economic and environmental aspects. Moreover, various barriers can be found from a legal perspective in reaching a swap agreement, ensuring the effective implementation of the agreement, and improving the transparency construction. In light of the increasing scale of four existing cases of DFNS for financing MPAs, the worldwide application of DFNS to assist marine conservation becomes an inevitable and growing trend, which tends to increase debt relief and provide more funds for marine conservation and to attract more countries to implement the DFNS. Ten countries have recently intended to implement the DFNS (TNC, 2023). Further, after analyzing the future development of DFNS, it can be found that the DFNS is expected to play an important role in promoting the establishment of MPAs, realizing the economic benefits, and having a satisfactory performance by legal measures. To conclude, the DFNS can provide a viable option for financing MPAs, thus contributing to the development of marine conservation and marine protection goals in the future.

In addition, the following recommendations can be provided for debtor countries to improve DFNS performance. First, the transparency of any institution participating in the DFNS transaction should be established to prevent corruption and “green-washing”. For example, stakeholder participation should be required in implementing DFNS, which helps the affected residents obtain relevant information before establishing MPAs and makes the implementation of DFNS transparent. Second, special legislation on managing DFNS is deemed the best practice; thus, the role should be emphasized in the future. Third, the DFNS needs to keep up with the innovation of the contractual approach of sovereign debt restructuring and the debt swap structure to adapt to the new needs of debtor countries for establishing MPAs. Fourth, in light of debt

sustainability, the amount of the debt for conversion and the scale of implementing DFNS should be specified or clarified. The amount of domestic currency a debtor country pays to the trust fund should also be limited to control the financial risks that the DFNS may generate. Finally, DFNS can be better implemented by coordinating with complementary assistance from two levels: international organizations, NGOs, and emerging creditor countries on an international scale, and domestic environmental protection strategies, especially the development strategies of MPAs on a domestic scale.

Future research directions. The case studies from the DFNS practices in Seychelles and Belize indicate that the DFNS is a viable option for financing MPAs. Despite this positive conclusion, future work should focus on the availability and system construction of the DFNS for financing MPAs. These findings suggest the following two directions for future research: first, there are only four cases of DFNS involved in the establishment of MPAs, and dearth of reports about the economic and environmental impacts of the implementation of DFNS in Barbados and Ecuador, which show that the universality of the DFNS for financing MPAs still needs further observation and ongoing research in the future. Second, each country has different national conditions. System construction and innovation of DFNS should be deliberately designed according to the national circumstances with diversified characteristics. Therefore, building a transparent and appropriate legal framework for promoting the performance of DFNS to achieve significant economic and environmental protection targets is the aim of this paper and the focus of future research directions.

Data availability

Data sharing is not applicable to this research as no data were generated or analyzed.

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References

- Brown C (1999) Susan Strange—a critical appreciation. *Rev Int Stud* 25(3):531–535. <https://doi.org/10.1017/S0260210599005318>
- Burand D (1989) Doing it naturally: the greening of international finance. *Int Financial Law Rev* 8(9):37–39
- Chamon D, Klok E, Thakoor V, Zettelmeyer J (2022) Debt-for-climate swaps: analysis, design, and implementation. *IMF Working Paper* 2022/162. International Monetary Fund, Washington, DC. <https://www.imf.org/-/media/Files/Publications/WP/2022/English/wpia2022162-print-pdf.ashx>
- CADTM (2022) Financing the 30x30 agenda for the oceans: debt for nature swaps should be rejected. <https://www.cadtm.org/Financing-the-30x-30-agenda-for-the-Oceans-Debt-for-Nature-swaps-should-be>. Accessed 30 Nov 2023
- Convergence (2017) Knowledge library: Seychelles debt conversion for marine conservation and climate adaptation case study. <https://www.convergence.finance/resource/seychelles-debt-conversion-for-marine-conservation-and-climate-adaptation-case-study/view>. Accessed 30 Nov 2023
- Crawford VP (1987) International lending, long-term credit relationships, and dynamic contract theory. *International Finance Section, Department of Economics, Princeton University*, No. 59, March 1987. <https://ies.princeton.edu/pdf/S59.pdf>. Accessed 30 Nov 2023
- De Santo EM (2012) From paper parks to private conservation: the role of NGOs in adapting marine protected area strategies to climate change. *J Int Wildl Law Policy* 15(1):25–40
- Essers D, Cassimon D, Prowse M (2021) Debt-for-climate swaps: killing two birds with one stone? *Glob Environ Change* 71:102407. <https://doi.org/10.1016/j.gloenvcha.2021.102407>
- European Parliament (2019) Single-limb collective action clauses: a short introduction. [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637974/EPRS_BRI\(2019\)637974_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/637974/EPRS_BRI(2019)637974_EN.pdf). Accessed 30 Nov 2023

- G20 (2017) Operational guidelines for sustainable financing. https://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Topics/world/G7-G20/G20-Documents/g20-operational-guidelines-for-sustainable-financing.pdf?__blob=publicationFile&v=1. Accessed 30 Nov 2023
- GoB (2022) Official launch of Belize's marine spatial planning process. <https://www.pressoffice.gov.bz/marine-spatial-planning-process/>. Accessed 30 Nov 2023
- GoS (2015) Seychelles' National Biodiversity Strategy and Action Plan 2015-2020. <https://chm.cbd.int/api/v2013/documents/4E62B15F-2926-5F4D-5D3C-D9597D60A0A9/attachments/204620/Seychelles%20NBSAP.pdf>. Accessed 30 Nov 2023
- Hansen S (1989) Debt for nature swaps — overview and discussion of key issues. *Ecol Econ* 1(1):77–93. [https://doi.org/10.1016/0921-8009\(89\)90025-6](https://doi.org/10.1016/0921-8009(89)90025-6)
- House of Representatives & Senate of Belize (2021) Blue Bonds Loan Act 2021. <https://www.nationalassembly.gov.bz/wp-content/uploads/2021/11/Act-No-28-of-2021-Blue-Bonds-Loan.pdf>. Accessed 30 Nov 2023
- IMF (2002) Assessing sustainability: policy development and review department. <http://www.imf.org/external/np/pdr/sus/2002/eng/052802.htm>. Accessed 30 Nov 2023
- IMF (2015) 2015 Article IV consultation, second review under the extended arrangement, and request for waiver and modification of performance criteria —press releases; staff report; staff statement; and statement by the executive director for Seychelles. IMF Country Report No. 15/201. <https://www.imf.org/external/pubs/ft/scr/2015/cr15201.pdf>. Accessed 30 Nov 2023
- IMF (2022) Belize 2022 Article IV consultation—press release; and staff report. IMF Country Report No. 22/133. <https://www.imf.org/-/media/Files/Publications/CR/2022/English/IBLZEA2022001.ashx>. Accessed 30 Nov 2023
- IMF (2023) Belize staff concluding statement of the 2023 Article IV mission. <https://www.imf.org/en/News/Articles/2023/02/17/belize-staff-concluding-statement-of-the-2023-article-iv-mission>. Accessed 30 Nov 2023
- IIF (2019) Voluntary guidelines for debt transparency. <https://www.iif.com/Portals/0/Files/Principles%20for%20Debt%20Transparency.pdf>. Accessed 30 Nov 2023
- Islam GMN, Tai SY, Kusairi MN, Ahmad S, Aswani FMN, Senan MKAM, Ahmad A (2017) Community perspectives of governance for effective management of marine protected areas in Malaysia. *Ocean Coast Manag* 135:34–42. <https://doi.org/10.1016/j.ocecoaman.2016.11.001>
- Knicley JE (2012) Debt, nature, and indigenous rights: twenty-five years of debt-for-nature evolution. *Harv Environ Law Rev* 36(1):79–122
- National Assembly of Seychelles (2015) Conservation and climate adaptation trust of Seychelles act 2015. <https://faolex.fao.org/docs/pdf/sey150876.pdf>. Accessed 30 Nov 2023
- Nedopil C, Yue M, Hughes AC (2023) Are debt-for-nature swaps scalable: which nature, how much debt, and who pays?. *Ambio* 2023. <https://doi.org/10.1007/s13280-023-01914-4>
- OECD (2007) Lessons learnt from experience with debt-for-environment swaps in economies in transition. *OECD Pap* 7(5):1–65. https://doi.org/10.1787/oecd_papers-v7-art15-en
- OECD (2022) Debt transparency initiative: trends, challenges and progress. *OECD Business and Finance Policy Papers*, No. 3, OECD Publishing, Paris, <https://doi.org/10.1787/66b1469d-en>
- Paris Club (2015) Debt swap provision of the Paris Club. <https://clubdeparis.org/en/communications/page/debt-swap>. Accessed 30 Nov 2023
- Post M (1990) The debt-for-nature swap: a long-term investment for the economic stability of less developed countries. *Int Lawyer* 24(4):1071–1098
- Reuters (2023) Ecuador seals record debt-for-nature swap with Galapagos bond. <https://www.reuters.com/world/americas/ecuador-seals-record-debt-for-nature-swap-with-galapagos-bond-2023-05-09/>. Accessed 30 Nov 2023
- Roos J (2019) Why not default? The political economy of sovereign debt. Princeton University Press, New Jersey
- Shandra JM, Restivo M, Shircliff E, London B (2011) Do commercial debt-for-nature swaps matter for forests? A cross-national test of world polity theory. *Sociological Forum* 26(2):381–410. <https://doi.org/10.1111/j.1573-7861.2011.01245.x>
- Simmons BA, Ray R, Yang H, Gallagher KP (2021) China can help solve the debt and environmental crises. *Science* 371:468–470. <https://doi.org/10.1126/science.abf4049>
- Sommer JM, Restivo M, Shandra JM (2020) The United States, bilateral debt-for-nature swaps, and forest loss: a cross-national analysis. *J Dev Stud* 56:748–764. <https://doi.org/10.1080/00220388.2018.1563683>
- SMSP (2022) The Seychelles' marine spatial plan on the leading edge of marine conservation & climate change, 2022. https://seymssp.com/wp-content/uploads/2022/06/SeychellesMSP1Pager_A4_2022.pdf. Accessed 30 Nov 2023
- Strange S (1992) States and markets. Pinter Publishers Limited, London
- TNC (2022) Case study: Belize debt conversion for marine conservation. <https://www.nature.org/content/dam/tnc/nature/en/documents/TNC-Belize-Debt-Conversion-Case-Study.pdf>. Accessed 30 Nov 2023
- TNC (2023) 10 Places to Watch in 2023. <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/future-of-conservation-10-places/>. Accessed 30 Nov 2023
- UNESCO (2018) Principles of effective governance for sustainable development. E/2018/44-E/C.16/2018/8, para. 31. https://publicadministration.un.org/portals/1/images/cepa/principles_of_effective_governance_english.pdf. Accessed 30 Nov 2023
- UN (1992) United Nations Framework Convention on Climate Change. A/RES/48/189. <https://unfccc.int/resource/docs/convkp/conveng.pdf>. Accessed 30 Nov 2023
- UN (2015) Transforming our world: the 2030 agenda for sustainable development. A/RES/70/1. <https://undocs.org/en/A/RES/70/1>. Accessed 30 Nov 2023
- Weiss EB (1992) In fairness to future generations and sustainable development. *Am Univ Int Law Rev* 8(1):19–26
- Zimmerman JF (1992) The tax consequences of debt-for-nature swaps: foreign-tax-credit limitations and the need for clarification. *Tax Lawyer* 45(4):1083–1102

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Author contributions

All authors made substantial contributions to the conception or design of the work. Xiaoyi Jiang contributed to the conceptualization, revision, supervision, and writing review. Hao Cao contributed to the conceptualization, writing-original draft, and revision. These authors contributed equally to this work. All authors agreed to the published version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The research did not require any ethical approval as it did not include human participants.

Informed consent

The informed consent was irrelevant as the research did not include any human participants.

Additional information

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