Online ISSN: 2588-3526

Journal of Wildlife and Biodiversity

*Volume 9(2): 110-120 (2025) (*http://www.wildlife-biodiversity.com/*)*

Research Article

The impact of education on borderless conservation: A case study of a seminar on capacity-building for officials from parties implementing CITES in China

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Received: 25 February 2025 / Revised: 14 April 2025 / Accepted: 18 April 2025/ Published online: 18 April 2025.

How to cite: Mostafavi, S.M., Zheng, Y. (2025). The impact of education on borderless conservation: A case study of a seminar on capacity-building for officials from parties implementing CITES in China, Journal of Wildlife and Biodiversity, 9(2), 110-120. DOI: https://doi.org/10.5281/zenodo.15242910

Abstract

The concept of borderless conservation emphasizes the necessity for international collaboration aimed at safeguarding biodiversity and natural resources. The illegal trade of wildlife across borders significantly contributes to the extinction of various species. Proper enforcement of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has the potential to be instrumental in curtailing this detrimental trend. Education and capacity-building initiatives are essential components in the protection of biodiversity and natural resources, necessitating international dialogue and information sharing. This study assesses the effects of a seminar aimed at building the capacities of CITES scientific officials in China, with participants from nine developing nations. The seminar included diverse topics such as the regulation of endangered plant trade, the protection of aquatic wildlife, and strategies for combating illegal wildlife trafficking. Methodologically, a combination of qualitative and quantitative approaches was employed, utilizing surveys and interviews to evaluate participant awareness before and after the seminar. Findings indicate the effectiveness of seminars in fostering collaboration and enhancing expert capabilities, demonstrating that all offered courses had a substantial positive impact on the participants. This study's outcomes provide a foundation for refining future CITES training initiatives to maximize their effectiveness.

Keywords: Biodiversity, endangered species, international collaboration, wildlife trafficking

Introduction

The conservation of biodiversity and natural resources stands as one of the foremost challenges of the 21st century, demanding international cooperation and information exchange (Adger & Jordan, 2009). The term "borderless conservation" encapsulates the idea of worldwide collaboration to conserve biodiversity. Neglecting such cooperation can result in serious environmental crises. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) plays a critical role in this context, aiming to protect endangered species from extinction by regulating international trade. Education is pivotal in transforming attitudes and fostering behavioral changes

that enhance organizational development. By inspiring members of organizations to improve their performance, education can lead to enhanced capacities and the creation of a knowledgeable workforce. This paper investigates the influence of the Seminar on Capacity-building for Officials from Parities Implementing CITES held in China on strengthening the expertise of individuals involved in borderless conservation. This type of research highlights the significant impact that education can have on environmental protection, serving as a vital basis for future initiatives focused on capacity building and international knowledge exchange (Zhang, 2022). The decline of wildlife species and populations is observable in many regions of the world, often driven by the illegal international trade in wildlife. CITES is an international environmental agreement designed to protect endangered species from extinction, either by imposing restrictions on their international trade to sustainable levels or by imposing a complete ban (Heid & Márquez-Ramos, 2023). Established in 1975, CITES is the only treaty aimed at ensuring that international trade does not threaten the survival of wild flora and fauna (Lukumbuzya & Sianga, 2017; Brown & Swails, 2006; Wijnstekers, 2018; Franckx, 2003). This legally binding convention currently includes 185 member nations across various continents, along with the European Union as a Party. The effectiveness of CITES hinges upon the capacity of each member to implement its provisions. The treaty pursues three primary objectives: to ensure that international trade in wild animals and plants does not threaten their survival; To ensure that trade in wild animals and plants is conducted sustainably; To promote cooperation among countries to achieve these objectives (Heinrich & Gomez, 2021). CITES categorizes species into three appendices; Appendix I: species that are threatened with extinction and trade in these species is only allowed in exceptional circumstances; Appendix II: species that are not necessarily threatened with extinction, but trade in these species must be controlled to avoid utilization incompatible with their survival; Appendix III: species that are protected in at least one country that has asked other CITES Parties for assistance in controlling trade (Species & Commission, 1975).

Adopted at the 11th Conference of the Parties in 2000, the Strategic Vision of CITES emphasizes the need for capacity building among Parties. Specifically, Goal 1 focuses on enhancing each Party's ability to implement the Convention, highlighting the importance of organizational capacity and regional coordination and collaboration for national agencies in achieving this aim. Objective 1.3 targets the enhancement of enforcement capabilities, while an action item under objective 1.5 advocates for an evaluation of national capacities and training requirements based on information from member nations. Additionally, objective 5.1 calls for developing collaborative projects with other Multilateral Environmental Agreements (MEAs) to further capacity-building efforts (Environmental Management Group, 2004). Wildlife trade poses a significant threat to global biodiversity, with approximately 18% of over 31,500 species of birds, mammals, amphibians, and reptiles involved in this trade (Scheffers et al., 2019). The illegal wildlife trade represents a multi-billion-dollar industry, threatening not only wildlife survival but also public health and community welfare (Patel, 2015; Dongol & Heinen, 2012). Furthermore, wildlife trafficking frequently involves violence and intimidation, negatively affecting local communities that rely on natural resources for their livelihoods (Abensperg-Traun & Abensperg-Traun, 2020).

The Role of Education in Biodiversity Conservation

Education serves as a fundamental mechanism for empowering communities and individuals to engage in the conservation of natural resources. A lack of awareness regarding international legislation and treaties often leads to the exploitation of these resources. Therefore, educational initiatives such as seminars should be prioritized as crucial strategies in biodiversity conservation. Capacity building encompasses the development of individual and group skills, knowledge, and expertise that enhance the management and protection of organizations, extending beyond mere academic learning to include practical infrastructure and indigenous knowledge practices (Williamson et al., 2003). The establishment of capacity-building measures and enforcement strategies is critical for effectively addressing wildlife trafficking and ensuring adherence to CITES regulations. Generally, 'capacity building' refers to the development of activities and materials aimed at fostering specific knowledge and skills needed to effectively implement provisions of the Convention (CITES, n.d., retrieved January 2024). Given the importance of CITES in protecting endangered species, it is essential to identify and address the gaps in its implementation in countries. However, there are concerns that enforcement agencies may lack the requisite awareness, knowledge, and capacity to successfully implement CITES (Nelson, 2020). Several factors contribute to this situation: limited awareness among enforcement bodies regarding CITES compliance; inadequate understanding of protected species and their legal statuses under CITES; and insufficient capabilities to oversee and regulate the international trade of these species (Secretariat et al., 2022). The deficiencies and gaps in CITES implementation not only threaten the ability of a Party to manage its trade in wildlife, but also provide opportunities for the illegal trade to take place. The assessment of the awareness, knowledge, and capacity of CITES implementation within countries' enforcement agencies will provide a basis for strengthening the implementation framework and improving compliance with CITES regulations.

This research aims to contribute to wildlife conservation and sustainable usage initiatives in developing countries, providing insights for future research and intervention strategies aimed at enhancing CITES implementation and protecting endangered species. A seminar on Capacity-building for Officials from Parties Implementing CITES is organized by the China National Bamboo Research Center (CBRC). The headquarters of the China National Bamboo Research Center is in Hangzhou and was established in 1988 with the aim of bamboo research and development, international exchanges, cooperation, personnel training, and bamboo industrialization. The seminar aimed to promote and expand wildlife conservation management and the implementation of CITES-related matters, foster cooperation in executing joint initiatives under CITES, take collective action to combat and control the trafficking of endangered wildlife species, and establish a platform for enhanced mutual understanding and collaboration between China and participating countries, including Iran, Armenia, Myanmar, Mauritius, Zimbabwe, Cameroon, Nigeria, East Timor, and Thailand. Over 14 days, the event was conducted through training sessions and by inviting academic professors and administrative officials from China. The course contents included lectures: Introducing China and Its Geographical and Natural Features, Aquatic Wildlife Conservation and Fishery Management in China, CITES and Management of Import and Export of Endangered Plants in China, Illegal Trade of Wildlife in Southeast Asia, Discussion on Main Topics of Concern of COP20, Future Perspective of Capacity Building Seminars, Overview of Global and Regional Multilateral Environmental Treaties, Wildlife Trade, Conservation and Policy, CITES and CITES Implementation and Enforcement in China, Analysis and Prospects of CITES Implementation and Enforcement, Wildlife Conservation in China, The

Approaches to Crack Down Illegal Wildlife Trafficking, Wildlife Conservation Monitoring, Human and Wildlife Coexistence in China, Advancing Wood Identification Techniques to Promote Conservation of Tree Species Diversity, tracking technologies, such as GPS and radio collars, to monitor and track wildlife populations and identify illegal activities, use of remote sensing and aerial surveillance technologies to improve monitoring and detection of poaching activities in remote areas. Field visits to Protected Areas and the Successful implementation of population restoration programs using captive breeding methods, such as the *Crested ibis* population restoration, were also conducted after the training course. Finally, a discussion on wildlife protection and CITES implementation in each participating country, with presentations by each country's representatives, and discussions and exchanges on increasing cooperation between Asian countries in the field of wildlife protection and CITES implementation was done.

Material and methods

This study was designed to assess the impact of educational initiatives on borderless conservation, specifically focusing on a seminar aimed at building the capacity of scientific officials in implementing CITES in China. China, covering a land area of approximately 9.6 million km² and home to about 1.4 billion residents, stands as the world's second-largest economy and offers an advanced education system. With its richest wildlife resources, China has 6482 species of vertebrates, which account for 10 percent of the world, including 581 species of mammals, 1332 species of birds, 412 species of reptiles, 295 species of amphibians, and 2862 species of fish. Meanwhile, there are more than 30000 species of high plants listed among top 3 of the world, of which more than 17000 species are endemic to China. To protect endangered wildlife species, the Chinese government promulgates a series of laws on wildlife conservation, such as the Forest Law, the Wildlife Protection Law, the Regulations on Wild Plant Conservation, and the Management Regulations on Import and Export of Endangered Species, list 341 terrestrial wildlife species and 246 wild plants species as national key protection species, implement national program on wildlife conservation and nature reserve construction, protect wildlife and its habitat using establishing nature reserves, conducting endangered species reproduction, cultivation, and reintroduction, strictly cracking down illegal activities, promoting community co-management, and encouraging international cooperation etc. The research employed a mixed-methods approach, incorporating both qualitative and quantitative techniques and collecting data through surveys and interviews to evaluate participant awareness before and after the seminar.

Data collection occurred over one month, from November 2024 to December 2024, involving 30 seminar participants from nine countries: Iran, Armenia, Myanmar, Mauritius, Zimbabwe, Cameroon, Nigeria, East Timor, and Thailand. Questionnaires were directed to government officials responsible for enforcing regulations related to wildlife trade violations, particularly those involving CITES-listed species. The questionnaires consisted of structured questions with predefined options, facilitating rapid data collection from a large sample of respondents (Kothari, 2004). The questionnaire included eight key questions to assess the impact of each training course, rating them on a scale from 1 (lowest) to 5 (highest). The assessed variables included Training and Awareness (Increase in experts' knowledge about CITES and conservation principles), Import and Export Management (Better understanding of trade regulations and wildlife management), Wildlife Conservation (Strategies for wildlife conservation and management in China), Discussion at Cop 20 (Importance of issues raised at the twentieth conference), International Collaboration

(Impact of international cooperation on natural resource conservation), Approaches to Combat Trafficking (Awareness of methods to combat illegal wildlife trafficking), Outcomes of the Seminar (Overall impact of the seminar on the capabilities of experts in borderless conservation) and Future Suggestions (Comments and suggestions provided for the improvement of future seminars). The survey was distributed to 30 individuals, and 30 responses were received, yielding a response rate of 100%.

The Kirkpatrick Model, a widely recognized framework for assessing training effectiveness, consists of four levels that aid in understanding and evaluating learning and its organizational impact. The first level, Reaction, focuses on participants' responses to the training program, measuring satisfaction through surveys and feedback forms. The second level, Learning, emphasizes the changes in participants' knowledge, skills, and attitudes post-training, typically assessed through tests and practical evaluations. The third level, Behavior, evaluates changes in participants' behavior and performance following the training, while the fourth level, Results, addresses the overall outcomes from the training, such as increased productivity and improved quality (Kirkpatrick, 1994).

In summary, the Kirkpatrick Model offers training and development experts a structured framework to evaluate and assess the effectiveness of training programs, making it an effective resource for improving educational practices (Kirkpatrick, 1994). Descriptive analysis was used to summarize the questionnaires. During analysis for the questionnaire, respondents were dependent variables, and questions were independent variables (Krueger, 2002). Data were analyzed and presented in frequencies, percentages, and charts (Daniel, 2019). Statistical analyses were done using the Statistical Package for the Social Sciences (SPSS).

Results

Preferences among participants regarding different training topics were analyzed using Kruskal-Wallis tests, revealing no significant differences among the training components ($p < 0.05$) (Table 1).

Table 1. Preference for type of education based on the Kruskal-Wallis test

Ranks

	Priority	N	Mean Rank
Educational groups	2	2	105.50
	3	10	57.50
	4	60	102.50
	5	138	110.28
	Total	210	

Test Statistics[a,b]

	Educational groups
Kruskal-Wallis H	7.391
df	3

Asymp. Sig.	0.060

a. Kruskal Wallis Test
b. Grouping Variable: Priority

The survey results indicated a notable increase in participants' awareness and understanding of the topics discussed. The majority reported that the seminar provided them with valuable insights into environmental issues. Specifically, 87% of participants indicated a high to very high impact regarding their knowledge about CITES and conservation principles, with 93% acknowledging a similar impact from discussions related to CoP 20 and combating trafficking. Furthermore, all participants recognized significant positive effects on wildlife conservation, international collaboration, and overall seminar outcomes (Table 2 and Fig. 1).

Table 2. The impact of each training course is based on a score of 1 to 5

Component	Count (n)	Median	Mode	Mean
Training and Awareness- Increase in experts' knowledge about CITES and conservation principles	30	5	5	4/5
Import and Export Management- Better understanding of trade regulations and wildlife management	30	5	5	4/4
Wildlife Conservation-Strategies for wildlife conservation and management in China	30	5	5	4/7
Discussion at COP 20-Importance of issues raised at the twentieth conference	30	5	5	4/5
International Collaboration-Impact of international cooperation on natural resource conservation	30	5	5	4/6
Approaches to Combat Trafficking-Awareness of methods to combat illegal wildlife trafficking	30	5	5	4/7
Outcomes of the Seminar-Overall impact of the seminar on the capabilities of experts in borderless conservation	30	5	5	4/8

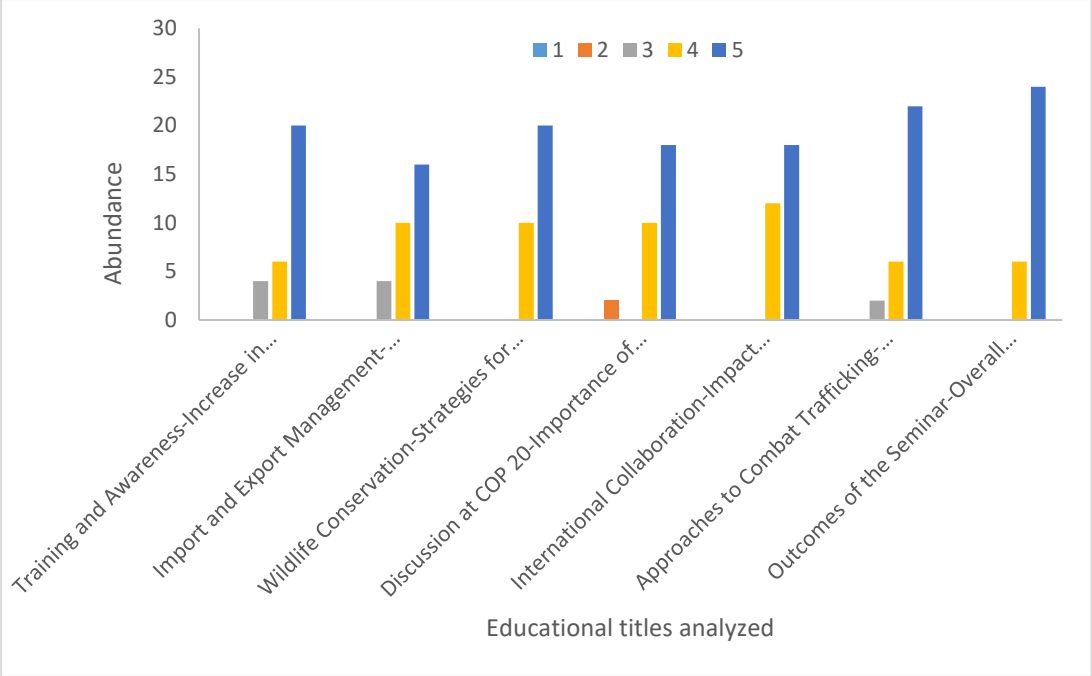

Figure 1. The frequency of grades and educational titles was analyzed.

Reaction Level

This level assesses participants' feelings and perceptions regarding the training course. Overall, participants expressed satisfaction, as high scores were recorded for both the "Training and Awareness" and "Seminar Outcomes" variables.

Learning Level

This level examines the degree to which participants acquired new knowledge and skills. The scores indicated a significant increase in participants' understanding of CITES and its conservation principles, suggesting effectiveness in learning outcomes.

Behavior Level

This level evaluates behavioral changes among participants following the training course. Positive changes were noted in areas related to import and export management, wildlife protection, and international collaboration.

Outcomes Level

This level assesses the overall impact of the training course on broader organizational or societal outcomes. While feedback was generally positive, some lower scores in specific areas indicated a continued need for improvement.

Overall Conclusion

The results captured through the Kirkpatrick model's four evaluation levels reflect participants 'satisfaction with the training course. Effective learning outcomes were achieved, with observable behavioral changes aligning with the course content. However, addressing future comments and suggestions is crucial for optimizing future training offerings.

When asked for feedback to enhance future seminars, 86% of participants provided constructive suggestions.

Discussion

This research demonstrates the significant contributions that educational seminars and capacity-building initiatives make toward borderless conservation. The findings indicate that international partnerships and knowledge exchanges can provide effective solutions to pressing environmental issues. Consequently, it is vital for nations to allocate more resources to these endeavors and to continue facilitating similar programs. Education is a powerful catalyst for transforming attitudes and practices concerning environmental challenges (Kettunen & ten Brink, 2015). In light of the results, it is evident that increased expert awareness leads to improved decision-making in environmental management domains.

Ultimately, this study affirms that capacity-building seminars for CITES scientific officials positively impact knowledge enhancement. The influence of capacity-building initiatives extends to various fields, as evidenced by research highlighting positive outcomes from faculty development and professional training programs (Lim & Choy, 2014; Davis et al., 2015). Furthermore, the findings reveal a desire to forge connections with other educational groups and cultivate new collaborative networks as an essential outcome of empowered stakeholders. Frantz et al. (2015) examined how participants perceive the impact of the SAFRI fellowship on their personal and professional growth. Their study identified a strong desire to forge connections with other educational groups and to develop new collaborative networks as a significant aspect of capacity building fostered by the empowerment of board members. The research utilized Kirkpatrick's evaluation framework. While the paper primarily highlights the positive and notable effects of faculty development programs in enhancing faculty competence, implementing and sustaining such initiatives requires adequate resources, staffing, facilities, funding, and the commitment of a dedicated organizing team. Additionally, it is essential to have clearly defined objectives, purposes, and models that can effectively guide and shape program development in alignment with the institution's vision and mission. Training programs must focus on the specific needs of participants, including customs officers responsible for enforcing CITES provisions or protected area managers working with local communities. Nonetheless, challenges such as staff turnover must be addressed to improve training effectiveness (Environmental Management Group, 2004).

Overall, the findings indicate that while CITES is effective in wildlife protection, successful enforcement relies on the commitment of member countries to implement its directives properly (Heid & Márquez-Ramos, 2023). The necessity for ongoing training opportunities has been identified as the foremost resource requirement, emphasizing the importance of investing in training programs for enforcement agencies. The needs assessment survey revealed that a significant majority of respondents agreed on the usefulness of a conceptual framework for capacity building. For instance, a study conducted in Zanzibar identified a serious lack of awareness and understanding of CITES regulations among enforcement officers, with only 30% of those surveyed aware of the regulations and just 25% possessing adequate knowledge about them. To address these gaps, there is a critical need for regular and comprehensive training programs tailored for enforcement officers that focus on CITES regulations, clearly defining their responsibilities and roles in enforcement. These training programs should encompass essential topics such as species identification, trade documentation enforcement procedures, and wildlife crime investigation techniques. Additionally, effective capacity-building initiatives must be implemented, which include ensuring adequate resources, infrastructure, and staffing to boost the efficiency of enforcement agencies. It is essential to identify and tackle the challenges that

developing countries face in tracking their progress towards the strict implementation of CITES regulations aimed at wildlife protection. Specific capacity-building initiatives should be designed to address these challenges (Ibrahim Salmin, 2023).

Challenges and strengths of CITES

With the increase in species covered by CITES and challenges such as trade sanctions and restrictions, the need for scientific research and risk assessment in international trade is becoming more felt. Strengthening the scientific basis for decision-making processes on CITES-related issues has a major impact on Borderless conservation. Based on the insights gathered from the participants of the seminar on wildlife conservation in China, several key themes and recommendations emerge that highlight the successful aspects of the seminar while also suggesting improvements for future iterations. Firstly, the seminar was highly praised for its in-depth scientific content, knowledgeable experts, and the comprehensive information provided regarding China's wildlife conservation laws, strategies, and practical case studies. Participants appreciated the emphasis on international collaboration and the need for governmental cooperation to combat illegal wildlife trafficking. The discussions underscored the importance of strengthening cross-border partnerships and promoting shared responsibility among nations to tackle biodiversity loss and enhance conservation efforts. The effective blend of theoretical and practical approaches allowed attendees to gain valuable insights into the complexities of CITES implementation and wildlife management.

However, participants also offered constructive feedbacks aiming at enhancing the effectiveness of future seminars. Key suggestions included extending the duration of the seminars to allow for more in-depth discussions, hands-on training, and field visits to relevant organizations and authorities, such as CITES management. A more diverse mix of participants from various countries was recommended to facilitate better interaction, collaboration, and sharing of regional challenges and solutions. An approach to assessing and monitoring capacity is always necessary. This study was conducted with this aim in mind. Accordingly, there is a need to agree on the objectives of the framework, target audiences, indicators and measures of success. Extensive consultation, including regional workshops and online forums, is essential to review the elements of the framework. It is important to identify the benefits and challenges of online and face-to-face capacity-building approaches and to strengthen communication and collaboration between CITES authorities (CITES, 2021).

One limitation of the study is the relatively small sample size, which may restrict the generalizability of the findings. To enhance the robustness of future research, utilizing a larger sample size could yield more representative results. Additionally, future studies could focus on evaluating the effectiveness of training programs and other interventions designed to enhance the capacity of implementing agencies in enforcing CITES regulations. Such evaluations would provide valuable insights that could inform the improvement of future CITES training courses, ensuring they are more effective in meeting the needs of enforcement personnel and improving wildlife protection efforts.

Conclusion

The experience of holding the CITES Scientific Officials Capacity Building Seminar in China demonstrates the importance of education in environmental and biodiversity conservation. The seminar not only raised awareness but also facilitated the establishment of effective collaboration

networks among experts, underscoring the importance of education in the execution of conservation projects. Moreover, emphasizing international cooperation as a fundamental requirement for resource and information security can yield substantial gains in borderless conservation efforts. Engagements at the international level foster knowledge and technology transfer, crucial for effectively addressing environmental challenges.

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