


# Local management and governance improve natural resource incomes of communal conservancies in Namibia

J. D. Goergen<sup>1</sup>  | M. P. Louis<sup>2</sup> | K. F. Kellner<sup>1</sup> | G. J. Roloff<sup>1</sup> |  
M. Lindeque<sup>3</sup> | J. L. Belant<sup>1</sup>

<sup>1</sup>Department of Fisheries and Wildlife, Michigan State University, East Lansing, Michigan, USA

<sup>2</sup>Namibian Association of Community-Based Natural Resource Management Support Organizations, Windhoek, Namibia

<sup>3</sup>Green Economy Trust, Windhoek, Namibia

## Correspondence

J. D. Goergen, Department of Fisheries and Wildlife, Michigan State University, East Lansing, Michigan, USA.  
Email: [goergen5@msu.edu](mailto:goergen5@msu.edu)

## Funding information

Boone & Crockett Program in Wildlife Conservation; Michigan Involvement Committee of Safari Club International, Flint Regional Chapter

## Abstract

Effective governance of communal institutions is critical to financial sustainability of community-based natural resource management economies. We evaluated effects of local management and governance on income earned by communal conservancies in Namibia during 2011–2022. We compiled annual income and performance scores for natural resource management and institutional governance using conservancy accounting and ‘event book’ monitoring data (governance performance collected since 2019). Conservancies earning > \$0 income generated a median annual \$60,518 since 2011 and \$50,283 since 2019 (17% less than during 2011–2022), which reflected a decline in tourism during the COVID-19 pandemic despite an increase in grants received. Income increased with years since conservancy establishment, higher management performance, presence of nongovernmental organization (NGO) support within conservancies, and annual general meeting (AGM) occurrence. Higher management performance positively affected the probability conservancies earned > \$0 since 2011 and 2019. Income earned during 2019–2022 also increased with higher governance performance. Median management and governance performances across conservancies were only about 50% of their maximum scores, indicating higher income potential with improved performance. Support from NGOs remained critical to financial sustainability of conservancies and AGMs were important governance functions. Natural resource management and institutional governance facilitated income generation by Namibia’s conservancies, but more emphasis on benefit distribution could increase socioeconomic impact. We recommend that Namibia’s conservancies, particularly those established more recently or without NGO presence, prioritize improving local management and governance to develop more sustainable community-based natural resource economies.

## KEYWORDS

community-based natural resource management, governance, indigenous peoples and local communities, nongovernmental organizations

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2025 The Author(s). *Conservation Science and Practice* published by Wiley Periodicals LLC on behalf of Society for Conservation Biology.

## 1 | INTRODUCTION

Indigenous-led governance of communal lands is necessary for effective and socially just conservation (Artelle et al., 2019). Community-based natural resource management (CBNRM) is a democratic approach to governance based on the devolution of land use rights from government to local levels (Smith, 2019), decentralized management authority (Ribot, 2002), and shared decision-making (Child, 2019). Benefits generated from ecosystem services (e.g., hunting and photographic tourism), however, are not passively converted into conservation outcomes by indigenous peoples or local communities (Child & Barnes, 2010). Developing communal institutions (Agrawal & Gibson, 1999) and adaptive management (Barnes & Child, 2014) are necessary to administer finances and provide incentives for participation in coupled human-natural systems (Ostrom, 2010). Benefit distribution also can be a critical governance challenge for CBNRM (Silva & Mosimane, 2013).

In southern Africa, rapid income generation from sustainable wildlife use (Weaver et al., 2011) necessitates local financial management with community engagement and leadership accountability (Child & Barnes, 2010). Benefits from CBNRM programs (e.g., Communal Areas Management Program for Indigenous Resources Association in Zimbabwe; Taylor, 2009) can be greater than the costs of developing communal institutions when distribution is equitable and transparent (Child et al., 2014). Empowerment from inclusive social organization (Silva & Mosimane, 2014) can provide conservation incentives without financial benefits (Ashley, 1998). However, income is invested in management capacity and generates community interest in benefit distribution, which can reduce corruption (Jones et al., 2015). Income potential improves with more effective governance (Chidakel & Child, 2022) as community participation increases accountability (Child, 2006), conservation practices are accepted (Ostrom, 2000), and investments from the private sector (Lapeyre, 2011) or nongovernmental organizations (NGO) increase (Lindsey et al., 2014).

International policies and multilateral environmental agreements (Larson et al., 2022) increasingly recognize the importance of indigenous peoples and local communities to conservation (e.g., Convention on Biological Diversity; Reyes-García et al., 2022). Despite this global support (Garnett et al., 2018), along with concern for socioeconomic impacts of CBNRM (Fariss et al., 2022) and programmatic focus on improving governance (NACSO, 2022a), quantitative information on the performance of communal institutions is limited (Zhang et al., 2023) and existing community-led monitoring data

is underused (Collomb et al., 2010). Less income generated from tourism and social gathering restrictions during the COVID-19 pandemic (Lindsey et al., 2020) also emphasized the need for resilient communal institutions (Hulke et al., 2022). Additionally, while environmental drivers of income to communal conservancies (e.g., Naidoo, Weaver, Stuart-Hill, & Tagg, 2011) and tourism operations in Namibia are well understood (e.g., Goergen et al., 2024), little research has focused on the role of governance in financial sustainability.

Namibia's conservancies monitor natural resource management and institutional governance annually to assess performance (NACSO, 2023). Income from CBNRM generally increases with program age (Bandyopadhyay et al., 2009), as older conservancies have more mature management capacity (Brooks, 2017), implement best governance practices, and facilitate private sector or NGO investments (Humavindu & Stage, 2014). Conservancies employ staff that manage natural resources (e.g., community game guards) and are governed by elected committees. Performances of conservancy staff in natural resource management and committees in institutional governance are reported separately using indicators with categorical ratings (Stuart-Hill et al., 2005). Support NGOs (e.g., Integrated Rural Development and Nature Conservation) facilitated development of Namibia's conservancy program in the late 1990s and assist with natural resource management, private sector negotiations, and securing grants (Kalvelage et al., 2020). Annual general meetings (AGM) provide opportunities for conservancy members to engage directly in decision-making processes (e.g., committee elections, budget approval), especially financial management, and with tourism operators or NGOs (Muyengwa, 2015) but participation can be limited (Collomb et al., 2010).

We evaluated the effects of local management and governance on income earned by conservancies in Namibia during 2011–2022. We refer to income as revenue to conservancy management structures and financial benefits to members. We refer to management as natural resource-related operational activities conducted by conservancy staff and governance as administrative leadership from conservancy committees. We predicted that income would increase with years since conservancy establishment, higher management performance scores, NGO presence, and AGM occurrence. We predicted that income would also increase with higher governance performance scores during 2019–2022 despite less income earned and challenges to conservancy operations during the COVID-19 pandemic (i.e., 2020–2021) (Lendelvo et al., 2020).

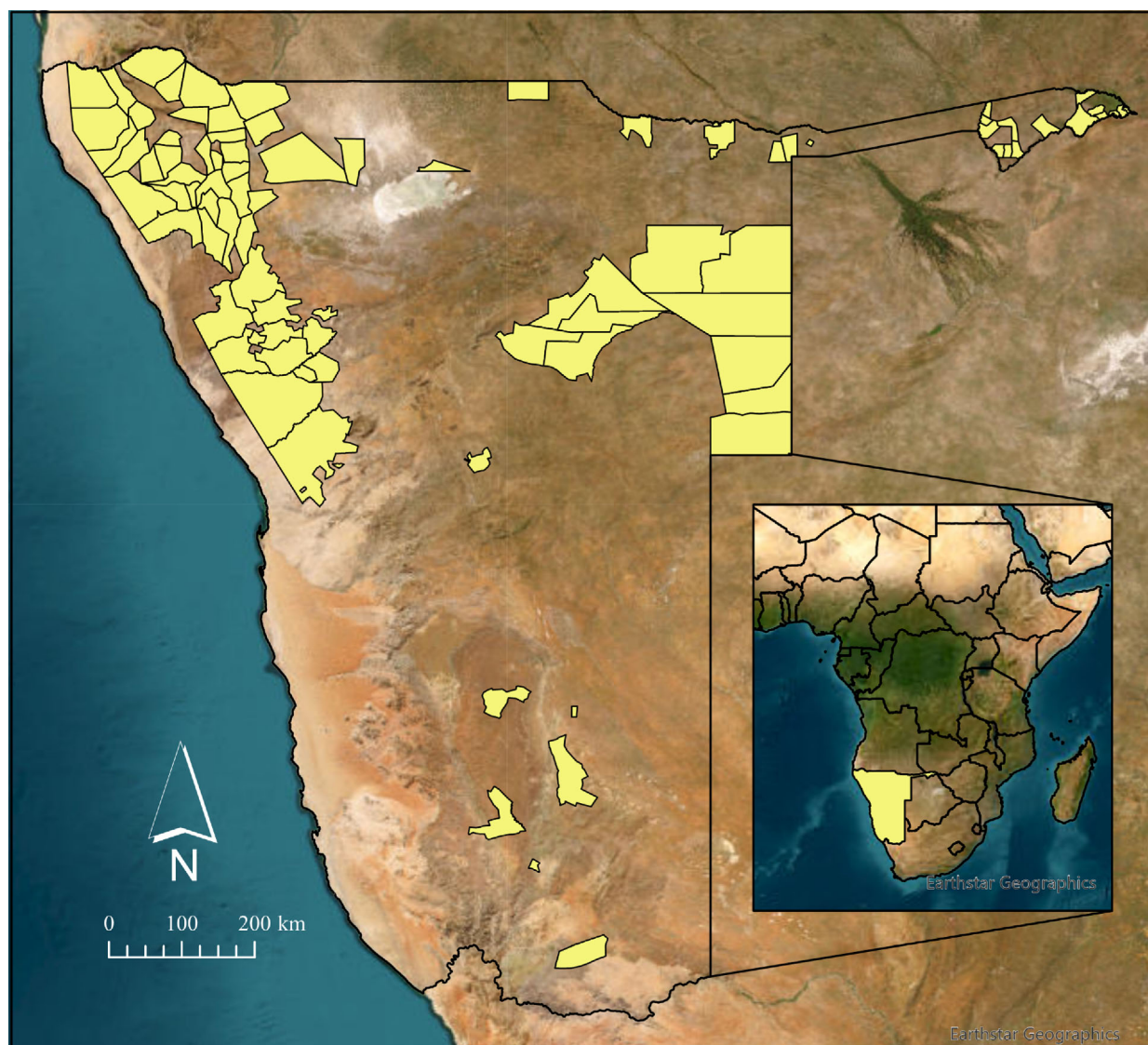


FIGURE 1 Communal conservancies (yellow polygons) in Namibia, 2022 (NACSO).

## 2 | STUDY AREA

Namibia is a sparsely populated country in southern Africa (824,000 km<sup>2</sup>; Atlas of Namibia Team, 2022) with 50% of its 3 million people living in rural areas with high poverty and unemployment (NSA, 2024; WBG, 2023). Protected areas, communally managed wildlife areas, and private freehold lands used for wildlife ranching (Lindsey et al., 2013) combined represent about 46% of Namibia's land area (NACSO, 2021a). Economic potential for communal areas with high wildlife abundance was recognized in the 1990s (Ashley & Barnes, 1997) after commercialization of wildlife ranching on private lands (Republic of Namibia, 1975). Following Namibia's independence in 1990, progressive land-use policies (e.g., MET, 1995; MWCT, 1992) led to the Nature Conservation Amendment Act (Republic of Namibia, 1996),

which authorized communities to register customary landholdings as conservancies. Subsequent legislation enabled conservancy ownership and management of tourism enterprises (MET, 2007; Republic of Namibia, 2002).

Conservancies are local natural resource management institutions with conditional property rights and reporting requirements (e.g., constitution, zonation, wildlife management and benefit distribution plans) to the Ministry of Environment, Forestry and Tourism (MEFT) (Jones, 1999). Namibia's conservancies are recognized globally as a leading CBNRM program (Jones, 2010) enabled by support from NGOs and land use rights legislated by the national government (Boudreaux & Nelson, 2011). The conservancy program is supported by the Namibian Association of Community-Based Natural Resource Management Support Organizations (NACSO)

and administered by MEFT. The 86 registered conservancies represent about 20% (166,179 km<sup>2</sup>) of Namibia's land area and support more than 230,000 people (Figure 1; NACSO, 2022b).

### 3 | METHODS

We compiled data collected by conservancies and from NACSO including accounting records during 1998–2022, years since conservancy establishment, and annual presence of NGO support within conservancies. We used conservancies' annual monitoring data collected during 2011–2022 from NACSO to compile management performance, governance performance (collected since 2019), and AGM occurrence for each conservancy that used NACSO's 'event book' monitoring tool (Stuart-Hill et al., 2005).

We estimated total income earned by each conservancy annually during 2011–2022 by summing concession and hunting fee payments to respective governing committees, salaries earned by conservancy members, direct household payments, and in-kind non-financial benefits (e.g., game meat, development projects, training, meals) from tourism operators. We added income from small- to medium-sized businesses (e.g., plant harvesting [e.g., Devil's claw {*Harpophytum* spp.}; Lavelle, 2023], craft sales), game meat from conservancy harvests, grants, donations, bank interest, and other miscellaneous sources included in NACSO's accounting records. We used game meat values calculated by NACSO using replacement-cost shadow prices applied nationally each year (Naidoo et al., 2016), which was 27 Namibian dollars (NAD)/kg in 2022 (NACSO, 2023). We standardized all income values to 2022 United States dollars (USD) using the geometrically averaged annual NAD to USD exchange rate (Bank of Namibia, 2023) and USD consumer price index during 2011–2022 (USBLS, 2023). We report median income values due to skewed distribution of income across conservancies.

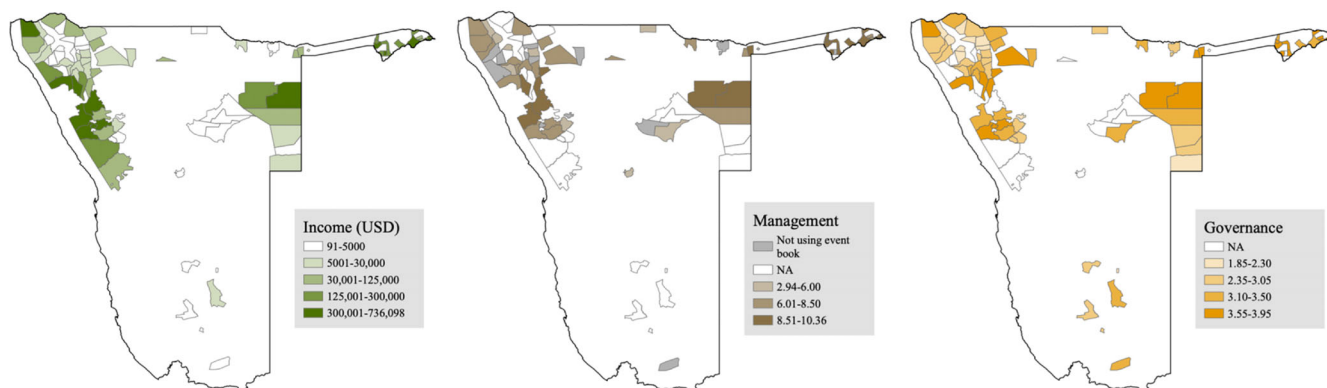
Performances of conservancy staff in natural resource management and committees in institutional governance are reported separately in event books. We compiled annual management performance scores for each conservancy during 2011–2022 using categorical ratings of 16 indicators assessing conservancy commitment to, planning or monitoring of, and benefits from natural resource management activities (Appendix S1). We excluded other indicators due to missing data (i.e., harvest management) or because they did not directly assess performance of conservancy staff. Categorical ratings were 0–2 to 0–6 depending on the indicator. Therefore, we scaled all ratings to 1 to treat each

indicator equally. We summed all ratings to derive an overall management performance score of 16 maximum points for each conservancy annually, and we assumed equal importance among indicators as each was similarly prioritized and rated by NACSO (Figure 2). Data were missing from 15 conservancies that did not use event books to report management performance and other conservancies that did not report ratings for every indicator each year (Table 1).

We compiled annual governance performance scores for each conservancy during 2019–2022 using categorical ratings of 6 indicators including member engagement, transparent and participatory benefit planning, equitable benefit distribution, committee accountability, external stakeholder engagement, and financial management. We excluded an indicator for compliance with MEFT requirements due to missing data. Categorical ratings for all indicators ranged from 0 to 5 (i.e., NA, none, weak, moderate, strong, and exceptional, respectively). We scaled all ratings to 1 to treat each indicator equally based on its inclusion as a performance metric. We summed all ratings to derive an overall governance performance score of 6 maximum points for each conservancy annually, again assuming indicators were equally important as prioritized and rated by NACSO (Figure 2).

We used generalized linear mixed models to evaluate the effects of local management and governance on income earned by conservancies in Namibia. We conducted two analyses during 2011–2022 and 2019–2022 to account for different data domains (governance performance collected since 2019; Table 2). As the distributions of conservancy incomes were zero-inflated and skewed, we fit two regression models for each analysis. We used linear regression to model log-transformed incomes >\$0 and logistic regression to model a binary response (0 for conservancies earning no income, 1 for conservancies earning >\$0 income; Naidoo, Weaver, Stuart-Hill, & Tagg, 2011). Both models included fixed-effect covariates for years since conservancy establishment, annual management performance, annual NGO presence (0 or 1), and AGM occurrence (0 or 1) (Table 1). In the second analysis, we used the same modeling approach but used only the subset of data during 2019–2022 when governance performance was collected. Model structures were identical to the previous analysis, except we also included a covariate for annual governance performance.

For all models, we included random intercepts by conservancy to account for repeated annual measurements of the same conservancies across years. We calculated pairwise correlations  $r$  between continuous covariates and retained the most relevant for analyses when  $|r| \geq 0.70$  (Dormann et al., 2013). We centered and scaled continuous covariates using a standardized  $z$ -score



**FIGURE 2** Annual mean income, management performance, and governance performance (2019–2022) of communal conservancies in Namibia, 2011–2022.

**TABLE 1** Variables potentially affecting incomes earned by communal conservancies in Namibia, 2011–2022 and 2019–2022; data not available = NA.

Variable	2011–2022			2019–2022		
	Median	Range	NA	Median	Range	NA
Years since establishment	10	0–24	-	15	1–24	-
Annual management performance (maximum score of 16)	7.4	0.2–11.8	227	7.8	1.1–11.8	76
Annual governance performance (maximum score of 6)	-	-	-	3.2	1.6–4.6	24
Annual nongovernmental organization presence	1	0–1	63	1	0–1	15
Annual general meeting occurrence	1	0–1	113	1	0–1	21

**TABLE 2** Summary of annual income estimates (in 2022 United States dollars) earned by communal conservancies in Namibia, 2011–2022 and 2019–2022.

Statistic	2011–2022	2019–2022
Mean	\$114,096	\$104,270
Median income >\$0	\$60,518	\$50,283
Maximum	\$1,368,827	\$1,022,904
Total	\$111,928,397	\$35,868,952
Conservancies earning income > \$0	86	84
Median income >\$0 for conservancies without a nongovernmental organization present (19)	\$4638	\$6808

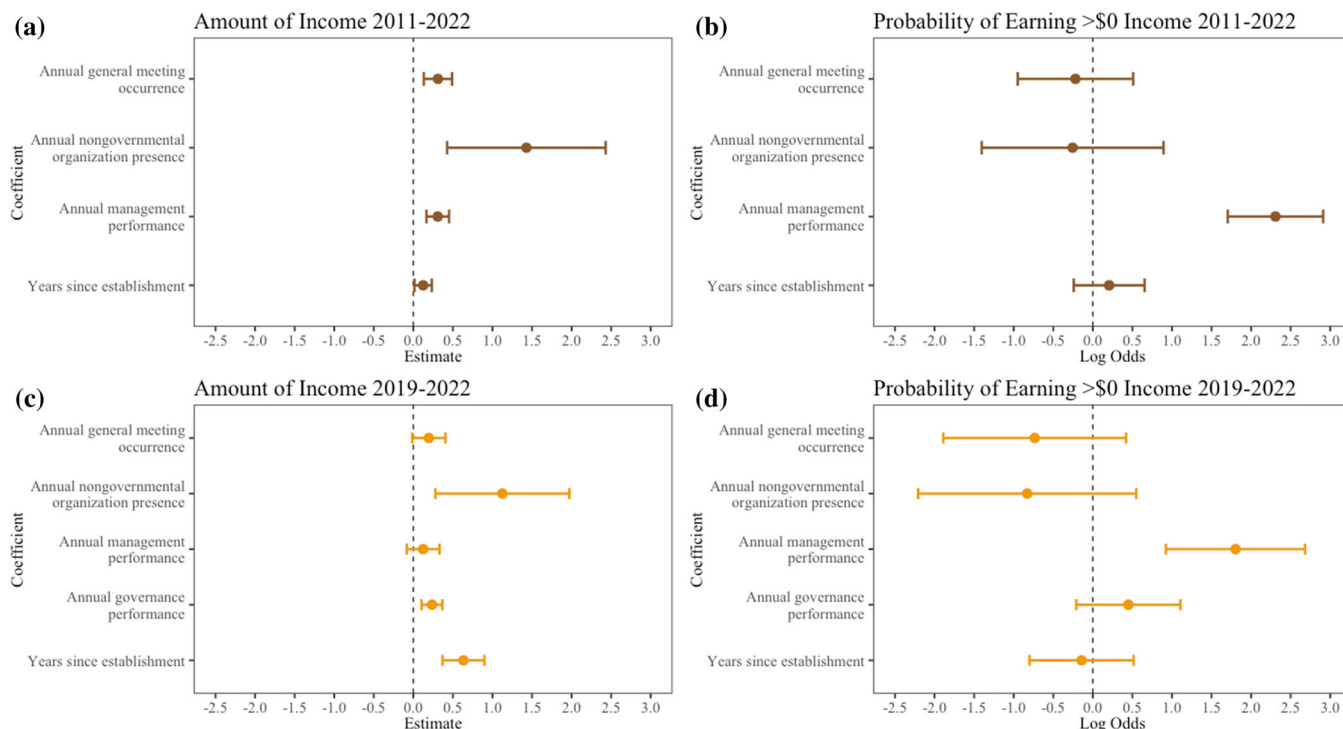
normalization (mean = 0, standard deviation = 1). We tested for statistical significance of regression coefficients using  $\alpha \leq 0.05$ . We visualized regression coefficient estimates and uncertainty using dot-whisker plots with 95% confidence intervals (CI). We performed all analysis in R version 4.2.2 (R Core Team, 2023) using the glmmTMB

package for generalized linear mixed models (Brooks et al., 2017) and the DHARMA package for residual diagnostics (Hartig, 2022).

## 4 | RESULTS

Median number of years from conservancy establishment through 2022 was 10 since 2011 and 15 since 2019 (Table 1). Median annual management performance score across conservancies was 7.4 during 2011–2022 (Table 1) and 4.8 for 19 conservancies without an NGO present (maximum of 16). Median annual governance performance score was 3.2 (maximum of 6) (Table 1). The proportion of conservancies across years with an NGO present was 0.76 and with an AGM was 0.69 during 2011–2022.

Median annual income for conservancies earning >\$0 was \$60,518 (\$1,368,827 maximum, \$111,928,397 total) during 2011–2022 and \$50,283 (\$1,022,904 maximum) during 2019–2022 (Table 2). Median annual income for 19 conservancies without an NGO present when earning >\$0 was \$4638 during 2011–2022 and \$6808 during



**FIGURE 3** Standardized regression coefficient estimates with 95% confidence intervals (i.e., whiskers) for generalized linear mixed models fit to the (a) amount of income earned and (b) probability of earning >\$0 income during 2011–2022, and (c) amount of income earned and (d) probability of earning >\$0 income during 2019–2022 by communal conservancies in Namibia.

2019–2022 (i.e., 8% and 14%, respectively, of median annual income for conservancies earning >\$0; Table 2). All 86 conservancies earned at least some income since 2011, but 2 conservancies did not earn income since 2019 (Table 2). Since 1998, conservancies on average generated income 1.8 years after establishment.

#### 4.1 | Models for 2011–2022, management only

Residual diagnostics showed no model fit issues except that the dispersion of observed quantile-quantile values deviated from expected for nonzero incomes during 2011–2022 (Appendix S2). Years since conservancy establishment positively affected the amount of income ( $\beta = 0.12$ , CI = 0.01–0.23, Figure 3a, Appendix S3) with an increase of 1 year in median conservancy age resulting in an increase of \$870, holding all other covariates at median values. Annual management performance positively affected the amount of income ( $\beta = 0.31$ , CI = 0.17–0.45, Figure 3a) with an increase from 7.4 to 16 (i.e., maximum score) of the median score across conservancies resulting in an increase of \$89,581 (i.e., 148% of median annual income for conservancies earning > \$0), holding all other covariates at median values.

Annual management performance also positively affected the probability that conservancies earned >\$0 income ( $\beta = 2.37$ , CI = 1.75–2.99, Figure 3b). Annual NGO presence positively affected the amount of income ( $\beta = 1.43$ , CI = 0.43–2.43, Figure 3a). Relative to conservancies without an NGO present, conservancies with NGO presence earned \$29,240 (i.e., 48% of median annual income for conservancies earning >\$0) greater income, holding all other covariates at median values. Occurrence of AGMs also positively affected the amount of income ( $\beta = 0.31$ , CI = 0.13–0.49, Figure 3a). Relative to conservancies that did not hold an AGM, conservancies with AGM occurrence earned \$10,286 greater income, holding all other covariates at median values.

#### 4.2 | Models for 2019–2022, management and governance

Years since conservancy establishment positively affected the amount of income ( $\beta = 0.63$ , CI = 0.37–0.90, Figure 3c, Appendix S3) with an increase of 1 year in median conservancy age resulting in an increase of \$6743, holding all other covariates at median values. Annual governance performance positively affected the amount of income ( $\beta = 0.24$ , CI = 0.10–0.37, Figure 3c)

with an increase from 3.2 to 6 (i.e., maximum score) of the median score across conservancies resulting in an increase of \$86,251 (i.e., 172% of median annual income for conservancies earning >\$0), holding all other covariates at median values. Annual management performance positively affected the probability conservancies earned > \$0 income ( $\beta = 1.80$ , CI = 0.92–2.68, Figure 3d) but not the amount of income. Annual NGO presence positively affected the amount of income ( $\beta = 1.13$ , CI = 0.28–1.97, Figure 3c). Relative to conservancies without an NGO present, conservancies with NGO presence earned \$34,515 (i.e., 69% of median annual income for conservancies earning >\$0) greater income, holding all other covariates at median values. Occurrence of AGMs was not correlated with income during 2019–2022 when annual governance performance was included.

## 5 | DISCUSSION

Our predictions that incomes earned by conservancies in Namibia during 2011–2022 and 2019–2022 were affected by local management and governance were supported. The probability that conservancies earned >\$0 income was positively affected by management performance, but other covariates had no effect, likely because most conservancies earned >\$0 income annually since 2011 regardless of NGO presence, AGM occurrence, or age. That conservancy age increased income could indicate that older conservancies were established in higher quality wildlife areas or had more time for wildlife populations to recover, which facilitated tourism or NGO investments (Goergen et al., 2024).

Management performance positively affected the amount of income during 2011–2022 but not during 2019–2022, and the probability conservancies earned >\$0 income during both time periods. Governance performance also increased the amount of income earned during 2019–2022. That management performance was not correlated with the amount of income earned during 2019–2022 indicates that income depended more on conservancy age, governance performance, and NGO presence in more recent years or was influenced by missing data in management performance. Management performance also could be correlated with wildlife-based income potential from ecosystem services (Goergen et al., 2024), but governance performance was more important for increasing income earned from natural resources (Kalvelage et al., 2020). Income increased by an equivalent of 148% (i.e., \$89,581) or 172% (i.e., \$86,251) of median annual income for conservancies earning >\$0 when median annual management or governance performance increased to maximum scores since 2011 and

2019, respectively. That median annual management and governance performances across conservancies were only about 50% of their maximum scores (30% of management performance for conservancies without an NGO present) indicates higher income potential with improved performance.

Presence of an NGO was associated with greater income, which likely reflected natural resource management assistance or grants provided by NGOs. Despite potential for income generation through ecosystem services (Barnes et al., 2002), NGO support remained critical to the financial sustainability of conservancies. However, NGOs rely on philanthropic funding that could represent external interests misaligned with conservancy priorities (e.g., wildlife conservation vs. benefit distribution; Crosman et al., 2021). More transparent partnerships with conservancies (Buzzard et al., 2023) and NGO assistance in institutional development could increase governance performance for low-scoring indicators (i.e., benefit planning, benefit distribution, financial management). We suggest expanding NGO support to other conservancies through new partnerships, especially for conservancies earning less income and with lower performance scores (e.g., northwest Kunene Region).

Occurrence of AGMs was associated with greater income earned since 2011 but not since 2019, which likely reflected fewer AGMs during the COVID-19 pandemic due to social gathering restrictions (i.e., 60% of conservancies that reported had no AGM in 2020; NACSO, 2021b). The sample size of AGM occurrence during 2019–2022 could have been too small to identify a consistent pattern across models. That AGMs positively affected the amount of income earned during 2011–2022 indicates that AGMs are important functions for conservancies (Muyengwa, 2015). That AGM occurrence recovered quickly after the COVID-19 pandemic (i.e., 87% of conservancies that reported had an AGM in 2021; NACSO, 2022b) also emphasized their importance to conservancy governance and high demand for participation. However, conservancy members' trust in governing committees to administer finances can be low (B. Child et al., unpublished data), suggesting that AGMs could be restructured to increase governance performance for member engagement and committee accountability indicators (Shimansky, 2021).

Local management and governance facilitate income by Namibia's conservancies (Lapeyre, 2015). Median annual income for conservancies earning >\$0 during 2019–2022 was 17% (i.e., \$10,235) less than during 2011–2022, despite an increase in grants (e.g., COVID-19 pandemic emergency relief funding), but we expect income to recover from the COVID-19 pandemic as tourism increases (NACSO, 2022b). The number of natural

resource-based income sources had the lowest median score (i.e., 0.17) among management performance indicators, indicating the need for diversification (Naidoo, Weaver, Longcamp, & Plessis, 2011). Income generation can also improve with direct participation of indigenous peoples and local communities in tourism industries (e.g., shared business ownership models; Hoole, 2009) or developing international wildlife trade policy (Störmer et al., 2019; e.g., Convention on International Trade in Endangered Species of Wild Fauna and Flora; Roe et al., 2022).

Financial sustainability is critical to building CBNRM economies that are resilient to climate change-induced drought (Carpenter, 2022), increasing costs of human-wildlife conflicts (Schneegg & Kiaka, 2018), and tourism market dynamics (e.g., wildlife trade restrictions; Angula et al., 2018; Nyamayedenga et al., 2021). Benefit distribution had the lowest median score (i.e., 0.4) among governance performance indicators but increases participation in CBNRM (Merz et al., 2023). In 2022, only 7 conservancies met MEFT's requirement to invest at least 50% of income in community development (NACSO, 2023) and compensation for human-wildlife conflicts represented 47% of cash benefits to conservancy members (NACSO, 2023). While human-wildlife conflict compensation is an important social service (Tavolaro et al., 2022), it diverts spending from income-generating opportunities or more transformative community development (B. Child et al., unpublished data). Continued emphasis on equitable benefit distribution and more effective conservancy spending could increase the socio-economic impact of income generated (Mosimane & Silva, 2015).

Namibia's event books are an effective community-led monitoring system used to assess conservancy performance as natural resource management institutions (Stuart-Hill et al., 2005). Event books can also be used to monitor poaching or human-wildlife conflicts (Wenborn et al., 2022) but some data could be socially constructed (Lubilo & Hebinck, 2019) and confirmed by additional data collection. Missing data precluded analysis of factors including conservancy compliance with MEFT requirements or gender equality of committees and staff, priorities for NACSO (NACSO, 2022a). In addition, some NGOs that work in Namibia's conservancies (e.g., World Wildlife Fund Namibia) were not included in the data. Increasing the number of conservancies using event books and overall data reporting quality could improve future research.

Namibia's national level legislation and NGO support enabled effective governance (Nelson et al., 2021) relative to CBNRM programs in other countries (Child & Barnes, 2010). However, secure land tenure can limit

development of CBNRM (Nelson & Agrawal, 2008) and its contributions to indigenous peoples' rights (e.g., Khoi and San peoples; Anaya, 2013). Representative committees, while an effective governing structure for Namibia's conservancies (Child et al., 2014), might not be applicable to communal institutions elsewhere in southern Africa (Mavah et al., 2022).

Improvements in natural resource management and institutional governance can greatly increase income for CBNRM economies. Our results support the development of emerging conservancies in Namibia's northeast Zambezi Region that have high income potential from high management and governance performances and NGO presence (NACSO, 2021b). We recommend that Namibia's conservancies, particularly those established more recently or without NGO presence (e.g., northwest Kunene Region), prioritize improving local management and governance to develop more resilient communal institutions that are financially sustainable.

## ACKNOWLEDGMENTS

We acknowledge Namibia's communal conservancies as owners of the accounting and monitoring data used. We thank the Namibian Association of CBNRM Support Organizations and World Wildlife Fund Namibia for providing data access including R. Diggle, I. Katjingsiua, K. Dierkes, H. Angula, and R. Illeka. Funding was provided by the Boone & Crockett Program in Wildlife Conservation at Michigan State University and the Michigan Involvement Committee of Safari Club International, Flint Regional Chapter.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

Data is not publicly available but can be shared upon reasonable request by contacting M. P. Louis.

## ORCID

J. D. Goergen  <https://orcid.org/0009-0008-4752-3913>

## REFERENCES

- Agrawal, A., & Gibson, C. C. (1999). Enchantment and disenchantment: The role of Community in Natural Resources Conservation. *World Development*, 27(4), 629–649.
- Anaya, J. (2013). Report of the Special Rapporteur on the rights of indigenous peoples: The situation of indigenous peoples in Namibia, Advance unedited version. United Nations Human Rights Council, 24th session, A/HRC/24/41.
- Angula, H. N., Stuart-Hill, G., Ward, D., Matongo, G., Diggle, R. W., & Naidoo, R. (2018). Local perceptions of trophy hunting on communal lands in Namibia. *Biological Conservation*, 218, 26–31. <https://doi.org/10.1016/j.biocon.2017.11.033>

- Artelle, K. A., Zurba, M., Bhattacharyya, J., Chan, D. E., Brown, K., Housty, J., & Moola, F. (2019). Supporting resurgent indigenous-led governance: A nascent mechanism for just and effective conservation. *Biological Conservation*, 240, 108284.
- Ashley, C. (1998). Intangibles matter: non-financial dividends of Community Based Natural Resource Management in Namibia. World Wildlife Fund Living in a Finite Environment Program. Windhoek, Namibia.
- Ashley, C., & Barnes, J. (1997). Wildlife use for economic gain: The potential for wildlife to contribute to development in Namibia. In *Environmental Sustainability*. CRC Press. <https://doi.org/10.1201/9780429117411-10>
- Atlas of Namibia Team. (2022). *Atlas of Namibia: Its land, water and life*. Namibia Nature Foundation.
- Bandyopadhyay, S., Humavindu, M., Shyamsundar, P., & Wang, L. (2009). Benefits to local communities from community conservancies in Namibia: An assessment. *Development Southern Africa*, 26(5), 733–754.
- Bank of Namibia. (2023). Bilateral Exchange Rate. Windhoek, Namibia.
- Barnes, G., & Child, B. (2014). *Adaptive cross-scalar governance of natural resources*. Routledge. <https://doi.org/10.4324/9781315851693>
- Barnes, J. I., Macgregor, J., & Chris Weaver, L. (2002). Economic efficiency and incentives for change within Namibia's community wildlife use initiatives. *World Development*, 30(4), 667–681.
- Boudreaux, K., & Nelson, F. (2011). Community conservation in Namibia: Empowering the poor with property rights. *Economic Affairs*, 31(2), 17–24.
- Brooks, J. S. (2017). Design features and project age contribute to joint success in social, ecological, and economic outcomes of community-based conservation projects. *Conservation Letters*, 10(1), 23–32.
- Brooks, M. E., Kristensen, K., van Benthem, K. J., Magnusson, A., Berg, C. W., Nielsen, A., Skaug, H. J., Mächler, M., & Bolker, B. M. (2017). glmmTMB balances speed and flexibility among packages for zero-inflated generalized linear mixed modelling. *The R Journal*, 9(2), 378–400.
- Buzzard, B., Chick, J., & Sulle, E. (2023). Rooting for change: Strengthening local-global partnerships in African conservation. Maliasili.
- Carpenter, S. (2022). Exploring the impact of climate change on the future of community-based wildlife conservation. *Conservation Science and Practice*, 4(1), e585.
- Chidakel, A., & Child, B. (2022). Convergence and divergence in the economic performance of wildlife tourism within multi-reserve landscapes. *Land Use Policy*, 120, 106252.
- Child, B. (2006). Revenue distribution for empowerment and democratization. In *Participatory learning and action 55: Practical tools for community conservation in southern Africa* (pp. 20–29). International Institute for Environment and Development.
- Child, B. (2019). *Sustainable governance of wildlife and community-based natural resource management: From economic principles to practical governance*. Routledge.
- Child, B., & Barnes, G. (2010). The conceptual evolution and practice of community-based natural resource management in southern Africa: Past, present and future. *Environmental Conservation*, 37(3), 283–295.
- Child, B., Mupeta, P., Muyengwa, S., & Lubilo, R. (2014). Community-based natural resource management: Micro-governance and face-to-face participatory democracy. In *Governance for justice and environmental sustainability*. Routledge.
- Collomb, J. G. E., Mupeta, P., Barnes, G., & Child, B. (2010). Integrating governance and socioeconomic indicators to assess the performance of community-based natural resources management in Caprivi (Namibia). *Environmental Conservation*, 37(3), 303–309.
- Crosman, K. M., Singh, G. G., & Lang, S. (2021). Confronting complex accountability in conservation with communities. *Frontiers in Marine Science*, 8, 709423.
- Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., Marquéz, J. R. G., Gruber, B., Lafourcade, B., Leitão, P. J., Münkemüller, T., McClean, C., Osborne, P. E., Reineking, B., Schröder, B., Skidmore, A. K., Zurell, D., & Lautenbach, S. (2013). Collinearity: A review of methods to deal with it and a simulation study evaluating their performance. *Ecography*, 36(1), 27–46.
- Fariss, B., DeMello, N., Powlen, K. A., Latimer, C. E., Masuda, Y., & Kennedy, C. M. (2022). Catalyzing success in community-based conservation. *Conservation Biology*, 37(1), e13973.
- Garnett, S. T., Burgess, N. D., Fa, J. E., Fernández-Llamazares, Á., Molnár, Z., Robinson, C. J., Watson, J. E. M., Zander, K. K., Austin, B., Brondizio, E. S., Collier, N. F., Duncan, T., Ellis, E., Geyle, H., Jackson, M. V., Jonas, H., Malmer, P., McGowan, B., Sivongxay, A., & Leiper, I. (2018). A spatial overview of the global importance of indigenous lands for conservation. *Nature Sustainability*, 1(7), 369–374.
- Goergen, J. D., Lindeque, M., Louis, M. P., Kellner, K. F., Roloff, G. J., & Belant, J. L. (2024). Drivers of hunting and photographic tourism income to communal conservancies in Namibia. *Global Ecology and Conservation*, 56, e03294. <https://doi.org/10.1016/j.gecco.2024.e03294>
- Hartig, F. (2022). DHARMA: Residual Diagnostics for Hierarchical (Multi-Level/Mixed) Regression Models. R package version 0.4.6.
- Hoole, A. (2009). Place-power-prognosis: Community-based conservation, partnerships, and ecotourism enterprises in Namibia. *International Journal of the Commons*, 4(1), 78–99.
- Hulke, C., Kalvelage, L., Kairu, J., Revilla Diez, J., & Rutina, L. (2022). Navigating through the storm: Conservancies as local institutions for regional resilience in Zambezi, Namibia. *Cambridge Journal of Regions, Economy and Society*, 15(2), 305–322.
- Humavindu, M. N., & Stage, J. (2014). Community-based wildlife management failing to link conservation and financial viability. *Animal Conservation*, 18(1), 4–13. <https://doi.org/10.1111/acv.12134>
- Jones, B. (2010). The evolution of Namibia's communal conservancies. In *Community rights, conservation and contested land: The politics of natural resource governance in Africa*. Routledge.
- Jones, B. T. B. (1999). Policy lessons from the evolution of a community-based approach to wildlife management, Kunene region, Namibia. *Journal of International Development*, 11(2), 295–304. [https://doi.org/10.1002/\(SICI\)1099-1328\(199903/04\)11:2<>3.0.CO;2-U](https://doi.org/10.1002/(SICI)1099-1328(199903/04)11:2<>3.0.CO;2-U)
- Jones, B. T. B., Diggle, R. W., & Thouless, C. (2015). From exploitation to ownership: Wildlife-based tourism and communal area conservancies in Namibia. In *Institutional arrangements for conservation, development and tourism in eastern and southern Africa: A dynamic perspective*. Springer Netherlands. [https://doi.org/10.1007/978-94-017-9529-6\\_2](https://doi.org/10.1007/978-94-017-9529-6_2)

- Kalvelage, L., Revilla Diez, J., & Bollig, M. (2020). How much remains? Local value capture from tourism in Zambezi, Namibia. *Tourism Geographies*, 24(4–5), 759–780.
- Lapeyre, R. (2011). Governance structures and the distribution of tourism income in Namibian communal lands: A new institutional framework. *Journal of Economic and Human Geography*, 102(3), 302–315.
- Lapeyre, R. (2015). The Tsiseb conservancy: How communities, the state and the market struggle for its success. In *Institutional arrangements for conservation, development and tourism in eastern and southern Africa: A dynamic perspective*. Springer Netherlands. [https://doi.org/10.1007/978-94-017-9529-6\\_3](https://doi.org/10.1007/978-94-017-9529-6_3)
- Larson, A. M., Sarmiento Barletti, J. P., & Heise Vigil, N. (2022). A place at the table is not enough: Accountability for indigenous peoples and local communities in multi-stakeholder platforms. *World Development*, 155, 105907.
- Lavelle, J.-J. (2023). Towards pro-poor or pro-profit? The governance framework for harvesting and trade of devil's claw (*Harpagophytum spp.*) in the Zambezi region, Namibia. In *Conservation, markets & the environment in southern and eastern Africa*. James Currey.
- Lendelvo, S. M., Pinto, M., & Sullivan, S. (2020). A perfect storm? The impact of COVID-19 on community-based conservation in Namibia. *Namibian Journal of Environment*, 4, 15.
- Lindsey, P., Allan, J., Brehony, P., Dickman, A., Robson, A., Begg, C., Bhammar, H., Blanken, L., Breuer, T., Fitzgerald, K., Flyman, M., Gandiwa, P., Giva, N., Kaelo, D., Nampindo, S., Nyambe, N., Steiner, K., Parker, A., Roe, D., ... Tyrrell, P. (2020). Conserving Africa's wildlife and wildlands through the COVID-19 crisis and beyond. *Nature Ecology & Evolution*, 4(10), 1300–1310. <https://doi.org/10.1038/s41559-020-1275-6>
- Lindsey, P. A., Havemann, C. P., Lines, R. M., Price, A. E., Retief, T. A., Rhebergen, T., van der Waal, C., & Romañach, S. S. (2013). Benefits of wildlife-based land uses on private lands in Namibia and limitations affecting their development. *Oryx*, 47(1), 41–53. <https://doi.org/10.1017/S0030605311001049>
- Lindsey, P. A., Nyirenda, V. R., Barnes, J. I., Becker, M. S., McRobb, R., Tambling, C. J., Taylor, W. A., Watson, F. G., & t'Sas-Rolfes, M. (2014). Underperformance of African protected area networks and the case for new conservation models: Insights from Zambia. *PLoS One*, 9(5), e94109. <https://doi.org/10.1371/journal.pone.0094109>
- Lubilo, R., & Hebinck, P. (2019). 'Local hunting' and community-based natural resource management in Namibia: Contestations and livelihoods. *Geoforum*, 101, 62–75.
- Mavah, G., Child, B., & Swisher, M. E. (2022). Empty laws and empty forests: Reconsidering rights and governance for sustainable wildlife management in the Republic of the Congo. *African Journal of Ecology*, 60(2), 212–221.
- Merz, L., Pienaar, E. F., Fik, T., Muyengwa, S., & Child, B. (2023). Wildlife institutions highly salient to human attitudes toward wildlife. *Conservation Science and Practice*, 5(2), e12879.
- Ministry of Environment and Tourism (MET). (1995). Wildlife management, utilization and tourism in communal areas. Government of Republic of Namibia, Policy Document. Windhoek, Namibia.
- Ministry of Environment and Tourism (MET). (2007). Policy on tourism and wildlife concessions on state land. Government of Republic of Namibia, Policy Document. Windhoek, Namibia.
- Ministry of Wildlife, Conservation and Tourism (MWCT). (1992). The Establishment of Conservancies in Namibia. Government of Republic of Namibia, Policy Document. Windhoek, Namibia.
- Mosimane, A., & Silva, J. (2015). Local governance institutions, CBNRM, and benefit-sharing Systems in Namibian Conservancies. *Journal of Sustainable Development*, 8(2), 99.
- Muyengwa, S. (2015). Determinants of individual level satisfaction with community based natural resources management: A case of five communities in Namibia. *Environments*, 2(4), 608–623.
- NACSO. (2021a). *The state of community conservation in Namibia (Annual Report 2019)*. Ministry of Environment, Forestry and Tourism, and Namibian Association of CBNRM Support Organizations. Windhoek.
- NACSO. (2021b). *The state of community conservation in Namibia (Annual Report 2020)*. Ministry of Environment, Forestry and Tourism, and Namibian Association of CBNRM Support Organizations.
- NACSO. (2022a). *Strategic plan 2023–2026*. Namibian Association of CBNRM Support Organizations.
- NACSO. (2022b). *The state of community conservation in Namibia (Annual Report 2021)*. Ministry of Environment, Forestry and Tourism, and Namibian Association of CBNRM Support Organizations.
- NACSO. (2023). *The state of community conservation in Namibia (Annual Report 2022)*. Ministry of Environment, Forestry and Tourism, and Namibian Association of CBNRM Support Organizations.
- Naidoo, R., Weaver, L. C., Diggle, R. W., Matongo, G., Stuart-Hill, G., & Thouless, C. (2016). Complementary benefits of tourism and hunting to communal conservancies in Namibia. *Conservation Biology*, 30(3), 628–638.
- Naidoo, R., Weaver, L. C., Longcamp, M. D., & Plessis, P. D. (2011). Namibia's community-based natural resource management programme: An unrecognized payments for ecosystem services scheme. *Environmental Conservation*, 38(4), 445–453.
- Naidoo, R., Weaver, L. C., Stuart-Hill, G., & Tagg, J. (2011). Effect of biodiversity on economic benefits from communal lands in Namibia. *Journal of Applied Ecology*, 48(2), 310–316.
- Namibia Statistics Agency (NSA). (2024). *Namibia 2023 Population and Housing Census: Main Report*. Namibia Statistics Agency.
- Nelson, F., & Agrawal, A. (2008). Patronage or participation? Community-based natural resource management reform in sub-Saharan Africa. *Development and Change*, 39(4), 557–585.
- Nelson, F., Muyamwa-Mupeta, P., Muyengwa, S., Sulle, E., & Kaelo, D. (2021). Progress or regression? Institutional evolutions of community-based conservation in eastern and southern Africa. *Conservation Science and Practice*, 3(1), e302.
- Nyamayedenga, S., Mashapa, C., Chateya, R. J., & Gandiwa, E. (2021). An assessment of the impact of the 2014 US elephant trophy importation ban on the hunting patterns in Matetsi hunting complex, north-west Zimbabwe. *Global Ecology and Conservation*, 30, e01758.
- Ostrom, E. (2000). Collective action and the evolution of social norms. *Journal of Economic Perspectives*, 14(3), 137–158.
- Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. *The American Economic Review*, 100(3), 641–672.
- R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing.
- Republic of Namibia. (1975). *Nature conservation ordinance*. Government Gazette of The Republic of Namibia.

- Republic of Namibia. (1996). *Promulgation of nature conservation amendment act*. Government Gazette of The Republic of Namibia.
- Republic of Namibia. (2002). *Communal land reform act*. Government Gazette of The Republic of Namibia.
- Reyes-García, V., Fernández-Llamazares, Á., Aumeeruddy-Thomas, Y., Benyei, P., Bussmann, R. W., Diamond, S. K., García-del-Amo, D., Guadilla-Sáez, S., Hanazaki, N., Kosoy, N., Lavidés, M., Luz, A. C., McElwee, P., Meretsky, V. J., Newberry, T., Molnár, Z., Ruiz-Mallén, I., Salpeteur, M., Wyndham, F. S., ... Brondizio, E. S. (2022). Recognizing indigenous peoples' and local communities' rights and agency in the post-2020 biodiversity agenda. *Ambio*, 51(1), 84–92. <https://doi.org/10.1007/s13280-021-01561-7>
- Ribot, J. C. (2002). *Democratic decentralization of natural resources. Institutionalizing popular participation*. World Resource Institute.
- Roe, D., Wilson-Holt, O., Leger, T., Parry-Jones, R., & O'Criodain, C. (2022). Engaging Indigenous people and local communities in international policy- and decision-making: Lessons for CITES from multilateral environmental and human rights processes. IUCN Sustainable Use and Livelihoods Specialist Group and WWF International.
- Schnegg, M., & Kiaka, R. D. (2018). Subsidized elephants: Community-based resource governance and environmental (in) justice in Namibia. *Geoforum*, 93, 105–115.
- Shimansky, T. L. (2021). *The Effects of Governance Type and Scale on Community Conservation in Southern Africa*. University of Florida.
- Silva, J. A., & Mosimane, A. (2014). “How could I live here and not Be a member?”: Economic versus social drivers of participation in Namibian conservation programs. *Human Ecology*, 42(2), 183–197.
- Silva, J. A., & Mosimane, A. W. (2013). Conservation-based rural development in Namibia: A mixed-methods assessment of economic benefits. *The Journal of Environment & Development*, 22(1), 25–50.
- Smith, G. (2019). Design Matters: CBNRM and Democratic Innovation. In *Governance Discussion Paper No. 3*. World Bank Group.
- Störmer, N., Weaver, L. C., Stuart-Hill, G., Diggle, R. W., & Naidoo, R. (2019). Investigating the effects of community-based conservation on attitudes towards wildlife in Namibia. *Biological Conservation*, 233, 193–200. <https://doi.org/10.1016/j.biocon.2019.02.033>
- Stuart-Hill, G., Diggle, R., Munali, B., Tagg, J., & Ward, D. (2005). The event book system: A community-based natural resource monitoring system from Namibia. *Biodiversity and Conservation*, 14(11), 2611–2631.
- Tavolaro, F. M., Woodgate, Z., Brown, C., Redpath, S. M., & O'Riain, M. J. (2022). Multispecies study of patterns and drivers of wildlife impacts on human livelihoods in communal conservancies. *Conservation Science and Practice*, 4(9), e12773.
- Taylor, R. (2009). Community based natural resource management in Zimbabwe: The experience of CAMPFIRE. *Biodiversity and Conservation*, 18(10), 2563–2583.
- United States Bureau of Labor Statistics (USBLS). (2023). *Consumer price index for all urban consumers*. United States Bureau of Labor Statistics.
- Weaver, C. L., Hamunyela, E., Diggle, R., Matongo, G., & Pietersen, T. (2011). The catalytic role and contributions of sustainable wildlife use to the Namibia CBNRM Programme. In *CITES and CBNRM. Proceedings of an international symposium on “the relevance of CBNRM to the conservation and sustainable use of CITES-listed species in exporting countries”*. International Union for Conservation of Nature.
- Wenborn, M. J., Nijman, V., Kangombe, D., Zaako, R. K., Tjimune, U., Kavita, A., Hinu, J., Huwe, R., Ngarukue, V. J., Kapringi, K. J., & Svensson, M. S. (2022). Analysis of records from community game guards of human-elephant conflict in Orupupa conservancy, northwest Namibia. *Namibian Journal of Environment*, 6, A-100.
- World Bank Group (WBG). (2023). Namibia – data. Washington, DC, USA.
- Zhang, Y., West, P., Thakholi, L., Suryawanshi, K., Supuma, M., Straub, D., Sithole, S. S., Sharma, R., Schleicher, J., Ruli, B., Rodríguez-Rodríguez, D., Rasmussen, M. B., Ramenzoni, V. C., Qin, S., Pugley, D. D., Palfrey, R., Oldekop, J., Nuesiri, E. O., Nguyen, V. H. T., ... Agyei, F. K. (2023). Governance and conservation effectiveness in protected areas and indigenous and locally managed areas. *Annual Review of Environment and Resources*, 48(1), 559–588. <https://doi.org/10.1146/annurev-environ-112321-081348>

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Goergen, J. D., Louis, M. P., Kellner, K. F., Roloff, G. J., Lindeque, M., & Belant, J. L. (2025). Local management and governance improve natural resource incomes of communal conservancies in Namibia. *Conservation Science and Practice*, e70054. <https://doi.org/10.1111/csp2.70054>