

CITATION

For the publication: Kettunen, M., Dudley, N., Gorricho, J., Hickey, V., Krueger, L., MacKinnon, K., Oglethorpe, J., Paxton, M., Robinson, J.G., and Sekhran, N. 2021. *Building on Nature: Area-based conservation as a key tool for delivering SDGs*. IEEP, IUCN WCPA, The Nature Conservancy, The World Bank, UNDP, Wildlife Conservation Society and WWF.

For individual case studies: *Case study authors*. 2021. Case study name. In: Kettunen, M., Dudley, N., Gorricho, J., Hickey, V., Krueger, L., MacKinnon, K., Oglethorpe, J., Paxton, M., Robinson, J.G., and Sekhran, N. 2021. *Building on Nature: Area-based conservation as a key tool for delivering SDGs*. IEEP, IUCN WCPA, The Nature Conservancy, The World Bank, UNDP, Wildlife Conservation Society and WWF.

CORRESPONDING AUTHORS

Nigel Dudley (nigel@equilibriumresearch.com) and Marianne Kettunen (mkettunen@ieep.eu)

PARTNERS

Institute for European Environmental Policy (IEEP) IUCN World Commission on Protected Areas (WCPA) The Nature Conservancy (TNC) The World Bank Group UN Development Programme (UNDP) Wildlife Conservation Society (WCS) WWF



DISCLAIMER

The information and views set out in this publication are those of the authors and do not necessarily reflect official opinions of the institutions involved.

ACKNOWLEDGEMENTS

This report and the work underpinning it has benefitted from the support of the following people: Sophia Burke (AmbioTEK CIC), Andrea Egan (UNDP), Marie Fischborn (PANORAMA), Barney Long (Re-Wild), Melanie McField (Healthy Reefs), Mark Mulligan (King's College, London), Caroline Snow (proofreading), Sue Stolton (Equilibrium Research), Lauren Wenzel (NOAA), and from the many case study authors named individually throughout the publication.

Design and layout: Miller Design

INSTITUTE FOR EUROPEAN ENVIRONMENTAL POLICY (IEEP)

IEEP Main Office Rue Joseph II 36-38 1000 Bruxelles, Belgium Tel: +32 (0) 2738 7482 Fax: +32 (0) 2732 4004 London Office 25EP, 25 Eccleston Place Belgravia SW1W 9NF London, the UK Tel: + 44 (0)204 524 9900 \checkmark @IEEP_eu

The Institute for European Environmental Policy (IEEP) is a sustainability think tank with offices in Brussels and London. As a not-for-profit research organisation with over 40-years of experience, we are committed to advancing evidence-based and impact-driven sustainability policy across the EU and the world.



Area-based conservation as a key tool for delivering SDGs

Table of contents

Executive summary	7
Part A: Setting the scene	14
1. Objective and approach of the guidance	17
2. Introduction	18
2.1. What is effective area-based conservation?	18
2.2. How can effective area-based conservation support the sustainable	
development goals?	21
3. Status of our natural capital	25
3.1. Status of our natural environment and resources	25
3.2. Status of effective area-based conservation	26
3.3. Status of the sustainable development goals	28
3.4. Contribution of effective area- based conservation to the sustainable	
development goals	30
Part B: Goal by goal guidance	234
Cornerstones of conservation and underpinnings of	
prosperity	36
SDG 15: Life on land	37
Case study: Protecting the Papua New Guinea tree kangaroo, eradicatin poverty and building livelihoods of	g
local communities Case study: Saving the black lion	42
tamarin, securing long-term sustainability for local communities	45
Case study: Private conservation of	

remnant forests ecosystems to support

50

sustainable development

7	SDG 14: Life below water
14	 Case study: Protecting corals and seagrass to combat climate change and its impacts
17	Case study: Sustainable development of a coastal community, building on the benefits of a marine protected area
18	
18	conservation as a means to strengthen climate resilience
	Fundamentals for wellbeing
2	SDG 2: Zero hunger
25 t	Case study: Protecting crop wild varieties for food security
25	Case study: Growing coffee to restore rainforest and local livelihoods
26	
28	SDG 6: Clean water and sanitation
30	Case study: Maintaining and managing wetlands for fresh water supply and biodiversity
234	Case study: Securing regional water supply through protected areas restoration
	Case study: Supplying clean
36	drinking water to a capital city

54

60

63

66

70 71

78

80

87

92

95

98

SDG 13: Climate action	103	SDG 11: Sustainable cities	
Case study: Climate adaptation	-	and communities	179
through the protection of cultural landscape and practices	109	Case study: A city in nature – Singapore's vision of restoring	
Case study: Adapting to climate	109	nature into the city	184
change through community-led conservation	113	Case study: Community conserved areas as building blocks for sustainal	
Case study: Conserving intact forest for climate mitigation and adaptation		communities Case study: Combining conservation	
Case study: Protecting and restoring the Mesoamerican coral reef to impr	-	and cultural tourism to support local livelihoods	193
climate resilience and adaptation	119	Case study: Evolving management of protected areas as a solution	
Sustainable and healthy societies	106	towards a resilient eco-city	196
	126		
SDG 1: No poverty Case study: Supporting area-based	127	SDG 16: Peace, justice and strong institutions	202
conservation as a means to reduce		Case study: Collaboration for	203
poverty and improve food security Case study: Indigenous protected	132	conservation delivering peace and improved regional security	208
areas helping to rebuild communitie	S	Case study: Parks & peace:	
in Australia	136	strengthening peace in Colombia through inclusive conservation	212
SDG 3: Good health and wellbeing 141		Case study: Conservation, sustainable development and peace work in a	
SDG 3: Good health and wellbeing	141	The second s	ole
-	-	The second s	215
wellbeing Case study: Promotion of national	-	development and peace work in a	
wellbeing Case study: Promotion of national health benefits as a part of protected		development and peace work in a war zone	215 220
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a 	147	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the	215 220
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a source of health for all SDG 10 and SDG 5: Reduced 	147	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the sustainable development goals	215220223
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a source of health for all SDG 10 and SDG 5: Reduced inequalities, including improving gender equality Case study: Indigenous lands and nationally protected areas: how area-based conservation reduces economic, political and gender 	147 151 159	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the sustainable development goals	215220223
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a source of health for all SDG 10 and SDG 5: Reduced inequalities, including improving gender equality Case study: Indigenous lands and nationally protected areas: how area-based conservation reduces 	147	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the sustainable development goals	215220223
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a source of health for all SDG 10 and SDG 5: Reduced inequalities, including improving gender equality Case study: Indigenous lands and nationally protected areas: how area-based conservation reduces economic, political and gender 	147 151 159	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the sustainable development goals	215220223
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a source of health for all SDG 10 and SDG 5: Reduced inequalities, including improving gender equality Case study: Indigenous lands and nationally protected areas: how area-based conservation reduces economic, political and gender inequities Case study: Improving women's 	147 151 159 165 168 ties	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the sustainable development goals	215220223
 wellbeing Case study: Promotion of national health benefits as a part of protected area governance Case study: Protected areas as a source of health for all SDG 10 and SDG 5: Reduced inequalities, including improving gender equality Case study: Indigenous lands and nationally protected areas: how area-based conservation reduces economic, political and gender inequities Case study: Improving women's lives through conservation Case study: Reducing local inequalities 	147 151 159 165 168 ties	development and peace work in a war zone Part C: Call for action Towards using effective area-based conservation as a tool for delivering the sustainable development goals	215220223

15 LIFE ON LAND

Co-benefit SDGs







Robin Moore, Global Wildlife Conservation and S.Blair Hedges, (Temple University).





Grand Bois Privately Protected Area, Haiti

Case study



Background: Haiti's biodiversity is threatened by the almost complete loss of primary forest cover, which has been reduced by some estimates to approximately 0.3 per cent of the original;⁶⁷ one of the highest losses in the tropics. Forests have continued to be destroyed even within national parks and 42 out of the 50 highest mountains have lost all their primary forest.⁶⁸ Even taking into account technical concerns disputed among experts,⁶⁹ less than one per cent of primary forest remains, placing biodiversity in peril.⁷⁰ Deforestation has already caused the extinction of endemic species, by inference, and many more species are under severe threat.⁷¹

Sustainability challenge: The primary pressures include smallholder agriculture and charcoal production.⁷² There are larger areas of secondary forests and plans for reforestation,⁷³ but any forests other than primary forests will support only a small fraction of the original biodiversity. Some timber use, including some charcoal

production,⁷⁴ may be sustainable, but the critical conservation priority is to preserve the fragments of primary forests that remain, where many of the endemic species are concentrated.⁷⁵

One of the most important remaining forest areas is on the isolated Grand Bois mountain, with substantial forest cover remaining above a thousand metres.⁷⁶ Two research expeditions documented 68 species of vertebrates, including 19 amphibian species, giving this area the distinction of being home to one of the largest groupings of co-occurring frog species anywhere in the Caribbean.77 Grand Bois is found in Haiti's Massif de la Hotte mountain range, the number one priority conservation site in the country and one of the most important sites for amphibians in the world.⁷⁸ Because 19 Critically Endangered amphibian species are restricted to this single area globally,79 Massif de La Hotte has been recognised as an Alliance for Zero Extinction site,80 and probably has the world's largest number of

Case study



known AZE species in a single site.⁸¹ It is also within a Key Biodiversity Area, a nationally identified site of global significance for biodiversity.

Conservation solution: The NGO,

Global Wildlife Conservation, has partnered with Rainforest Trust and the local NGOs, Haiti National Trust and Audubon Society of Haiti, to buy the country's first privately protected area on Grand Bois in 2019. The new reserve broadly overlaps with the newly declared Grand Bois National Park, established by the Haitian government in 2015, but where logging was continuing and new approaches were urgently needed. The privately protected area covers about 5 km² including a core of primary forest, offering protection to several rare species found nowhere else on Earth. These include the Critically Endangered Ekman's magnolia tree (Magnolia ekmanii), known only from Grand Bois, and the Tiburon streamfrog (Eleutherodactylus semipalmatus), until a recent expedition, thought to have been long extinct.

The forest was already being protected to some extent by local people, who recognised its role as a water tower and a means of preventing the landslides that have proved deadly in large parts of the island. There is local community support for conservation of the area, and continued work on long-term restoration around the site. By purchasing the site directly, and employing local people as rangers, the Haiti National Trust is hoping to secure biodiversity, provide disaster risk reduction and water services to local and more distant communities, and also prevent further losses of unique biodiversity.

Endnotes

1 IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E.S. Brondízio, H.T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K.A. Brauman, S.H.M. Butchart, K.M.A. Chan, L.A. Garibaldi, K. Ichii, J. Liu, S.M. Subramanian, G.F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y.J. Shin, I.J. Visseren-Hamakers, K.J. Willis and C.N. Zayas (eds.). IPBES Secretariat, Bonn, Germany.

https://www.iucnredlist.org/ accessed 14 March 2020.
 Ramsar Convention. 2018. *Global Wetland Outlook*.
 Gland, Switzerland.

4 O'Hara, C.C., VillaseñorDerbez, J.C., Ralph, G.M. and Halpern, B.S. 2019. Mapping status and conservation of global at-risk marine biodiversity. *Conservation Letters* **12**: e12651. https://doi.org/10.1111/conl.12651.

5 Jones, K.R., Klein, C.J., Halpern, B.S., Venter, O., Grantham, H., Kuempel, C.D., Shumway, N., Friedlander, A.M., Possingham, H.P. and Watson, J.E.M. 2018. The Location and Protection Status of Earth's Diminishing Marine Wilderness. *Current Biology* 28 (16): 2683.

6 Ramsar Convention. 2018. Op cit.

7 Schipper, J., Chanson, J.S., Chiozza, F., Cox, N.A., Hoffman, M. et al. 2008. The stats of the world's land and marine mammals: diversity, threat and knowledge. *Science* 322: 225-230.

8 BirdLife International. 2018. *State of the world's birds: taking the pulse of the planet*. BirdLife International, Cambridge, UK.

9 Böhm, M., Collen, B., Baillie, J.E.M., Bowles, P., Chanson, J. et al. 2013. The conservation status of the world's reptiles. *Biological Conservation* **157**: 372-385.

10 Catenazzi, A. 2015. State of the world's amphibians. *Annual Review of Environmental Resources* **40**: 91-119.

11 Arthington, A.H., Dulvy, N.K., Gladstone, W. and Winfield, I.J. 2016. Fish conservation in freshwater and marine realms: status, threats and management. *Aquatic Conservation: Marine and Freshwater Ecosystems.* **26** (5): 838-857.

12 Wagner, D.L. 2020. Insect declines in the Anthropocene. *Annual Review of Entomology* **65**: 457-480.

13 Willis, K.J. (ed.) 2017. *State of the World's Plants 2017*. Royal Botanic Gardens, Kew.

14 Wei, W., Swainsgood, R.R., Pilfold, N.W., Owen, M.A., Dai, Q., Wei, F., Han, H., Yang, Z., Yang, X., Gu, X., Zhang, J., Yuan, S. Hong, M., Tang, J., He, K. and Zhang, Z. 2020. Assessing the effectiveness of China's panda protection system. *Current Biology* **30** (7): 1280-1286.

15 Hodgetts, T., Lewis, M., Bauer, H., Burnham, D., Dickman, A. et al. 2018. Improving the role of global conservation treaties in addressing contemporary threats to lions. *Biodiversity and Conservation* **27** (10): 2747-2765.

16 Riggio, J.S., Jacobson, A., Dollar, L., Bauer, H., Becker, M. et al. 2013. The size of savannah Africa: A lion's (*Panthera leo*) view. *Biodiversity and Conservation* **22** (1): 17-35.

17 Bauer, H., Chapron, G., Nowell, K., Henschel, P., Funston, P. et al. 2015. Lion (*Panthera leo*) populations are declining rapidly across Africa, except in intensively managed areas. *Proceedings of the National Academy of Science* **112**: 14894-14899.

18 Henschel, P., Coad, L., Burton, C., Chataigner, B., Dunn, A., MacDonald, D. et al. 2014. The Lion in West Africa Is Critically Endangered. *PLOS ONE* **9** (1).

19 http://forestdeclaration.org/goal/goal-1/ accessed 14 March 2020.

20 NYDF Assessment Partners. 2019. Protecting and Restoring Forests: A Story of Large Commitments yet Limited Progress. New York Declaration on Forests Five-Year Assessment Report. Climate Focus (coordinator and editor). Accessible at forestdeclaration.org

21 Forest Trends. 2018. Zooming In: Companies, commodities and traceability commitments that count, 2018. Washington DC.

22 Weisse, M. and Dow Goldman, E. 2019. The world lost a Belgium-sized area of primary rainforests last year. World Resources Institute, 29 April 2019, https://www.wri. org/blog/2019/04/world-lost-belgium-sized-area-primaryrainforests-last-year accessed 14 March 2020.

23 Barbier, E. and Hochard, J. 2016. Does land degradation increase poverty in developing countries? *PLoS ONE* **11**:12-15.

24 UNCCD. 2017. Global Land Outlook. UNCCD, Bonn.

25 Qadir, M., Quillerou, E., Nangia, V., Murtaza, G., Singh, M. et al. 2014. Economics of salt-induced land degradation and restoration. *Natural Resources Forum* **28**: 282-295.

26 Montgomery, D. 2007. Soil erosion and agricultural sustainability. *Proceedings of the National Academy of Sciences* 104:13268-72

27 Don, A., Schumacher, J. and Freibauer, A. 2011. Impact of tropical land-use change on soil organic carbon stocks–a meta-analysis. *Global Change Biology* 17: 1658-1670.
28 Pierzynski, G.M., Sims, J.T. and Vance, G.F. 2005. *Soils and*

28 Pierzynski, G.M., Sims, J.T. and Vance, G.F. 2005. *Soils and Environmental Quality*, Third Edition. Taylor and Francis, Boca Raton, FL, USA.

29 Kochian, L.V., Piñeros, M.A., Liu, J. and Magalhaes, J.V. 2015. Plant Adaptation to Acid Soils: The Molecular Basis for Crop Aluminum Resistance. *Annual Review of Plant Biology* **66**: 571-598.

30 Horn, R. 2011. Management effects on soil properties and functions. 447-455. In: J. Glinski, J. Horabik and J. Lipiec (eds.) *Encyclopedia of Agrophysics*. Springer Verlag, Dordrecht.

31 Wagg, C., Bender, S.F., Widmer, F. and van der Heijden, M.G.A. 2014. Soil biodiversity and soil community composition determine ecosystem multifunctionality. *Proceedings of the National Academy of Sciences* **11** (14): 5266-5270.

32 Mountain Partnership. Undated. *Why mountains matter for climate change adaptation and disaster risk reduction: A call for action on the Sustainable Development Goals.* Rome.

33 Wilson Fernandes, G., Serra Cielho, M., Bomfin Machado, R., Ferreira, M.E., Moura de Souza Aguiar, L. Dirzo, R., Scariot, A. and Lopes, C.R. 2016. Afforestation of savannas: an impending ecological disaster. *Natureza & Conservação* **14**: 146-151.

34 Veldman, J.W., Buisson, E., Durigan, G., Wison Fernandes, G., Le Stradic, S., Mahy, G., Negreiros, D., Overbeck, G.E., Veldman, R., Zaloumis, N.P., Putz, F.E. and Bond, W.J. 2015. Towards an old-growth concept for grasslands, savannas, and woodlands. *Frontiers in Ecology and the Environment* **13** (3): 154-162.

35 Nelson, A. and Chomitz, K. 2009. *Protected Area Effectiveness in Reducing Tropical Deforestation*, The World Bank, Washington, DC.

36 Joppa, L.N. and Pfaff, A. 2011. Global protected area impacts. *Proceedings of the National Academy of Sciences* **278**: 1633-1638.

37 Geldmann, J., Coad, L., Barnes, M.D., Craigie, I.D., Woodley, S., Balmford, A. et al. 2018. A global analysis of management capacity and ecological outcomes in terrestrial protected areas. *Conservation Letters*: p.e12434

38 WWF. 2016. *Living Planet Report 2016. Risk and resilience in a new era.* WWF International, Gland, Switzerland.

39 Butchart, S.H.M., Stattersfield, A.J. and Collar, N.J. 2006. How many bird extinctions have we prevented? *Oryx* **40**: 266-278.

40 Young, R.P., Hudson, M.A., Terry, A.M.R., Jones, C.G., Lewis, R.E. et al. 2014. Accounting for conservation: Using the IUCN Red List Index to evaluate the impact of a conservation organization. *Biological Conservation* **180**: 84-96.

41 Hoffmann, M., Duckworth, J.W., Holmes, K., Mallon, D.P., Rodrigues, A.S.L. et al. 2015. The difference conservation makes to extinction risk of the world's ungulates. *Conservation Biology* **29**: 1303-1313.

42 Foxcroft, L.C., Pyšek, P., Richardson, D.M. and Genovesi, P (eds.) *Plant Invasions in Protected Areas: Patterns, problems and challenges.* Springer, Dordrecht.

challenges. Springer, Dordrecht.
43 Venter, O., Magrach, A., Outram, N., Klein, C.J., Possingham, H.P., Di Marco, M. and Watson, J.E.M. 2017. Bias in protected-area location and its effects on long-term aspirations of biodiversity conventions. *Conservation Biology* 32 (1): 127-134.

44 Watson, J.E.M., Venter, O., Lee, J., Jones, K.R., Robinson, JG., Possingham, H.P. and Allan, J.R. 2018. Protect the last of the wild. *Nature* **563**: 27-30.

45 Gill, D.A., Mascia, M.B., Ahmadia, G.N., Glew, L., Lester, S.E., Barnes, M. et al. 2017. Capacity shortfalls hinder the performance of marine protected areas globally. *Nature* **543** (7647): 665-669.

46 Dinerstein, E., Vynne, C. Sala, E. Joshi, A.R., Fernando, S.,
Lovejoy, T.E., Mayorga, J. et al. 2019. A Global Deal for Nature:
Guiding principles, milestones, and targets. *Science Advances* 5 (4): eaaw2869.

47 Wilson, E.O. 2016. *Half Earth: Our planet's fight for life*. Liveright/W.W. Norton, New York.

48 IUCN-WCPA Task Force on OECMs. 2019. *Recognising and reporting other effective area-based conservation measures.* Gland, Switzerland.

49 Dudley, N., Jonas, H., Nelson, F., Parrish, J., Pyhälä, A., Stolton, S. and Watson, J.E.M. 2018. The essential role of other effective area-based conservation measures in achieving big bold conservation targets. *Global Ecology and Conservation* **15**: e0024.

50 Nepstad, D., Schwartzman, S., Bamberger, B., Santilli, M., Ray, D. et al. Inhibition of Amazon deforestation and fire by parks and indigenous lands. *Conservation Biology* **20** (1): 65-73. **51** Fa, J.E., Watson, J.E.M., Leiper, I. Potapov, P., Evans, T.D. et al. 2020. Importance of indigenous peoples' lands for the conservation of intact forest landscapes. *Frontiers of Ecology and the Environment*: doi:10.1002/fee.2148.

52 Hilty, J., Worboys, G.L., Keeley, A. et al. 2020. *Guidelines for conserving connectivity through ecological networks and corridors.* Best Practice Protected Area Guidelines Series No. 30. IUCN, Gland, Switzerland.

53 IUCN-WCPA Task Force on OECMs. 2019. *Recognising and reporting other effective area-based conservation measures*. IUCN, Gland, Switzerland.

54 Stolton, S., Redford, K.H. and Dudley, N. 2014. *The Futures of Privately Protected Areas*. IUCN, Gland, Switzerland.

55 IUCN-WCPA Task Force on OECMs. 2019. Op cit.

56 Zimmerman, B.L. and Kormos, C.F. 2012. Prospects for sustainable logging in tropical forests. *Bioscience* **62** (5): 479-487.

57 Putz, F.E., Zuidema, P.A., Synnott, T., Peña-Claros, M., Pinard, M.A. et al. 2012. Sustaining conservation values in selectively logged forests: the attained and the attainable. *Conservation Letters* 5 (4): 296-303.

58 Dudley, N., MacKinnon, K. and Stolton, S. 2014. The role of protected areas in supplying ten critical ecosystem services in drylands: a review. *Biodiversity* doi: 10.1080/14888386.2014.928790.

59 Al-Dousari, A.M. 2009. Recent studies on dust fallout within preserved and open areas in Kuwait. In: N.R. Bhat, A.Y. Al-Nasser and S.A.S. Omar (eds) *Desertification in Arid Lands: Causes, consequences and mitigation.* Kuwait Institute for Scientific Research, Kuwait: 137-147.

60 Schneider, I.E. and Burnett, G.W. 2000. Protected area management in Jordan. *Environmental Management* **25** (3): 241-246.

61 https://www.zoo.org/tkcp accessed 8 July 2020.

62 Dinu, A., Paxton, M., Cadman, M. and Petersen, C. 2016. *Voices of Impact: Speaking for the global commons*. UNDP, New York.

63 Padua, S.M., Valladares-Padua, C. and Martins, C.S. 2011. Conservation education in Brazil: A case study of IPE - Instituto de Pesquisas Ecológicas / Institute for Ecological Research. *Biology International* **50**: pp.109-115

64 Seavy, N.E., Gardali, T., Golet, G.H., Griggs, F.T., Howell, C.A. et al. 2009. Why climate change makes riparian restoration more important than ever: recommendations for practice and research. *Ecological Restoration* **27** (3): 330-338

65 Modified from: Valladares-Padua, C., Cullen Jr., L., Padua, S.M., Martins, C.S. and Lima, F.S. 2002. Assentamentos de reforma agrária e conservação de áreas protegidas no Pontal do Paranapanema. In: N. Bensusan. (ed.). *Seria melhor mandar ladrilhar? Biodiversidade, como, para que por quê.* São Paulo and Brasilia: Instituto Socioambiental and Universidade de Brasília, pp. 67-76.

66 Based on: Cullen Jr., L. 2020. Corridor for Life: Improving Livelihoods and Connecting Forests in Brazil, 2020. Available at: www.jee.org.br or www.facebook.com/100008282959361/ videos/2546258742326866/.

67 Hedges, S.B., Cohen, W.B., Timyan, J. and Yang, Z. 2018. Haiti's biodiversity threatened by nearly complete forest loss. *Proceedings of the National Academy of Sciences* **115** (46): 11850-11855.

68 Ibid.

69 Wampler, P.J., Tarter, A., Bailis, R., Sander, K. and Sun, W. 2019. Discussion of forest definitions and tree cover estimates for Haiti. *Proceedings of the National Academy of Sciences* **116** (12): 5202-5203.

70 Hedges, S.B., Cohen, W.B., Timyan, J. and Yang, Z. 2018. Reply to Wampler et al.: Deforestation and biodiversity loss should not be sugarcoated. *Proceedings of the National Academy of Sciences* **116** (12): 5204.

71 Hedges, S.B., Cohen, W.B., Timyan, J. and Yang, Z. 2018. Haiti's biodiversity threatened by nearly complete forest loss. *Proceedings of the National Academy of Sciences* **115** (46): 11850-11855.

Haiti National Trust. 2020. Haiti National Trust. Available online at https://www.haititrust.org/ (accessed 15 July 2020).
 Haiti Takes Root. 2020. Haiti Takes Root. Available online

at https://www.haititakesroot.org/ (accessed 15 July 2020). **74** Tarter, A., Kennedy Freeman, K., Ward, C., Sander, K., Theus, K. et al. 2017. *Charcoal in Haiti*. The World Bank Group,

Theus, K. et al. 2017. *Charcoal in Haiti*. The World Bank Group, Washington, DC.

75 Hedges, S.B. et al. 2018. Op cit.

76 Haiti National Trust. 2020. Op cit.

77 Hedges, S.B. et al. 2018. Op cit.

78 Anadón-Irizarry, V., Wege, D.C., Upgren, A., Young, R., Boom, B. et al. 2012. Sites for priority biodiversity conservation in the Caribbean Islands Biodiversity Hotspot. *Journal of Threatened Taxa* **4** (8): 2806-2844.

79 Caribherp. 2020. Caribherp: Amphibians and Reptiles of Caribbean Islands. Available online at http://www.caribherp. org/ (accessed 15 July 2020).

80 Anadón-Irizarry, V. et al. 2012. Op cit.

81 AZE. 2020. Alliance for Zero Extinction. Available online at https://zeroextinction.org/ (accessed 15 July 2020).