Institution: University of Kent

Unit of Assessment: 14: Geography and Environmental Studies

Title of case study: Developing Spatial Decision-Support Tools to Benefit Biodiversity by Advancing Conservation Standards and Policies across the World

Period when the underpinning research was undertaken: 2012-2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Professor Zoe G. Davies	Professor in Biodiversity Conservation	2010-present
Professor Robert J. Smith	Professor in Conservation Science	2006-present
Dr Matthew J. Struebig	Reader in Conservation Science	2010-present
Dr Jake E. Bicknell	Lecturer in Conservation Biology	2014-present

Period when the claimed impact occurred: Aug 2013-2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact (indicative maximum 100 words)

Working in collaboration with government agencies, NGOs, and industry bodies, Davies, Smith, Struebig, and Bicknell have developed context-specific state-of-the-art decision-support tools that have changed conservation standards and policies across the world to benefit biodiversity. The team has directly influenced the protected area policy in Guyana through their systematic conservation planning analyses, helping the Government to expand protected-area coverage and meet international conservation commitments in a robust and evidence-based manner. The team has also produced research that has informed sustainability standards in oil palm agriculture via the 'High Carbon Stock' approach (a land-use-planning decision-support tool for companies) and Roundtable for Sustainable Palm Oil standards and policies for establishing forest set-asides. Furthermore, they have undertaken research that underpins the new 'Key Biodiversity Area' Standard. This is the first internationally endorsed decision-support framework to support governments, donors, and NGOs in identifying and protecting globally important areas for biodiversity.

2. Underpinning research (indicative maximum 500 words)

Bicknell, Davies, Smith, and Struebig collectively form the Spatial Conservation research cluster in the Durrell Institute of Conservation and Ecology (DICE) at Kent. Smith has worked at DICE since 2001. Davies and Struebig joined the Institute in 2010 as early career researchers. Bicknell joined DICE as a PhD student (2011-14), under the supervision of Davies, Struebig, and Smith, before becoming a postdoctoral researcher and then Lecturer (2018 to date). Bicknell, Davies, Smith, and Struebig collaborate to generate applied research and decision-support tools to inform practices and policies affecting biodiversity, which are co-developed and co-delivered with policy-makers. Their work has spanned three main areas:

1. **Advancing protected area policy in Guyana to benefit biodiversity**

Since **2011**, under targets set by the Convention on Biological Diversity, countries must protect 17% of their terrestrial area, focusing on areas with high biodiversity value. Prior to Bicknell, Davies, Struebig, and Smith working in Guyana, only 8.5% of the terrestrial area of the country was protected. Additionally, there was no strategy in place to guide where, geographically, new protected areas should be designated. To address this, the team worked with the Government of Guyana's Protected Areas Commission between **2012** and **2016**, developing a

decision-support framework that underpinned a new protected area expansion policy for the country **[R1]**. The team led cutting-edge systematic conservation-planning analyses, to identify and prioritise where 2 million hectares of land for future protection should be located, based on a variety of biodiversity protection targets. The research was pioneering because it incorporated input from a diverse array of stakeholders, including indigenous and local communities, while also accounting for economically important land uses (e.g. mining, forestry), minimising the opportunity costs for these industries. In **2016**, the President of Guyana committed to achieving the 17% target by 2023, based directly on the Kent research team's findings. The process of establishing the new protected areas is now underway.

2. Advancing forest set-aside standards and policies to improve biodiversity in tropical agricultural landscapes

The High Carbon Stock approach is a decision-support tool, designed by Greenpeace and the Forest Trust, to help commodity production companies deliver on 'no deforestation' commitments. It distinguishes between forest patches that should be protected as set-asides for their carbon/biodiversity value or, alternatively, converted to plantation. Between **2013** and **2019**, Struebig and Davies led the testing of the tool in Malaysia to determine whether high-carbon stock areas also maintain high biodiversity **[R2]**. Combining innovative modelling, remote-sensing, and camera-trapping technology, they highlighted that the >100-hectare threshold used to identify High Carbon Stock forest patches for protection was beneficial for some threatened species, but that multiple patches need to be managed collectively to sustain viable mammal populations **[R3]**. Furthermore, during the same time period, Struebig and Davies tested current Roundtable on Sustainable Palm Oil (RSPO) and Sabah State Government forest set-aside policies for rivers edges, revealing the substantial biodiversity gains that could be achieved within plantations by expanding the mandated set-aside width from 20m to 40m **[R4]**.

3. Advancing internationally recognised protected-area standards to benefit biodiversity

The Key Biodiversity Area approach is the first internationally endorsed decision-support framework for governments, donors, and NGOs to identify and protect globally important areas for biodiversity. The approach was originally used by a few conservation NGOs, but in 2012 the International Union for the Conservation of Nature (IUCN) were tasked with updating it to produce a global standard. Smith was one of 11 researchers who conducted the research and established the new methodology. Between **2012** and **2016**, Smith co-led the systematic conservation planning analyses used to develop new criteria for Key Biodiversity Areas, demonstrating that the old approach used species distribution thresholds that were too weak to identify globally significant areas **[R5]**. The new Key Biodiversity Area Standard was launched in **2016**. It incorporated the work led by Smith that framed the approach in terms of systematic conservation planning, and explained how to use the new criteria when planning new protected areas **[R6]**.

3. References to the research (indicative maximum of six references)

[R1] Bicknell, J. E., Collins, M. B., Pickles, R. S. A., McCann, N. P., Bernard, C. R., Fernandes, D. J., Miller, M. G. R., James, S. M., Williams, A. U., **Struebig, M. J.**, **Davies, Z. G.**, and **Smith, R. J.** (**2017**). 'Designing protected area networks that translate international conservation commitments into national action'. *Biological Conservation* 214: 168-175. doi.org/10.1016/j.biocon.2017.08.024.

[R2] Deere, N. J., Guillera-Arroita, G., Platts, P. J., Mitchell, S. L., Baking, E. L., Bernard, H., Haysom, J. K., Reynolds, G., Seaman, J. D. I., **Davies, Z. G.**, and **Struebig, M. J.** (**2020**). 'Implications of zero-deforestation commitments: forest quality and hunting pressure limit mammal persistence in fragmented tropical landscapes'. *Conservation Letters* 13: e12701. doi.org/10.1111/conl.12701.

[R3] Deere, N. J., Guillera-Arroita, G., Baking, E. L., Bernard, H., Pfeifer, M., Reynolds, G., Wearn, O. R., **Davies, Z. G.**, and **Struebig, M. J.** (**2018**). 'High Carbon Stock forests provide co-benefits for tropical biodiversity'. *Journal of Applied Ecology* 55: 997-1008. doi.org/10.1111/1365-2664.13023.

[R4] Mitchell, S. L., Edwards, D. P., Bernard, H., Coomes, D., Jucker, T., **Davies, Z. G.**, and **Struebig, M. J.** (**2018**). 'Riparian reserves help protect forest bird communities in oil palm-dominated landscapes'. *Journal of Applied Ecology* 55: 2744-2755. doi.org/10.1111/1365-2664.13233.

[R5] Di Marco, M., Brooks, T., Cuttelod, A., Fishpool, L. D. C., Rondinini, C., **Smith, R. J.**, Bennun, L., Butchart, S. H. M., Ferrier, S., Foppen, R. P. B., Joppa, L., Juffe-Bignoli, D., Knight, A. T., Lamoreux, J. F., Langhammer, P. F., May, I., Possingham, H. P., Visconti, P., Watson, J. E. M., and Woodley, S. (**2016**). 'Quantifying the relative irreplaceability of important bird and biodiversity areas'. *Conservation Biology* 30: 392–402. doi.org/10.1111/cobi.12609.

[R6] Smith, R. J., Bennun, L., Brooks, T. M., Butchart, S. H. M., Cuttelod, A., Di Marco, M., Ferrier, S., Fishpool, L. D. C., Joppa, L., Juffe Bignoli, D., Knight, A. T., Lamoreux, J. F., Langhammer, P. F., Possingham, H. P., Rondinini, C., Visconti, P., Watson, J. E. M., Woodley, S., Boitani, L., Burgess, N. D., Silva, N., Dudley, N., Fivaz, F., Game, E. T., Groves, C., Lötter, M., McGowan, J., Plumptre, A. J., Rebelo, A. G., Rodriguez, J. P., and Scaramuzza, C. A. de M. (**2018**). 'Synergies between the key biodiversity area and systematic conservation planning approaches'. *Conservation Letters* 12: e12625. doi.org/10.1111/conl.12625

Grants

[G1] Natural Environment Research Council consortium grant (**2014-19**). Total value: £2.5 million; £530k (Kent).

[G2] Newton Fund / British Council (2016-18). Value: £170k.

[G3] Newton Fund Impact Scheme (2020). Value: £150k.

4. Details of the impact (indicative maximum 750 words)

1. Changing protected area policy in Guyana to benefit biodiversity

Before engagement with Bicknell, Davies, Struebig, and Smith (2012 to 2016), the Government of Guyana's Protected Areas Commission had no evidence-based approach to decision-making. The research delivered this, enabling the Government to target where the country's protected-area network should be expanded to meet international commitments, ensuring that species of conservation concern, potential land conflicts, and the needs of local communities and indigenous people were explicitly taken into account. In **2016**, the Commissioner of Protected Areas stated: 'your work has been critical to delivering a scientifically-robust and transparent process to support NPAS [National Protected Area System] decision-making' **[a]**. A cabinet paper written in **2016** described the new approach and need to establish 2 million hectares of new protected areas **[b]**, directly referring to the research **[R1]**. This was submitted to the President of Guyana, who publically committed to the expansion plan. The process of establishing the first two protected areas began in **2018** and **2020**, respectively, covering an area of >1.4 million hectares (equating to ~6% of the country) **[a, b, c]**. One of these, the North Rupununi, is a globally important wetland of 700,000 hectares. It was identified by the research as being a top conservation priority for biodiversity, and requiring engagement with local indigenous communities to protect it successfully **[R1]**. As a result, in **2019**, the Vice-President of Guyana and Minister of Indigenous Peoples Affairs stated: 'A particular high point for us is the work of DICE to help our Government's Protected Areas Commission to identify priority areas for the conservation of our biodiversity' **[c]**. The other protected area in progress covers an area of ~800,000 hectares of lowland primary rainforest, an area of substantial ecotourism potential for local communities that encompasses

core jaguar habitat **[d]**.

2. **Changing forest set-aside standards and policies to biodiversity in tropical agricultural landscapes**

The research of Struebig and Davies (2013-19) **[R3, R4]** was integral to the revision of the High Carbon Stock approach in **2017 [e]**. It validated the conservation credentials of the methodology, convincing environmental professionals advising the RSPO of its value. RSPO is the leading sustainability certification system for palm oil production globally, covering ~19% of the oil palm estate across multiple tropical nations. In **2018**, the RSPO formally adopted HCS as the principle means by which all oil palm companies seeking certification should identify forest areas for conservation or production. The Global Solutions Senior Advisor for the Greenpeace Forests Campaign stated: 'The rigor of the science and the testing were robust, and so were an important contribution towards RSPO adopting the High Carbon Stock Approach, as well as the credibility of the toolkit, which was released with assistance from Dr Struebig. It was likewise valuable that the testing and trialling were carried out by the DICE team in cooperation with government, stakeholders (including Greenpeace) and international researchers' **[f]**. As a result, since **2016** more than 2.8 million hectares of land have been assessed, and at least 690,000 hectares have been set aside for conservation **[f]**. In **2017**, Struebig provided evidence to RSPO and Sabah State Government in Malaysia regarding the protection of forest set-asides along rivers. RSPO then updated its best-practice management guidelines for these riparian set-asides **[g]**, based directly on the research recommendations **[R4]**. The RSPO Biodiversity Manager confirmed that 'Dr Struebig is one of the authors of the RSPO Simplified Guide: Management and Rehabilitation of Riparian Reserves. The guidelines are exceptionally helpful for growers, remediating formerly cleared areas, to understand the requirements and develop the framework for management and remediation' **[g]**. In **July 2020**, the Sabah State Government established a Technical Committee, led by the Environmental Protection Department and Department for Irrigation and Drainage, to revise the Sabah Water Resources Enactment (1998) and forest protection regulations for rivers. They plan to increase the minimum mandated set-aside width from 20m to 40m **[h]**, owing to the research findings **[R4]**. The Director of the South East Asian Rainforest Research Partnership emphasises the impact that this will have: 'Uptake of the project findings and incorporation into policy of decision-making tools for increased forest-edge set-aside protection zone widths dependent on local species assemblages is expected to dramatically improve conservation of local species populations and movement corridors' **[h]**.

3. **Changing internationally recognised protected area standards to benefit biodiversity**

The **2016** Key Biodiversity Area Standard is underpinned by systematic conservation planning research undertaken by Smith (2012-16) **[R5, R6]**. It provides the first internationally endorsed framework for identifying globally important areas for every aspect of biodiversity. The Head of the Key Biodiversity Areas Secretariat states: 'This research played a fundamental role in developing the Key Biodiversity Area Standard, helping ensure that it was based on the best available science and would be widely accepted by the international conservation community' **[i]**. For instance, the Head of the Key Biodiversity Areas Secretariat provides this illustrative example: 'The EU is proposing to use Key Biodiversity Area criteria to guide the expansion of protected area coverage to meet their 30% goals under their new biodiversity strategy' **[i]**. The Key Biodiversity Area Standard has improved the biodiversity benefits of conservation management and funding in three ways. First, since **2016**, it has been used to identify important areas for species that were previously neglected in 25 countries from six continents. For example, in **2019**, Smith's team co-led a Key Biodiversity Area process with the Government of Mozambique. Scientists identified 16 currently unprotected Key Biodiversity Areas for plants and invertebrates with a combined area of 1.8 million hectares, which were then demarcated as conservation areas in the Government's territorial plan **[i]**. The Head of the Key Biodiversity Areas Secretariat highlights that this 'will help conserve dozens of threatened and endemic plant, amphibian, reptile and invertebrate species that were missing from the existing nature reserve system' **[i]**. Second, since **2016**, every country must report the

percentage of their Key Biodiversity Areas protected, in line with UN Sustainable Development Goal commitments, encouraging progress towards Goals 14 (Life below water) and 15 (Life on land) **[j]**. Third, Key Biodiversity Areas underpin a number of global financing mechanisms: in **2016**, the Equator Principles were updated, so the 114 global financial institutions that are signatories (including the UK banks Barclays, HSBC, and Lloyds, plus the UK Government's Export Finance) cannot fund projects unless they avoid or mitigate negative impacts in Key Biodiversity Areas **[i].** In **2018**, the World Bank's Global Environment Facility updated their funding criteria so their US$178 million per annum spending only supports new protected areas if they have KBA status **[k, l]**. The Head of the Key Biodiversity Areas Secretariat emphases that: 'Research carried out by the Kent team is already playing an important part in changing global conservation policy and practice, both at the national level to inform conservation management on the ground and at the international level by influencing funding policies and so preventing the destruction of these important areas' **[i]**.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[a] Letter from the then Commissioner of Protected Areas, Guyana Protected Areas Commission, Ministry of Natural Resources, Government of Guyana. Now the CEO of Conservation International-Guyana.

[b] Cabinet Memorandum submitted by the Minister of Natural Resources: Request for Approval of Proposed Areas to be included in the Expansion of the National Protected Areas System. Guyana Protected Areas Commission. (2016). This document provides maps of the proposed protected area network, adapted from those in **[R1]**. The document is marked as highly confidential.

[c] Letter from the Vice-President and Minister of Indigenous Peoples' Affairs, Ministry of Indigenous Peoples' Affairs, Government of Guyana.

[d] Evidence of the GEF-funded project aimed at protecting an area of lowland rainforest in central Guyana. . See core indicator 1, p. 6.
https://doe.gov.gy/published/document/5cffbf9a47cb401cd490ccca

[e] The High Carbon Stock Approach Toolkit V2.0, published by the HCS Approach Steering Group (which includes Struebig) in May 2017, to guide operations for oil palm companies signing up to RSPO certification. Key material linked to the research in Modules 1 and 5.

[f] Letter from the Global Solutions Senior Advisor, Greenpeace Forests Campaign, Greenpeace International.

[g] Letter from the Biodiversity Manager, Roundtable on Sustainable Palm Oil (RSPO), Kuala Lumpur, Malaysia.

[h] Letter from the Director of the South East Asian Rainforest Research Partnership (SEARRP), Kota Kinabalu, Malaysia.

[i] Letter from the Head of the Key Biodiversity Areas Secretariat, explaining Smith's role and how the KBA process has been applied at a national and international level.

[j] 2020 UN Sustainable Development Goals Report.
https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf

[k] Global Environment Facility GEF-7 Replenishment Programming Directions (2018).

[l] The GEF-7 period is 2018-22. The total four-year commitment to relevant conservation projects is US$716 million (US$178 million per annum). https://www.thegef.org/projects