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POLICY PERSPECTIVE

Increasing the Scientific Evidence Base in the “High Conservation Value” (HCV) Approach for Biodiversity Conservation in Managed Tropical Landscapes

Michael J. M. Senior[1,2], Ellen Brown[3], Paulina Villalpando[3], & Jane K. Hill[4]

[1] Department of Biology, University of York, Wentworth Way, York, YO10 5DD, UK
[2] Proforest, South Suite, Frewin Chambers, Frewin Court, Oxford, OX1 3HZ, UK
[3] The HCV Resource Network, c/o The Proforest Initiative, South Suite, Frewin Chambers, Frewin Court, Oxford, OX1 3HZ, UK
[4] Department of Biology, University of York, Wentworth Way, York, YO10 5DD, UK

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Correspondence
Michael Senior, Proforest, South Suite, Frewin Chambers, Frewin Court, Oxford, OX1 3HZ, UK.
Tel: +44(0)-1865-243439;
Fax no: +44 (0) 1865 244820.
E-mail: mike@proforest.net

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Abstract

Land-use change is a major driver of tropical biodiversity declines. The “High Conservation Value” (HCV) approach aims to protect critical environmental and social values in production landscapes, and is a common feature of many voluntary certification schemes (e.g., Forest Stewardship Council, Roundtable on Sustainable Palm Oil). Despite the popularity of the HCV approach within forestry and agriculture production systems, it is little known in academia and the scientific evidence base supporting it is not well developed. By raising the profile of the HCV approach, we hope to instigate new research to examine the impact of the HCV approach on biodiversity conservation. We argue for better knowledge exchange between scientists, policy makers, and HCV users, sharing of information, and consideration of the practical constraints within which HCV users and commodity producers operate. Given the continuing loss and degradation of tropical rainforests, such strategies are required urgently to reduce biodiversity losses in production landscapes.

Introduction

Agricultural expansion and timber extraction account for 80% of global deforestation and 70% of global forest degradation, respectively (Kissinger *et al.* 2012). This habitat loss and degradation drives biodiversity loss, particularly in the biodiverse tropics (e.g., Green *et al.* 2005; Fitzherbert *et al.* 2008; Gibson *et al.* 2011). Increasing public concern about land-use change led to the development of voluntary certification schemes (e.g., the Forestry Stewardship Council (FSC) and the Roundtable on Sustainable Palm Oil (RSPO)) to mitigate the negative impacts associated with forestry and crop production. The High Conservation Value (HCV) approach is a key component of the major certification schemes (FSC, RSPO, Round Table on Responsible Soy (RTRS), Bonsucro), and aims to maintain and enhance significant environmental and social values within production landscapes. The predominant uses of the HCV approach are in the RSPO and FSC certification schemes, and so it is used globally in tropical, temperate, and boreal zones.

Many conservation practitioners and commodity producers see the HCV approach as a practical and accessible tool for mitigating the negative impacts of production. However, the scope of the approach has expanded from its original use in forestry to include agricultural contexts, and its effectiveness for biodiversity conservation has come under scrutiny (Edwards *et al.* 2010, 2012; Paoli & Harjanthi 2011). Criticism of the HCV approach has also come from HCV users and assessors (e.g., Paoli & Harjanthi 2011), and discussions between NGOs and private sector representatives led to the formation of the HCV Resource Network (HCVRN; www.hcvnetwork.org), to support the consistent application of the HCV approach.

Despite being so widely used, the HCV approach is rarely discussed in academic literature, and the few existing papers (Edwards *et al.* 2010, 2011, 2012; Edwards & Laurance 2012) argue that it provides insufficient protection for biodiversity in tropical agricultural landscapes. Thus, there is a disconnect between HCV users and academics; the HCV approach is widely used as a conservation tool in production landscapes, but there is little scientific investigation of its effectiveness. Given the urgent need to improve biodiversity conservation in production landscapes, we argue for increased engagement of scientists with the HCV approach.

First, we describe the HCV approach, discuss its scope, and the steps involved in an HCV assessment. We highlight why the HCV approach is widely used and remains one of the best practical tools for biodiversity conservation in production landscapes. We argue that improvements to the guidance and monitoring of the HCV approach are vital and suggest priorities for improvement. We acknowledge that wider governance changes are required to address the practical challenges of HCV implementation, but maintain that these must be complemented by an improved scientific evidence base for the HCV approach. In this paper, we focus on the role of scientists in strengthening the evidence base through: increased knowledge exchange between HCV users, researchers and policy makers, increased data sharing, and improved communication of research needs and findings. This paper focuses on the role of the HCV approach for biodiversity conservation in oil palm landscapes, as this is a heavily scrutinized sector, although many of the issues discussed apply to forestry and other crops.

What is the HCV approach?

The HCV approach is based on six values that aim to protect exceptional or critical environmental and social values (Box 1). The approach was first developed for sustainable forestry, and has since been incorporated into agricultural certification schemes (RSPO, RTRS, Bonsucro), and a number of corporations' purchasing and investment policies. The HCVs that incorporate biodiversity conservation are HCVs 1–4 (the focus of this paper), and HCV values 5 and 6 cover community needs and cultural values (Box 1).

Box 1: The six High Conservation Values (taken from Brown *et al.* 2013).

HCV 1: Species diversity. Concentrations of biological diversity including endemic species and rare, threatened or endangered species, that are significant at global, regional or national levels.

HCV 2: Landscape-level ecosystems and mosaics. Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

HCV 3: Ecosystems and habitats. Rare, threatened or endangered ecosystems, habitats or refugia.

HCV 4: Critical ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

HCV 5: Community needs. Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.

HCV 6: Cultural values. Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

The HCV assessment process (Figure 1) identifies values and makes management and monitoring recommendations for a particular land-use development (see S1 in Supporting Information for definitions). The first step is to identify if any of the six values are present at a site before any land clearance starts. If any HCVs are identified then areas required to maintain these values are defined. To qualify as an HCV area, there must be at least one value that is nationally, regionally, or globally significant, or critically important at the local level. Throughout the HCV assessment process, assessors are expected to consider the scale and context of the proposed development, how it might impact the identified HCVs, as well as potential conflict between HCVs, for example if

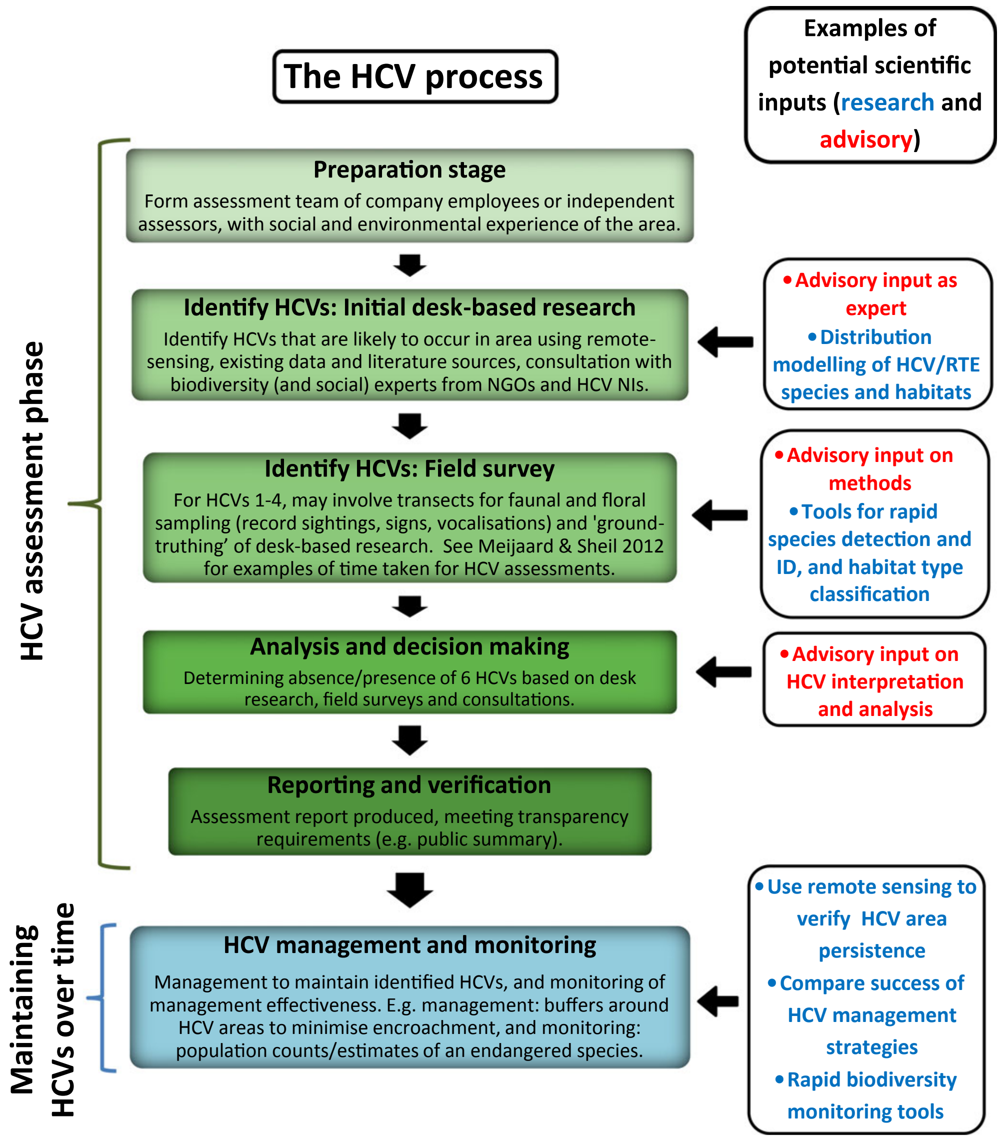

Figure 1 The HCV process, and suggestions for scientific input. This applies to any use of the HCV approach. The HCV assessment phase should always be conducted prior to any land clearance or development (see Brown *et al.* 2013 for more details). We give examples of possible scientific inputs at various stages of the HCV process focusing on: (1) broader research gaps (in red) and (2) advisory inputs as consulted technical experts for individual HCV assessments (in blue).

subsistence hunting threatens an endangered species (Edwards & Laurance 2012; Brown *et al.* 2013). Final decisions on which HCVs are present and their management and monitoring follow stakeholder consultation (e.g., communities, NGOs, research institutions, local authorities, and the company developing the management unit), and consider the wider landscape affected by the development. Consultation of scientific experts is key throughout the HCV assessment process, for information on local biodiversity and methods development (Figure 1). Final HCV decisions are guided by the precautionary approach (Brown *et al.* 2013) in recognition of difficulties in detecting many tropical species (Meijaard & Sheil 2012). The HCV approach is not intended to be a policy for zero deforestation or zero biodiversity loss, rather a tool for protecting critical social and environmental values.

An HCV assessment is only one of many steps required by certification schemes (see S2 in Supporting Information). After initial certification, companies have to undergo regular audits to retain their certification status, during which the management and monitoring of HCV areas are theoretically assessed. In practice, monitoring of biodiversity objectives during audits is typically cursory and so there is limited evidence for whether certification schemes, and HCV management, achieve their biodiversity goals (Kuijk *et al.* 2009).

Advantages of the HCV approach

The HCV approach has support from environmental and social NGOs and members of the private sector, who jointly developed it. This cross-sector collaboration means that the HCV approach includes values important to a wide range of stakeholders and balances social, economic, and environmental concerns (Meijaard & Sheil 2012). As a consequence of being used by certification schemes and being monitored by the HCVRN, the HCV approach also has the advantage of added scrutiny. However, it has only been used in agricultural contexts for <10 years, and has often been misapplied, leading to poor quality HCV assessments (Paoli & Harjanthi 2011). This makes it difficult to separate criticism of the approach from criticism of its application.

Improving the HCV approach for conserving tropical biodiversity

Both HCV users (Paoli & Harjanthi 2011) and academics (Edwards *et al.* 2012) have criticized the variable quality of HCV assessments. This inconsistency has been attributed to ambiguous and subjective terms used in HCV guidance documents, that depend too heavily on individual assessors' discretion (Edwards *et al.* 2012). For example, to qualify as HCV 1 the "concentration of endemic or rare, threatened or endangered (RTE) species must be globally, regionally or nationally significant," yet guidelines for assessing significance are sometimes unclear (but see Brown *et al.* 2013). Definitions for the HCV approach need to be broad if they are to be applied across ecosystems, countries, and sectors, but this has led to their misinterpretation by HCV assessors (Paoli & Harjanthi 2011). In particular, the application of the HCV approach to agricultural contexts has presented difficulties. Agricultural landscapes, such as oil palm plantations, support fewer forest species (e.g., Senior *et al.* 2013) than seminatural tropical production forests (e.g., Edwards *et al.* 2011b). HCV assessment and management in these different contexts requires divergent strategies, implying that more sector-specific guidance is needed.

Guidance and monitoring of the HCV assessment process have been introduced to address problems of misinterpretation. HCV national interpretations (NIs) have been developed to provide a local context (see S1 in Supporting Information for more detail). However, not all countries have HCV NIs and many are outdated, specific to just one commodity, or insufficiently detailed. Furthermore, many NIs contain ambiguous language, leaving assessors to decide what classifies as "nationally significant." Setting thresholds for populations of critically important species is not straightforward, and lessons may be learned from other conservation tools, such as IUCN Red Listing. Setting clearer thresholds could help to clarify the "critical values" that the HCV approach is designed to identify and protect, and to determine what makes a species' population nationally significant. Some HCV NIs require all species that are critically endangered, according to IUCN Red List classification, to be protected, but clearer guidance is needed for other categories of Red Listed species. For example, defining what population size or density of IUCN endangered species would qualify as a nationally significant population.

HCV assessors may not be able to estimate population sizes of endangered species reliably in the field (Meijaard & Sheil 2012), and so field data are often supplemented with other information to determine HCV areas and make management recommendations. For example, there is a considerable literature on methods for prioritizing conservation areas which may be useful in the HCV context. However, many of these methods are more applicable at larger scales than HCV assessments, or to locations, such as temperate regions, with good data on species' distributions (e.g., Moilanen *et al.* 2005; Wilson *et al.* 2006). More research is needed on modeling national distributions of threatened species in data scarce, tropical contexts (e.g., Kremen *et al.* 2006; Pearson *et al.* 2006) to inform mapping of national HCVs in the countries of greatest agricultural expansion (Figure 1).

One cause of HCV misinterpretation in practice is the variability in training and experience of HCV assessors. To address this issue, the HCVRN is introducing an HCV Assessor Licensing Scheme (ALS) that will provide tools and guidance, based on practical HCV experience, which assessors can use to improve the quality and consistency of their work. The ALS will also license assessors and monitor the quality of their assessments to confirm that they are of a high standard. The ALS aims to improve the consistency of HCV assessments and their management recommendations.

Guaranteeing the effective implementation of HCV management recommendations by companies is another major practical barrier to the effectiveness of the HCV approach (Colchester *et al.* 2009; Paoli & Harjanthi 2011) and certification audits need to become more stringent to determine whether companies follow HCV assessors' recommendations during initial plantation development and over time. Research that explores the extent to which HCV assessors' initial management recommendations are implemented could explore the scale of this problem (Figure 1).

Several large oil palm growers have made recent commitments to "zero deforestation," in a bid to go beyond the requirements of certification schemes (Greenpeace 2014). For example, the High Carbon Stock (HCS) approach aims to restrict new plantings to highly degraded, nonforest areas. This aspiration may be ideal for countries with high deforestation rates (e.g., Indonesia), where the economic advantages of oil palm may be realized with minimal additional environmental impact. However, applying the HCS approach in countries with high forest cover and historically low deforestation rates (e.g., many countries in Central Africa) could stifle economic development. When the methodological details of the HCS approach are finalized, research will be required that compares the overlap of HCV and HCS approaches, particularly in different national contexts (Paoli 2014).

Knowledge sharing between HCV users, scientists, and policy makers

Information is lacking on the effectiveness of HCV areas for protecting biodiversity. HCV assessors require information to help them identify HCVs and make robust management recommendations (Meijaard & Sheil 2012). However, many scientists are unaware of the HCV assessment process and of the practical constraints faced by assessors. For example, HCV assessors often have to carry out assessments and make management recommendations based on limited data that are supplemented with expert opinion and rapid field surveys (Figure 1; Edwards & Laurance 2012; Meijaard & Sheil 2012). Some guidance has been produced by NGOs to help HCV assessors and oil palm companies manage and monitor HCVs (e.g., ZSL 2011, 2013), but more knowledge exchange between researchers and assessors is needed to ensure that research is relevant and available to HCV assessors. Remote-sensing techniques could be used to map and monitor HCV areas, both at a management unit level and more widely to assess whether HCV areas are effective for biodiversity conservation. For example, a major gap is to assess whether HCV areas remain forested 5 years after establishment, which could be addressed using newly available maps of RSPO plantations (www.globalforestwatch.org). Other examples of research that could benefit from enhanced knowledge exchange would be to assess: the effectiveness of HCV management strategies in forestry versus agricultural contexts; the size and placement of HCV areas needed to conserve HCV species in the long term (e.g., Wearn *et al.* 2012); the placement of HCV areas required for connecting larger tracts of forest (e.g., Saura *et al.* 2014), and whether areas intended to maintain HCVs 5 or 6 could also benefit biodiversity (Figure 1).

At a management unit level, research can improve species detection rates during HCV assessments and subsequent monitoring of biodiversity in HCV areas (Figure 1). For example, new technologies, such as drones (http://conservationdrones.org), acoustic monitoring (Depraetere *et al.* 2012), and next-generation DNA sequencing (Yu *et al.* 2012) might allow quick but reliable measures of diversity in future HCV assessments. Such techniques could also help to monitor biodiversity in HCV areas and be coupled with other tools for monitoring threats to biodiversity, such as the Spatial Monitoring and Assessment Tool (SMART; http://www.smartconservationtools.org/). Collaborations between companies and conservation scientists could help to develop and test new technologies.

Research findings are often not in a suitable form for use by HCV assessors. There may be few simple and universally applicable rules in hyper-diverse tropical communities, but rules of thumb could be developed. For example, range size and population viability estimates may already exist for some threatened species (e.g., for orang-utan *Pongo pygmaeus*, Singleton *et al.* 2009). Similarly, data on the proportion of primary forest species protected in different sized fragments are available for many taxa (e.g., for birds in SE Asia, Edwards *et al.* 2010). These data could be used to inform management recommendations on minimum sizes of HCV areas for conserving particular species or communities, such as the size of HCV areas required to maintain different species under varying levels of hunting pressure. Collaborative research programmes, such as the SAFE (www.safeproject.net) and SEnSOR (http://sensorproject.net/) programmes can provide practically relevant scientific evidence on maintaining HCVs in oil palm landscapes. Similar programmes are needed for other commodities in other geographic regions.

It is vital that research findings are communicated to practitioners through appropriate channels and in appropriate language (Sutherland *et al.* 2004). This could involve web resources (www.ConservationEvidence.com, www.ibatforbusiness.org), or more targeted approaches that feed into HCV NIs or a dedicated HCVRN working group. Policy makers have a key role in the promotion of national or regional planning for conservation goals (such as landscape habitat corridors), which fall outside the control of individual producers (Edwards & Laurance 2012). Better knowledge exchange would help scientists communicate their findings to HCV users and policy makers, and HCV users and producers to share HCV management challenges with scientists and policy makers. Scientists and HCV users also need to be aware of legislative barriers and corruption that may prevent or slow implementation of policy changes in some countries (Smith *et al.* 2003; Rands *et al.* 2010). Access to HCV management data could improve the relevance of scientific research. Data sharing and transparency are part of the HCV assessment process and the requirements of certification schemes, although there is currently no repository for HCV monitoring reports. Monitoring reports would need to contain more detailed, long-term data, including details of monitoring protocols and population estimates of species where possible, if the effectiveness of HCV areas for biodiversity conservation is to be rigorously assessed. Collecting such data presents financial and logistical challenges to companies that could be met through collaborative research or the development of cost-effective proxies for HCV monitoring.

Solutions to improve the implementation of the HCV approach

We suggest the following improvements, to: identify knowledge gaps, carry out research to fill gaps, and disseminate information to stakeholders. We hope that a better understanding of the HCV assessment process will stimulate further knowledge exchange, increase the scientific evidence for HCV assessments, and make scientists aware of key management issues. Solutions might include for the HCVRN to set up an HCV "science evidence base" working group to engage researchers with HCV users. The HCVRN also needs a more formal mechanism (e.g., researcher database) to help HCV assessors find scientific experts to consult during HCV assessments.

Greater sharing of HCV management and monitoring data would allow the impacts of the HCV approach to be quantified, and to assess whether HCV management recommendations are implemented by companies. There may be financial and logistical limits to the quality and quantity of data that producers and HCV assessors can collect, but data already collected for HCV assessments and during HCV monitoring could be useful for academic research, especially if coupled with remote-sensing or modeling data. A starting point could be to share details of HCV areas in repositories hosted by the HCVRN or by certification schemes (for the RSPO this could be included in the report repository for new plantings). Agreements would be needed in terms of reuse of data, metadata standards, and quality control of the data deposited, but such data could be used to examine the contribution of HCV areas to long-term species persistence and wider conservation objectives.

Improving communication of research findings would ensure that research implications reach policy makers and HCV users in appropriate language. This could begin with workshops that bring together HCV users, scientists, and policy makers to discuss knowledge gaps, management, and policy challenges. An information repository could include findings from published peer-reviewed studies and from reports in the "grey" literature. Such a database could be used by HCV assessors and could inform threshold development for protecting species under HCV 1, and more refined definitions in HCV NIs. We suggest that these measures would make the HCV evidence base more robust and lead to improvements in the assessment process. It is vital that the overall effectiveness of the HCV approach is evaluated to improve the conservation of biodiversity in tropical production landscapes.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

S1. Glossary of key terms used in the paper.

S2. Requirements of certification schemes, beyond an HCV assessment. Producers also have to meet other expectations if they are seeking certification under certification schemes, including compliance with national laws and additional expectations of the certification schemes. We provide a brief list of these requirements.

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