Impact Assessment in Modified Agricultural Landscapes of Biodiversity Value

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Session 379 The Biodiversity Significance of Some Modified Habitats: Implications for Impact Assessment I

1. Introduction

Agricultural land is often deemed suitable for development from a biodiversity impacts perspective. Despite typically exhibiting low species diversity and a high prevalence of exotic and invasive species, such landscapes may nevertheless provide refuge or stepping stones for a range of species. It is important not to overlook the potential biodiversity value of farming landscapes when assessing the impacts of conversion to other developments (e.g., solar farms), intensification, altering management practices (e.g., irrigation), or changing the commodity produced. Failing to identify appropriate mitigation can lead to a biodiversity loss that goes undetected and can be significant cumulatively or at the landscape level.

The purpose of this paper is to:

- Provide examples of biodiversity value in modified agricultural areas;
- Posit that approaches and metrics used to assess impacts in areas of high biodiversity are not suitable for modified landscapes;
- Highlight how to better consider these landscapes during the key stages of the Impact Assessment (IA) process;
- Provide recommendations for addressing the current gap in methods and practice.

This paper draws on the author's operational experience, recent literature, and good practice guidance for integrating biodiversity in IA.

2. The Importance of Modified Agricultural Landscapes to Biodiversity

Recent literature shows that in an increasingly degraded natural world, modified habitats ranging from fallow land to urban landscapes are becoming increasingly important to biodiversity and Ecosystem Services (ES). The potential importance of agricultural landscapes for biodiversity and ES is partly a function of their surface area. Agricultural land occupies about a third of the world's total land area (4.1 billion out of 13 billion ha, FAO, 2023). Fields and crops often connect what is left of natural habitats in an area (Estrada-Carmona *et al*, 2022).

According to the IUCN (2024), 17% of species belonging to groups that have been comprehensively assessed for the Red List have agricultural land documented as a habitat. A total of 86 species have been found to live only in agricultural habitats. Mendenhall *et al*, (2016) found that, in tropical areas, some species can only be found and many thrive in agricultural areas (particularly reptiles, amphibians, and birds).

Densely developed agricultural landscapes can be a mosaic of fields and small patches of natural or semi-natural habitat, including isolated trees and thin linear patches. These may be important for connectivity, acting as stepping stones for species that move long distances (Tiang *et al*, 2021; Herrera *et al*, 2017) but are at particular risk of conversion, as they do not attract as much attention as larger habitat patches. The presence of areas and even fragments of natural habitat in an agricultural landscape is key to maintaining the biodiversity value and species diversity of an area (Outhwaite *et al*, 2022).

A high proportion of the remaining tree cover of a deforested tropical region may be embedded in agricultural landscapes, for instance, along field boundaries or rivers, or on steep terrain. Tree cover on private properties has been shown to support the larger, more diverse biological communities associated with forested areas (Mendenhall *et al*, 2016). In non-tropical landscapes, the presence of natural and semi-natural habitat in field edges, resulted in smaller field size areas being associated with higher biodiversity compared to landscapes in which larger field sizes occurred alongside larger patches of natural habitat (Fahrig *et al*, 2014). Losing small natural and semi-natural features and trees could therefore impact species movement and conservation at a wider scale than a project. Agricultural intensification (e.g., change from pasture to cropland) is also often associated with a decrease in biodiversity (Macchi *et al*, 2020).

The urgency of the climate crisis and the focus on renewables have introduced a new threat for agricultural landscapes. What has been referred to as "energy sprawl" could be avoided through better project siting that avoids agricultural areas in favor of less conventional areas for energy development (Madison *et al*, 2017).

3. Overview of Current Practices

Within IA, the conversion of modified agricultural landscapes to other land uses is often considered not significant for biodiversity. Biodiversity is often scoped out during the early stages of the process based on the absence of certain high biodiversity values (e.g., medium to large areas of natural habitat, presence of threatened species, overlap or proximity with protected areas). The approach of defining materiality and significance based on the presence of high value biodiversity is recommended by good practice guidance (Hardner *et al*, 2015; Ekstrom *et al*, 2015) as illustrated in Table 1 below. However, the value of a small patch of habitat or scattered trees can be missed with this approach (Tiang *et al*, 2021). The provision of ES (e.g., pollination, erosion control, cultural values among many others) can be similarly ignored. Moreover, the consideration of ES is a weak spot of many ESIAs, despite the opportunities for better assessments of cross-topic and cumulative impacts and processes that integration of ES in IA can offer (Van der Biest *et al*, 2023).

Given resource and time constraints associated with the IA process, little or no biodiversity baseline may be collected for projects in modified habitat. There are a range of methods suitable to assessing the value of modified landscapes for biodiversity, as illustrated by the studies referenced in the previous section. These include remote sensing, analysis of publicly available maps and datasets, and development of models to assess connectivity.

Impacts on high-value biodiversity are often avoided through siting projects outside of protected and designated areas or areas of natural habitat. It is then assumed that any land that does not fall into those categories is suitable for development, which may not always be the case. For instance, a study in Italy showed that photovoltaic projects had been developed in century-old olive groves, which led to the loss of significant ES, including cultural value. The local regulations identified a series of unsuitable areas for development (natural and protected areas, UNESCO sites, etc.), potentially opening all other areas to development (De Marco *et al*, 2014).

In conclusion, the assessment approaches valid for natural and high value habitats are not generally appropriate when dealing with modified or fragmented landscapes.

The good news is that there appear to be significant synergies between conserving or enhancing the biodiversity of productive areas and achieving other benefits. A recent analysis by IUCN (2024) concluded that biodiversity protection gains in agricultural landscapes do not have to come at a cost to food production or economic returns. Better land use and management are required. Including biodiversity-enhancing mitigation or introducing nature-based solutions (NbS) in the design of a project can provide social and financial benefits, for instance through improvements in agricultural productivity (Estrada-Carmona *et al*, 2022), additional sources of income, and lowering maintenance needs (Semeraro et al, 2022). Mixed-species systems such as agroforestry are considered good examples of NbS, where crops combined with trees, provide ES, including carbon sequestration and cultural services (Kumar & Kunhamu, 2022). Habitat enhancing and creation as part of an agricultural landscape such as planting of native trees for cover, addition of hedges or tree lines can generally increase diversity (Mendenhall *et al*, 2016) while not impacting or even increasing productivity.

TABLE 1: Impact consequence, example definitions from guidance on integrating biodiversity into IA (adapted from Hardner *et al*, 2015)

CONSEQUENCE	DESCRIPTION – based on IUCN rating	DESCRIPTION – based on lender requirements (e.g., IFC PS6)
Minor	No net loss in biodiversity value, regardless of conservation status	Incidental and localized impacts to natural habitat
Moderate	Net loss in value with a status of LC, NT or VU	Small-scale loss of natural habitat
Serious	Net loss in value with a status of EN, or status of a value changes to EN due to project impacts	Large-scale loss of natural habitat, or small-scale conversion of "critical" habitat (e.g., known to be occupied by species with EN status)
Extreme	Net loss in value with a status of CR, or status of a value changes to CR due to project impacts	Large-scale loss of "critical" habitat (e.g., known to be occupied by species with a conservation status of EN), or small-scale loss of "critical" habitat (e.g., known to be occupied by species with a conservation status of CR)
Catastrophic	Status of value changes to EW (species) or CO (ecosystem) due to project impacts	Large-scale loss of "critical" habitat (e.g., known to be occupied by species with a conservation status of CR)

4. How to Adapt the IA Process for Modified Agricultural Landscapes

Given limitations of current guidance and approaches, a range of suggestions to improve consideration of the biodiversity value of modified agricultural landscapes in the IA process are provided in **Table 2** below. These could be adapted to biodiversity due diligence and audits, if an IA is not required. The assessment should always be precautionary. There is an assumption that these types of habitats have low biodiversity value and that the focus should be on high-value habitats and species, which tends to be perpetuated in IA practice.

In the absence of guidance, case studies and examples should be shared, and these considerations should be integrated into IA training. In addition to the **Table 2** recommendations below, ES should be integrated in the IA process as detailed in good practice guidance[1].

TABLE 2: Recommendations for considering the biodiversity value of agricultural landscapes in IA

SCOPING STAGE
‣ Do not automatically exclude biodiversity consideration; ‣ Define a study area beyond the project boundaries that includes the surrounding landscape; ‣ Review site information to identify the presence of features indicating potential biodiversity value (examples of these are discussed in Sections 2 and 3 of this paper); ‣ Identify opportunities for biodiversity aligned design and mitigation.
BASELINE CHARACTERIZATION
‣ Carry out desktop data collection, stakeholder consultation and site visit if resources permit; ‣ Use remote sensing tools (e.g. to measure tree cover), existing datasets and maps, conduct literature review; ‣ Collect landscape information: connectivity, presence/absence of natural habitat in the wider landscape, proximity of the project to natural habitat that is protected or conversely at risk of conversion; ‣ Collect site information: presence of small patches of natural or semi-natural habitat, trees, tree curtains, hedges, water bodies/wetland areas; ‣ Visit by a specialist to assess factors such as connectivity and presence of patches of natural or semi-natural habitats.
ALTERNATIVES ASSESSMENT
‣ Favor project designs that integrate and retain natural and semi-natural features and align with sustainable agricultural practices (see Demozzi *et al*, 2024 p. 5-6 for a list of these)
IMPACT EVALUATION
‣ Develop impact characterization and assessment methodology appropriate to the expected types of impact (loss of connectivity, impacts to the wider landscape and to including natural habitats); ‣ Consider indirect and cumulative impacts, and impacts beyond the project boundary.

[1]For example WRI's guidance on Weaving Ecosystem Services into Impact Assessment (available: https://www.wri.org/research/weaving-ecosystem-services-impact-assessment)

MITIGATION

- Avoid conversion of natural or semi-natural patches, trees and other features – integrate into project design, no matter how small;
- Identify Good International Industry Practice (GIIP) measures to avoid and minimise environmental impacts and resource use (water use, chemicals, invasive species);
- Identify opportunities to increase biodiversity value through:
  - Sustainable agricultural practice (see Demozzi *et al*, 2024 p. 5-6);
  - Nature-based Solutions;
  - Habitat restoration and enhancement – increase the areas of natural/semi-natural habitat, planting of native trees for cover, hedges, tree lines.

MONITORING & EVALUATION

- Biodiversity monitoring beyond verification of implementation mitigation measures;
- Use remote sensing and desktop methods, evaluate both impacts and opportunities.

5. Conclusions and Future Avenues

Given the current biodiversity crisis, the potential loss of biodiversity and ES associated with the conversion of agricultural landscapes or agricultural intensification cannot be ignored.

Current approaches to integrating biodiversity into IA are not suitable to assess the impacts of conversion of modified habitats or loss of small areas of natural or semi-natural habitat. Therefore, it is likely that there is an ongoing loss of biodiversity that is not currently being detected.

Recent literature provides a range of methods to assess the biodiversity value of modified agricultural landscapes. Work needs to be carried out to adapt and mainstream similar approaches in IA. Training on desktop baseline data collection and modelling approaches for this type of landscape needs to be developed. Examples and case studies should be shared among practitioners.

There is a need to prepare guidance on the integration of biodiversity value of modified areas into IA. Until then, a precautionary approach is recommended to avoid this additional loss of biodiversity and ES for lack of appropriate identification and mitigation.

There are important synergies between biodiversity conservation and higher productivity and resilience, for instance through sustainable agriculture approaches and NbS.

An approach that focuses on impacts may not be appropriate for modified landscapes. While we should avoid any further losses through better consideration of the biodiversity value of modified habitats and an emphasis on avoidance, we also need a new paradigm that focuses on the opportunities for biodiversity that could be created in modified landscapes.

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