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15. Addressing the interactions between biodiversity conservation and poverty alleviation in impact assessment

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15.1. Introduction

Throughout the years, biodiversity has received increasing attention in impact assessment, as shown by the many guidance documents (EC, 2013; Rajvanshi et al., 2007), scientific publications (Scolozzi and Geneletti, 2012; 2011; Treweek et al., 2005) and reviews of practice (Gontier et al., 2006; Geneletti, 2006) that have been produced to foster biodiversity-inclusive impact assessment processes. The Convention on Biological Diversity (CBD) explicitly recognizes that impact assessment processes, such as Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), are important tools to support decision-making for development proposals that have potentially significant impacts on biodiversity. Voluntary guidelines on “biodiversity -inclusive impact assessment” were first adopted by parties to the CBD in 2002 and then further refined in 2006 (SCBD, 2006). The conceptual framework of these guidelines explores how physical and social (and economic) interventions lead to biophysical and social changes, which in turn influence different aspects of biodiversity. If these impacts are significant, this has an impact on the ecosystem services (ES) provided by biodiversity which can then affect human wellbeing.

In line with the three objectives of the Convention, the CBD guidance is intended to explore the impacts of external interventions on biodiversity conservation, on the potential for sustainable use,
and on access to, and/or rights over biological resources (SCBD, 2006). What is still overlooked, however, is the implications of biodiversity impacts for poverty alleviation. The Strategic Plan for Biodiversity 2011 – 2020 emphasises that biodiversity “contributes to local livelihoods, and economic development, and is essential for the achievement of the Millennium Development Goals, including poverty reduction” (SCBD, 2010). There is, however, no straightforward relationship between conserving biodiversity and reducing poverty and thus no straightforward path between the impacts on ES and impacts on human wellbeing in the CBD conceptual framework. Firstly the links between ES and biodiversity are complex in themselves (Cardinale et al., 2012), and secondly, different groups of poor people use and benefit from different components or attributes of biodiversity and so some bits of biodiversity may be more important than others when it comes to assessing their contribution to poverty alleviation (Roe et al., 2014). Understanding how poor people interact with biodiversity and how this interaction contributes to their livelihoods can provide a more nuanced understanding of the social consequences of biodiversity impacts and allow more insights to be derived from biodiversity impact assessments.

Clearly the poverty implications of biodiversity loss are not going to be relevant in every context in which a biodiversity impact assessment might be carried out. In poor countries, however, poverty alleviation is often a far higher political priority than biodiversity conservation. Making the case that minimising the negative impacts of external interventions on biodiversity can also help avoid any unexpected consequences for poverty can play a crucial role in attracting the attention of policy makers and ensuring political buy-in to the mitigation actions that are proposed. The Strategic Plan for Biodiversity (SCBD, 2010) highlights the need to “mainstream biodiversity across government and society” (Strategic Goal A), including integrating biodiversity into “national and local development and poverty reduction strategies and planning processes” (Aichi Target 2).

This chapter starts by presenting a conceptual framework to guide thinking about the interactions between different components or attributes of biodiversity and different dimensions of poverty. The framework recognises that both biodiversity and poverty are complex, multi-dimensional concepts.
and, furthermore, that the interactions between the two are mediated by a wide range of factors. In particular, cross-cutting determinants such as governance, policies on poverty and biodiversity protection, and population growth and density which are associated with the socio-economic context and are critical in determining whether or not biodiversity leads to actual poverty reduction. The chapter then continues by reviewing the existing evidence base on biodiversity-poverty linkages, drawing on a systematic mapping of the published and grey literature (Section 15.3). The findings of the review are used in Section 15.4 to formulate key distinctions that help to understand whether and how biodiversity helps in alleviating poverty, and in Section 15.5 to discuss their implications for impact assessment practice.

### 15.2. Linking Biodiversity and Poverty Alleviation – A Conceptual Framework

Biodiversity is defined by the CBD as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”. But the term is often used without any particularly focus on variability, and often simply as a synonym for nature in general. The term biodiversity is often used to refer to the *amount* (in terms of abundance or biomass) of a particular species or type of resource, or the *extent* of habitat rather than diversity *per se* (Leisher et al., 2013; Vira and Kontoleon, 2013). When thinking about how biodiversity contributes to poverty alleviation it is useful to consider whether it is indeed variability that is important or whether some other aspect of biodiversity is more critical.

Poverty is another term with many different definitions. The simplest usually relate to some level of material wealth – for example the Millennium Development Goal to “eradicate extreme poverty” refers to the billion-plus people whose income is less that US $1 a day. However, poor people often do not define themselves in cash income terms – indeed the concept of cash is completely meaningless for some indigenous communities who live outside of the cash economy. It has therefore
become increasingly recognised that poverty is multi-dimensional. The World Bank, for example, describes poverty as ‘to be hungry, to lack shelter and clothing, to be sick and not cared for, to be illiterate and not schooled’ (World Bank, 2001) while Sen discusses poverty in terms of ‘capabilities’ to fulfil a productive life including good health, access to education and political freedom (Sen, 1999). This conceptualisation of poverty is similar to that of human wellbeing, and indeed, poverty can be thought of as the opposite - or absence - of wellbeing (Millennium Ecosystem Assessment, 2005).

At some levels the relationship between biodiversity and poverty is absolute – biodiversity underpins the delivery of essential ES on which the whole of humanity is dependent. But there is certainly no linear relationship. For example, the Millennium Ecosystem Assessment (MA) suggested that while many millions of people have benefited from the transformation of ecosystems and exploitation of natural resources, the benefits have not been evenly or equitably distributed, with the poor being the biggest losers (Millennium Ecosystem Assessment, 2005). Other commentators have noted the dynamic and context-specific nature of the biodiversity conservation-poverty alleviation relationship (Kepe et al., 2004) and have suggested that factors such as individual access to, and control over, resources; policies on poverty and biodiversity protection; population growth and density are critical in determining whether or not the existence, or use, of biodiversity leads to poverty reduction (Tekelenberg et al., 2009).

Understanding how biodiversity contributes to poverty alleviation/human well-being or livelihood support thus requires thinking about the relationship in a number of stages. Firstly in requires unpacking the term biodiversity to understand which particular components or attributes of biodiversity are important in supporting poor peoples’ livelihoods. Is diversity important or is it more about the availability of certain key species? Are particular species important or is it rather the general type of resource e.g. fish, or function, e.g. pollinators? Secondly it requires unpacking the term poverty to understand which particular dimensions are influenced by biodiversity. Is it all about the income that can be derived or does biodiversity also affect other dimensions of poverty/wellbeing such as health, food security, energy security and so on?
It is also important to understand the mechanism by which value from biodiversity is extracted. Is it through harvesting and consuming wild products? Is it from using genetic diversity to improve traditional crop varieties? Is it from setting up biodiversity-based tourism enterprises? Mechanisms can be categorised into direct use, indirect use, non-use, and “biodiversity dis-services”. In this context, the terms “use” and “non-use” are employed slightly different to that commonly used in the concept of total economic value (TEV). Consistent with TEV, “direct use” refers to the consumptive use of certain species or resources such as NTFPs for subsistence or tradable purposes. In this case species or resources are removed from nature. Indirect use refers to the benefits derived from biodiversity being left in situ rather than being removed and includes, for example use of biodiversity for tourism or for soil nutrient cycling. Non-use refers to the co-benefits that can arise from biodiversity management efforts such as jobs. These first three categories all refer to the benefits that people get from biodiversity. The final category – “biodiversity dis-services” therefore refers to the negative impacts that components of biodiversity can have on people such as the health impacts of parasites and diseases, or the loss of crops and livestock as a result of wildlife incursions.

Finally some understanding is needed as to how these mechanisms actually work to contribute to poverty alleviation. Do they generate income? Do they provide a form of insurance or risk management? Do they act as a safety net and support basic needs in the absence of other options? Understanding the role of biodiversity requires differentiating between use of biodiversity for subsistence purposes only or to generate a tradable surplus or income; between immediate use and contributions to longer term resilience; between using biodiversity as a regular matter of course or as a last resort in times of emergency; and between supporting livelihood security or undermining it.

The actual impact that biodiversity has on poverty will be mediated by the environmental, political and institutional context which regulates the nature and severity of poverty, the natural availability of biodiversity, and the ability of poor people to access and use biodiversity. The impact could be positive, neutral or negative (for example if human wildlife conflict or vector-borne disease
exacerbates poverty). The use of biodiversity by poor people will also have an impact on biodiversity itself. The nature of this impact (biodiversity enhancement or depletion) will determine the long term sustainability of use and ongoing ability of biodiversity to provide poverty alleviation services.

Figure 15.1 provides a visual summary of the conceptual framework.

<<Insert Figure15.1 around here>>

Figure 15.1 Conceptual Framework for Reviewing Biodiversity-Poverty Linkages (source Roe et al., 2014).

15.3. The evidence base on biodiversity – poverty linkages

This section summarises the results of a systematic mapping of the published and grey literature on the contribution of biodiversity to poverty alleviation/wellbeing and/or supporting local livelihoods (Roe et al., 2014). From a starting point of over 10 000 studies – identified through an extensive key word search – we identified 387 relevant studies of which 249 included some kind of measure of the contribution of biodiversity to poverty alleviation or well-being. Relevant studies were those that met our criteria of identifying a link between biodiversity use/non-use and an effect on poverty/local livelihoods in medium or low income countries (so for example we rejected any that were concerned
with the effect of poverty/poor people on biodiversity, or those that we located in high income countries, or those that were about how conservation interventions influence poverty as opposed to how biodiversity itself influences poverty).

15.3.1 Defining biodiversity

Our interpretation of the term “biodiversity” in the context of this review merits some discussion. Although the CBD definition of biodiversity encompasses “living organisms from all sources”, we were predominantly interested in natural habitats and wild species - what Balmford et al (2002) describe as “wild nature” – rather than all living organisms. The line between what is wild and what is not is, however, very fuzzy. For example, we did not include mainstream agricultural crops but we did include indigenous varieties of crops and crop wild relatives, or locally domesticated wild species. Similarly, we did not include modern livestock as a component of biodiversity but we did include traditional breeds or landraces. We also omitted micro-organisms, parasite and disease vectors such as mosquitoes. We recognise, however, that the impact of such living organisms on poverty as a result of their health impacts is probably far more significant than of any other component of biodiversity.

Finally, we did not cover the broad ES literature unless a study specifically linked the provision of a specific ES with particular components of biodiversity and then made a link to poverty. Much has been written about the varied and complex inter-linkages between biodiversity and ES and the evidence requires careful interpretation. For example, focussing on provisioning and regulating services, Cardinale et al (2012) found that there is evidence that biodiversity either directly influences, or is strongly correlated with, some provisioning and regulating services but not all. The services most closely linked to ecosystem functions were those where the evidence for a link to diversity was also strongest. For many of the ES reviewed, the evidence for effects of biodiversity was mixed, unclear, or there was insufficient data to evaluate the link. They also found cases where increased biodiversity may actually be deleterious to ES – for example where diverse natural enemy communities sometimes inhibit biocontrol because they attack each other. Overall, Cardinale et al. “caution against making sweeping statements that biodiversity always brings benefits to society.”
Mace et al (2012) identify three different roles for biodiversity in ES: as a regulator of ecosystem processes; as a final ES; and as a good. Our review encompassed studies on biodiversity in each of these roles but within that has predominantly adopted what Mace et al. would refer to as a “conservation perspective” where the focus is on “a subset of biodiversity that includes charismatic species and those on threatened species lists.” Specifically, we focussed on a subset of biodiversity that is predominantly wild (or at least not domesticated to an industrial scale) and of a predominantly larger than micro-organisms scale (but not ignoring wild genetic resources). The sections below describe the evidence, following the structure of the conceptual framework discussed above.

15.3.2 Description of the evidence base

Components and attributes of biodiversity

The evidence addressed many different components of biodiversity – from genes to ecosystems (Figure 15.2). In addition to the standard “genes, species, ecosystems” typology, we added the category “guilds” to capture studies on, for example, the role of pollinators. We made a distinction between studies that focussed on individual species and those that focussed on groups of species (for example African plains game, or “the big five”). We also distinguished studies that were focussed on particular types of resources – rather than specific species – for example non-timber forest products (NTFPs). We found that the resources category accounted for the largest number of studies that we reviewed (38% of all papers) within which the most commonly studied type of resource was NTFPs. We found only a very small evidence base making a link between guilds such as pollinators and poverty, or genetic resources and poverty. Figure 15.2 summarises the results.
Figure 15.2 Components of biodiversity studied (dark grey columns represent total dataset meeting primary inclusion criteria; light grey columns represent subset with a measure of poverty impact).

In keeping with our finding about NTFPs we found that forests were by far the most studied ecosystem. Artificial terrestrial habitats (e.g. agricultural land) were also reasonably well studied but very little evidence was found relating to mountains, deserts and introduced/exotic habitats.

In most cases, the abundance or extent of biodiversity was the attribute that made it important for poverty alleviation. Diversity itself was the least frequently noted attribute (Figure 15.3).
Figure 15.3 Is diversity per se important? Attributes of biodiversity studied (dark grey columns represent total dataset meeting primary inclusion criteria; light grey columns represent subset with a measure of poverty impact).

**Dimensions of poverty**

The Ecosystem Services for Poverty Alleviation (ESPA) programme has produced a conceptual framework for understanding poverty (Suich, 2012). This identifies – from a review of the literature – 19 commonly used dimensions of poverty. Our analysis only identified studies that addressed 11 of these, plus an additional dimension – energy security. Although most studies examined more than one dimension of poverty, the most commonly studied was income (70% of all papers). Other commonly studied dimensions were food security (32% of all papers) and asset accumulation (23% of all papers) while the least commonly studied were energy, shelter and safe water. Figure 15.4 describes the frequency of study of each dimension.
Mechanisms linking biodiversity and poverty

Not surprisingly, the evidence reveals that the most common mechanism for linking biodiversity and poverty is through direct use of different components of biodiversity. Biodiversity disservices have received little attention in the literature – although our review did not attempt to address the literature on the links between poverty and human and livestock health – which may contain some useful insights into the significance of biodiversity. Figure 15.5 illustrates the diversity of mechanisms covered in the literature, the most common being NTFP harvesting (noted in over half of the studies reviewed).

In most cases, biodiversity influences poverty alleviation through acting as a source of income generation for poor people and/or through supporting basic needs. Less commonly identified processes were contributing to longer term resilience and acting as a safety net. For most of the mechanisms reviewed biodiversity influences multiple dimensions of poverty – way beyond the income effect. This was particularly pronounced in studies of fishing, NTFPs, tourism and wild plant cultivation where almost all dimensions of poverty were considered in one or more study.
Impact of biodiversity use on poverty – and on biodiversity

The overwhelming majority of studies reviewed described a positive effect of biodiversity on poverty – although only two-thirds of these actually included any measure of that effect. Measures related to almost all the dimensions of poverty were used although the most common type of measure was income-related. Non-income measures included increases in food availability and intake; numbers of jobs created; improvements in health; improvements in asset productivity. But only just over half of the studies included any consideration of whether the use of biodiversity was sustainable. Of these use was considered sustainable in 65% of cases. When this finding was compared with the type of use of biodiversity it can be seen – not surprisingly – that most doubts about the sustainability of use were associated with direct (consumptive) use mechanisms. Biodiversity use was considered to be unsustainable in 21% of direct use studies compared to 13% for indirect use studies.
15.4. Does biodiversity help in alleviating poverty?

The evidence base described above would suggest that the answer to this question is yes: poor people use - or interact with – biodiversity in a variety of different ways and the body of evidence suggests an overall positive effect. The reality, however, is that few studies have actually demonstrated a clear link between use of biodiversity and a change in state of poverty. Claims about the poverty reduction role of biodiversity thus need to be treated with some circumspection. Similarly claims may be made that biodiversity has delivered poverty benefits when in fact it was a single species (e.g. trophy hunting revenues from elephants) or it was the collective biomass of a number of species (e.g. fisheries, non-timber forest products). Furthermore, many of the beneficiaries of biodiversity conservation/use are rural communities who happen to be located close by but who may not necessarily be defined as “poor” by national or international standards. It is therefore necessary to make a number of clear distinctions in any discussion of biodiversity-poverty links:

- Poverty reduction vs poverty prevention: It is important to differentiate between: a) the safety net role that biodiversity plays in supporting rural people’s livelihoods in developing countries (e.g. see Vira and Kontoleon, 2013 for a meta-analysis of studies) and b) the role that biodiversity can play in actually lifting people out of poverty (e.g. WRI, 2005). Sunderlin et al (2005) make this same point with respect to the link between forests and poverty alleviation.

- Biodiversity vs biomass vs selected species: Species abundance or biomass, or the economic value of a single species or habitat can often make a far more significant contribution to poverty reduction – at least in the short term – than variability. Abundance, biomass, individual ecosystems, species and genes are all components or attributes of biodiversity but often the term biodiversity is used to refer to just one of these components. Vira and Kontoleon (2013) reviewing the evidence for the dependence of the poor on biodiversity note: “the term ‘nature’s resources’ better captures the generic categories of resources that have been studied in this literature. These include forests, both in terms of wood-based and non-timber forest products (NTFPs); mangroves; fish; wild animals (bushmeat) and wild plants
(including herbs); and common pool resources (CPRs) more generally.” Nevertheless, while only a limited number of species may be in direct use, they themselves are dependent on biodiversity to maintain the ecological systems of which they are part. Diversity is also important for food security, risk avoidance, livelihood insurance and the delivery of critical ES.

- Biodiversity use vs biodiversity conservation: Some uses of biodiversity may deliver significant poverty benefits in the short term but not all uses of biodiversity are sustainable in the long term (e.g. felling of Brazil nut trees for timber).

Nevertheless, despite all the problems identified above, and despite caveats about the state of the evidence base it is clear that that billions of poor people living in rural areas of developing countries are directly dependent on “biodiversity” to support their livelihoods (disservices notwithstanding) whether it be individual components, or whether it really is the variability among living organisms.

15.5. Implications for biodiversity impact assessment

It seems clear from the discussion above that efforts should be made to encourage conservation or restoration of biodiversity when impact assessment of a planned intervention indicates potentially negative consequences. Because the rural poor depend on biodiversity for their day to day livelihoods, it is logical that if it is conserved or restored it can continue to provide livelihood support functions.

In response to the Strategic Plan for Biodiversity 2011-2020, parties to the CBD are revising their National Biodiversity Strategies and Action Plans (NBSAPs) to better emphasise the links between biodiversity, poverty reduction and national development – including the need to recognise the impact of development interventions on biodiversity and the subsequent knock-on impacts on poor people. In Botswana, for example, the revised NBSAP highlights the importance of biodiversity to people’s livelihoods and when threats to biodiversity are discussed, the impact of these threats is discussed
both in terms of the impact on biodiversity and on people’s livelihoods (MEWT, 2014). The Uganda draft revised NBSAP provides more insights into the links between biodiversity, development and poverty and the need to ensure that development interventions – such as oil exploration - do not impact on biodiversity to the detriment of local livelihoods (Box 15.1)

Box 15.1 Linking Biodiversity and Poverty Alleviation in the Uganda NBSAP.

However the intervention that is employed to reach biodiversity conservation/restoration outcomes may itself have a negative poverty impact. For example strict enforcement of protected area and other exclusionary land uses may actually increase local incidence of poverty through the loss of resource access. The way conservation interventions are designed and implemented is a key determinant of their poverty impacts – whether they are protected areas (e.g. West et al., 2006); payments for environmental services schemes (e.g. Wunder, 2008) or any other mechanisms (e.g. Leisher et al., 2013). Incorporating poverty alleviation into biodiversity impact assessment therefore requires attention not just to how impacts on biodiversity from external intervention might have knock-on impacts on poor people, but also how efforts to mitigate those impacts on biodiversity may also have unintended consequences for poor people.

This chapter sheds light on some of the issues which should be addressed in biodiversity impact assessment of any planned development interventions if the subsequent implications for poverty are to be taken into account. Specifically, there is a need to:

- Un-pack “biodiversity”, and clarify which are the most important components of biodiversity for poor people (e.g., the availability of some key species? The availability of a particular type of resource such as bushmeat or firewood?) This would help to steer the scoping stage of impact assessment towards the issues that matter the most to poor people.

- Un-packing “poverty”, by identifying its different dimensions and disaggregating the potential impacts of the planned intervention on each of them. In this way, the impact chain can be unveiled and the drivers that are likely to cause changes in the individual components
of poverty (or wellbeing), can be properly identified and modelled. This approach is suggested by the Millennium Ecosystem Assessment framework (MA, 2005), but rarely applied in impact assessment practice, where studies tend to produce evaluations of the overall impact of proposed developments. This type of analysis could also help to disaggregate impacts for different groups of beneficiaries. These could be, for example, people with different income levels, or different degree of dependency from a given biodiversity resource or service (due to livelihood systems, culture, lifestyle, etc) (UNEP, 2014). In this way, clear predictions of winners and losers associated to planned interventions can be produced (Geneletti, in press; 2013), and used to inform decision-making, but also to enhance public engagement, which is central to impact assessment processes;

- Understand the way in which poor people extract values from biodiversity, so as to predict the effects on these processes that the planned intervention is likely to cause, for example, in terms of reducing the quality or quantity of a given resource or generating biodiversity “dis-services”. This would provide much more context-specific information on which to based possible alternative strategies that minimize negative interferences and/or enhance positive ones. In this way, impact assessment could be used not only in a reactive way to assess the effects of proposals, but also in a more proactive way, to improve the design and implementation of such proposals.

We recognise that the consideration of poverty issues within biodiversity impact assessment expands the scope of such exercises - which typically operate under tight time and resource constraints. Hence, it is important to keep the additional analysis and information load to a minimum, in order for the impact assessment process to be effective in actually supporting decision-makers. Nevertheless, just keeping in mind some of the issues discussed in this chapter can contribute to making biodiversity impact assessment much more effective in poor countries and can help to design interventions which not only minimise their impact on biodiversity but also minimise unintended consequences for the poor.
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