Environmental Science and Policy 75 (2017) 91–102

Contents lists available at ScienceDirect

Environmental Science and Policy

journal homepage: www.elsevier.com/locate/envsci

Utilitarian framings of biodiversity shape environmental impact assessment in development cooperation

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ARTICLE INFO

Keywords:
Biodiversity
Development cooperation
Environmental impact assessment (EIA)
Africa
Baseline

ABSTRACT

Biodiversity is under threat from anthropogenic pressures, in particular in biodiversity-rich developing countries. Development cooperation actors, who traditionally focus on the improvement of socio-economic conditions in the South, are increasingly acknowledging the linkages between poverty and biodiversity, e.g. by referring to the ecosystem services framework. However, there are many different framings which stress the need for biodiversity integration and which influence how biodiversity and development are and/or should be linked. Moreover, there is a gap between the lip service paid to biodiversity integration and the reality of development cooperation interventions. This study analyses how biodiversity framings are reflected in environmental impact assessment (EIA) practice, and how these framings influence EIA and decision-making. The findings, based on an in-depth qualitative analysis of World Bank EIAs undertaken in West Africa, indicate the incoherent quality but also the dominance of the 'utilitarian' and 'corrective' framings, which respectively stress human use of nature and mitigation of negative unintended development impacts. Identifying and highlighting these discursive trends leads to increased awareness of the importance of biodiversity among all development actors in North and South. However, some framings may lead to an overly narrow human-centred approach which downplays the intrinsic value of biodiversity. This study proposes recommendations for an improved integration of biodiversity in development cooperation, including the need for more systematic baseline studies in EIAs.

1. Introduction

Biodiversity is facing increasing threats at the global and local level. All dimensions of biodiversity, from genetic diversity to species, ecosystem, and functional diversity are under pressure (Steffen et al., 2015). This situation threatens human wellbeing in direct and indirect ways (Millennium Ecosystem Assessment, 2005) as human systems and (biodiversity-based) natural systems are closely intertwined. Biodiversity loss alters the functioning of ecosystems and their ability to provide society with goods and services (Cardinale et al., 2012). This challenge is particularly acute in developing countries, where a high proportion of people is directly dependent on biodiversity. Biodiversity is hence intrinsically linked to development cooperation, broadly defined as the range of international efforts aimed at raising human wellbeing sustainably (Drutschinin et al., 2015; Kok et al., 2008; Suich et al., 2015). While biodiversity is being defined by the Convention of Biological Diversity as 'the variability of living organisms from all sources, and the ecological complexes from which they are part' (CBD, 2017), it means many different things to many people (Holmes et al., 2017). The plurality of ways in which people view human-nature interactions has a direct relevance for development cooperation (Mace, 2014).

The growing realization of the linkages between biodiversity and development is reflected in international conventions and national legislation. At the international level, the Convention of Biological Diversity (CBD) and the Sustainable Development Goals (e.g. SDG 14 and 15) demand stronger linkages between biodiversity and development cooperation (UN, 2015). One of the CBD's Aichi Biodiversity

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http://dx.doi.org/10.1016/j.envsci.2017.06.003
Received 8 February 2017; Accepted 2 June 2017
Available online 08 June 2017

targets (CBD, 2010a) deals specifically with 'mainstreaming' biodiversity into policy, and calls for the application of environmental assessments which will help to internalize the costs and benefits of the conservation and sustainable use of biodiversity in decision-making (Tallis et al., 2015). A range of national governmental agencies have also integrated development and biodiversity conservation into their missions (Garnett et al., 2007). Most development projects do not have biodiversity conservation as one of their stated aims, but might negatively impact on biodiversity. Although some projects are explicitly focusing on biodiversity objectives (Kareiva et al., 2008), most projects will at best integrate biodiversity as a side-thought. This integration will often be realized through impact assessment processes.

While impact assessment is a broad term encompassing the identification of the future consequences of current or planned actions (IAIA, 2015), in a context of development cooperation it mostly takes on the form of environmental impact assessment (EIA) at project level, and of strategic environmental assessment (SEA) at policy, plan or programme level. More recently, sustainability assessment (SA) is increasingly being coined and used in development cooperation (Hugé et al., 2015).

Impact assessment has been a key process to mainstream environmental issues (among which biodiversity) in development cooperation since the 1980s (SIDA, 1998; OECD DAC, 1992). Although the philosophy and systematic approach of impact assessment has by now reached almost all countries, including the partner countries in the global South, biodiversity is not necessarily adequately considered in impact assessments and in development cooperation in general (Verissimo et al., 2014).

Simultaneously, the Sustainable Development Goals-induced momentum and the expected major changes in the organization and implementation of development cooperation (partly as a result of the climate negotiations at UNFCCC-COP21), has created a renewed sense of urgency to reflect and act upon the role of development cooperation to address the biodiversity crisis. Furthermore, a −real and/or predicted- decrease and/or reorientation of the available public funds for development cooperation stresses the rising importance of accountability and 'sound investment' (Underwood et al., 2008). In this context, there is a growing need for more knowledge on biodiversity integration in development cooperation, in order to better frame the potential 'return on investment'. At a conceptual level, this study aims to contribute to our understanding of the acknowledgement of the plurality of perspectives on human-nature interactions in a context of development cooperation.

The present study focuses on the consideration of biodiversity in environmental impact assessment (EIA) in the context of development cooperation.

We focus on:

- how biodiversity is framed in EIAs;
- how biodiversity is represented in EIAs;
- the decision-making context of EIAs;

2. Materials & methods

2.1. Conceptual framework

EIAs for development projects are performed and used in a wide variety of institutional, sectoral, environmental and socio-economic contexts. They are however typically characterized by a similar set of stages, reflecting a widespread uniformity in approach. This systematic, stepwise approach is encouraged and guided by the literature (Morgan, 2012), by international organizations (OECD DAC (1992, 2012), World Bank (2013)), and by the professional impact assessment community (IAIA, 1999).

For the analysis of the consideration of biodiversity in EIAs, we were inspired by the work of Pope et al. (2015), who developed a methodology that allows to conceptualize impact assessment approaches. We propose a three-step analysis framework to analyze the consideration of biodiversity in EIA, based upon three dimensions: i. the underpinning of biodiversity framings in the EIA; ii. the representations of biodiversity in the EIA; and iii. the decision-making context.

2.1.1. Framings & discourse

Framings or frames of meanings, refer to particular ways to interpret and represent an issue. Frame analysis is a form of discourse analysis, a field that focuses on the analysis of shared, structured ways of thinking, talking and writing about the world (Dryzek, 2005). A discourse is, simply stated, 'a way of seeing and talking about something' (Barry and Proops, 1999). There are various approaches to discourse (analysis) as summarized by Arts and Buizer (2009). This study follows the 'discourse as frame' approach (Arts and Buizer, 2009): *i.e.* we interpret discourse as the various meanings of words and texts-, but also as a shared frame of meaning. The use of language in specific situations is no longer the exclusive focus of attention, but the ways in which a certain frame of reference or 'frame of meaning' mediate the use of language is now key. Discourses exist in the minds of people and in the social networks of which they are part (Arts and Buizer, 2009). Hence potential controversies can only be resolved if the conflicting frames, which the competing parties hold, become a topic of dialogue. Building on existing frames, certain types of action seem more self-evident than others. For example, when a problem is framed as (mainly) globally or locally caused, very different policy options will emerge (Arts and Buizer, 2009; Phillips et al., 2004). So next to appreciating how ideas are framed in words, the framings also refer to the practices in which specific ways of looking at things are embedded (Buizer and Van Herzele, 2012). The framings represent the social norms and conventions that constrain and enable what can be acceptably said (Hugé et al., 2013). Frame analysis is used to make sense of tensions, contradictions, and implicit understandings of contested concepts such as e.g. biodiversity (Mace, 2014) or carbon accounting (Ascui and Lovell, 2011).

Biodiversity-and in particular its conservation, management and/or integration − is a broad concept which is also 'translated' into a variety of framings (Hutton et al., 2005; Mace, 2014). In summary, the question around which these framings centre is why we (need to) conserve biodiversity. Should biodiversity be protected for its own sake, *i.e.* because of its intrinsic value? Or should biodiversity −only- be protected to help ourselves as human beings, *i.e.* because of its instrumental value (Tallis and Lubchenco, 2014)? A combination of both rationales is of course possible as well. Detailing this well-known yet simplifying dichotomy, Mace (2014) identifies four major trends in biodiversity (conservation) framings, that continue to co-exist: the 'nature by itself' (emergence in the 1960s–1970s), 'nature despite people' (1980s–1990s), 'nature for people' (2000–2005) and 'people and nature' (2010 onwards) framings. Shifts in biodiversity framings are therefore related to how the relationship between human and nature is viewed (and this differs between and among stakeholder groups) (Mace, 2014). Well-known biodiversity perspectives such as ecosystem services, community-based conservation, fortress conservation etc. can be conceptually positioned by using predefined classifications of biodiversity framings, and all perspectives can be succinctly characterized by a number of key ideas. There exists a variety of classifications of biodiversity framings next to Mace's scheme, such as the regulatory versus the market-driven approaches regarding biodiversity conservation and management (Dressler and Roth, 2011; Jepson and Ladle, 2011), and the nature protectionist versus the more development-oriented social conservationist approach (Miller et al., 2011). Holmes et al., (2017) propose a fine-tuning of these dichotomies and identify three framings: one in favor of conservation to benefit people but opposing links with capitalism and corporations; a second framing favoring bio-centric approaches and a third framing representing a more instrumental view of the importance of benefiting people as a means to an end rather than an end, and a focus on both pristine and modified

Table 1
Schematic overview of key descriptors of ideal-typical biodiversity framings derived from the scientific literature (Holmes et al., 2011; Mace, 2014; Miller et al., 2011; Tallis and Lubchenco, 2014).

Biodiversity framings	Key descriptors	Source
Nature for itself	Species; Wilderness; Protected Areas;	Mace (2014)
Nature despite people	Extinction threats, threatened species; Habitat loss; Pollution; Overexploitation;	Mace (2014)
Nature for people	Ecosystems; Ecosystem services; Economic values;	Mace (2014)
People and nature	Environmental Change; Resilience; Adaptability; Socio-ecological systems;	Mace (2014)
Nature protectionists	Protected Areas (PAs); Limiting human presence & disturbance; Biodiversity protection as primary goal;	Miller et al. (2011)
Social conservationists	Sustainable use; Development and welfare-oriented goals; Poverty alleviation and social justice;	Miller et al. (2011)
Traditional conservation 2.0	Biocentric motivation; Conserving ecosystem processes; Biodiversity in pristine areas and in modified landscapes;	Holmes et al. (2017)
Nearly new conservation	Market-based instruments; Science should play a strong role; Avoid harm to people when protecting biodiversity;	Holmes et al. (2017)
Market skepticism	Benefits for people are key; Opposes links with capitalism and corporations;	Holmes et al. (2017)
Intrinsic value of nature	Protect nature for its own sake;	Tallis and Lubchenco (2014)
Instrumental value of nature	Protect nature to help ourselves;	Tallis and Lubchenco (2014)

landscapes. While we acknowledge that these −partly overlapping- schemes are all simplification of the complexity of the dynamics of biodiversity framings and their underlying motives (Jax and Heink, 2015), they provide entry points allowing to characterize the variety of ways in which biodiversity is framed in environmental impact assessment processes. Table 1 provides a schematic overview of biodiversity framings and lists key descriptors for each framing.

2.1.2. Representations of biodiversity

The representation of biodiversity in an EIA, although closely linked to the underpinning framing(s), refers to the way in which biodiversity, as one key component of the 'environment', is operationalized for the purpose of assessment and subsequent decision-making (Pope et al., 2017). While some framings imply a particular representation of biodiversity, the relationship between framing and representation is not strictly one-to-one. In other words, different representations or models can be used within the same framing, and the same representation can be used within different framings (Pope et al., 2017). In EIAs, representations are typically visible in the baseline data section, where basic descriptions, ecosystems information, data at a certain taxonomic level (class, family, genus, species…), and indicators are found. Representing biodiversity in an EIA process inevitably means that choices have to be made. In selecting which data to include (e.g. selection of: taxa, ecosystems, impacts described, etc.), and in deciding the level of detail of the presented information, EIAs show a wide variety of representations of biodiversity. By focusing on taxa, systems, and/or conservation status, and by providing qualitative and/or quantitative data, the representation of biodiversity in EIAs is instrumental for the translation of biodiversity into operational decision-Supporting information.

2.1.3. Decision-making context

The decision-making context refers to the context in which an EIA is supposed to make a difference within the concerned development cooperation project. Traditionally, EIAs are mainly corrective processes. An EIA is performed before the project is implemented (*ex ante*). Ideally, an EIA makes an analysis of the expected impacts of an intervention, and subsequently proposes mitigation measures. These aim at minimizing expected negative impacts and/or maximizing positive impacts. As a rule, EIAs are applied at the project level. However the decision-making context in which they are applied may differ according to the party commissioning the assessment (government, proponent) and other contextual specificities (Rose, 2015). In order to assess if an EIA does have an influence on the ultimate decision regarding the approval and implementation of a development project, long-term monitoring and evaluation of the project and the EIA's recommendations are ideally required. A comprehensive analysis of this process falls outside of the scope of this paper, and would confront us with serious information and transparency gaps. Therefore, we now study the linkages between the biodiversity baseline data presented in the EIA, and the proposed environmental management plan outlining the mitigation measures. This approach sheds some first insights on the decision-making context of the EIAs.

The three dimensions (framings, representation, decision-making context) underpinning this conceptual framework enable reflection upon current and future EIA practice in development cooperation, and allow to compare and analyze the consideration of biodiversity in diverse EIAs. This framework is used to analyze a selection of EIAs.

2.2. Analysis of EIAs

In order to select the most appropriate EIA database to perform a systematic analysis of the consideration of biodiversity using the framework described in Section 2.1, we followed a three-step approach:

Step 1: *Exploration of the accessibility of EIA data among major providers of bilateral development cooperation*

Our exploration of accessible EIA databases was guided by the size of the development cooperation providers (in terms of official development aid (ODA) in USD). First, we explored the public accessibility of EIAs performed by the five largest *bilateral* providers in terms of official development assistance (ODA): the United States, the United Kingdom, Germany, France and Japan (OECD DAC, 2015). Most agencies had no publicly available information about the presence/absence of EIA in their development projects, which touches on the issue of public transparency on spending tax payers' money. Development agencies have no harmonized approach on displaying their projects and their EIA to the public, which poses the issue of harmonization ('Donor countries coordinate, simplify procedures and share information to avoid duplication') according to the Paris Declaration on Aid Effectiveness (2005). A qualitative exploration of the largest providers' (cf. *supra*) web portals showed that only USAID provides a comprehensive and systematic access to information regarding the presence/absence of EIA in their projects through its 'environmental compliance database' (USAID, 2015). However, there was no systematic access to full EIAs in the USAID database. Turning towards the multilateral donors, only the World Bank (the largest multilateral provider in the world) was found to have a fully accessible EIA database (http://documents.worldbank.org/curated/en/docadvancesearch), which allowed for a systematic analysis, and which was therefore used for the current study.

Step 2: Geographical selection

Our geographical focus is West Africa (consisting of 16 countries and excluding Saint Helena, as defined by the UNSD (2013): Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo) because of: the high proportion of Least Developed Countries (12 out of 16 (UN DESA 2016)), the presence of the West African Forests biodiversity hotspot (Myers et al., 2000), and the strong decline of biodiversity in this rapidly developing region with a population which is expected to double to 600 million by 2050 (IUCN, 2009).

Step 3: Selection of EIAs for detailed analysis of biodiversity integration

We used the World Bank database (http://documents.worldbank.org/curated/en/docadvancesearch,) and selected all publicly available EIAs performed for World Bank-financed projects in West-Africa from 2013 onwards. This approach yielded 18 EIAs in 10 countries.

For each selected EIA, the following dimensions were assessed:

- The considered biodiversity aspects, which give information about the framing of biodiversity (3.1);
- The quality (incl. systematic approach) and the level of detail ('resolution') of the biodiversity baseline data, which give information on the representation of biodiversity (3.2);
- The linkages between the biodiversity baseline data and the proposed management or mitigation measures, which give information on the decision-making context (3.3);

Step 3.1 Framings of biodiversity

In order to identify how biodiversity was framed in every EIA, we identified constitutive elements that underpin a particular framing of biodiversity. We followed Dryzek (2005) approach (as also applied in Hugé et al., 2013) to perform the coding, and identified characteristic language and -proxies for-assumptions regarding biodiversity. We used Dryzek's constitutive elements of framings, by focusing on indications regarding:

- The basic entities recognized or constructed (how is biodiversity understood (included information, taxa and systems described, …));
- The assumptions about relationships (impacts, causalities,…);
- Agents and their motives (key actors and their interests and motives with regard to biodiversity conservation);
- Keywords:, metaphors and other rhetorical devices used to describe biodiversity.

This exercise yielded a list of descriptors (See Table 2) for each EIA. We subsequently compared these case-specific descriptors with key descriptors of biodiversity framings as drawn from the literature (Holmes et al., 2017; Miller et al., 2011; Mace, 2014; Tallis and Lubchenco, 2014) and synthesized the results in Table 1.

The identification of the representation of biodiversity in the EIA processes was mainly based on the baseline data sections in the EIAs, based on which we describe the overall approach, the level of detail and the quality of the baseline data.

The linkages between the biodiversity baseline data and the environmental management plans gave a first indication about the decision-making context of each EIA, and were identified by qualitatively comparing the environmental management plan sections of each EIA with its baseline data section.

3. Findings

Table 2 presents the biodiversity-relevant characteristics of the analysed EIAs.

The findings from Table 2 are drawn from the analysed EIAs. They were subsequently interpreted and synthesized in Table 3 using the three-step analysis outlined in Section 2. Biodiversity framings were identified by a comparison of keywords used in the EIAs and the keywords drawn from the literature (see Table 1). The representation of biodiversity was synthesized based on the baseline data provided in the EIA. For information relating to the decision-making context; we used the inclusion of biodiversity baseline data in the environmental management plan sections of the EIAs as a proxy for the potential use of biodiversity data in actual decision-support.

4. Discussion

4.1. Framings

Most studied EIAs reflect framings that are akin to the utilitarian 'nature for the people', 'instrumental value' and 'social conservationist' framings, while some reflect the 'nature despite people', 'nature protectionist' framings (see Table 1 for an overview of the respective framings' descriptors), the latter two being the framing in which EIA historically emerged in the late 1960s (Morgan, 2012). The prevalence of the ecosystem services approach in the studied EIAs is rooted in the primary purpose of development projects, which have the increase in human well-being at their core. There is a focus on 'provisioning ecosystem services' which is in line with the findings of Honrado et al. (2013).

There is no consensus on the ecosystem services-concept being a help or a hindrance in EIA (Baker et al., 2013). However Landsberg et al. (2013) state that ecosystem services can provide project proponents '*new glasses to look at a project they think they know very well*'. Some EIAs go beyond a purely descriptive account of biodiversity (which entails e.g. a presence list of a selection of taxa), in order to emphasize linkages between human and natural impacts. While this may lead to an increased awareness of the importance of biodiversity among decision-makers, it may also lead to an overly narrow human-centred approach which downplays the intrinsic value of biodiversity. Two main approaches to integrating ecosystem services within EIA are recognized from the literature (Baker et al., 2013): a comprehensive approach where the assessment framework is entirely guided by ecosystem services, and a philosophical approach that applies a 'light-touch' ecosystems-thinking mind-set, contributing to frame the assessment process rather than defining it. In the set of assessed

EIAs, the 'light-touch' approach dominates, as it allows to select and/or emphasize particular biodiversity aspects that are deemed relevant (e.g. in EIA #14, 15, 16, 17). Only one EIA (EIA #6) provides a comprehensive description of all ecosystem services provided by each habitat, and assesses the impacts of the project on these services.

However, the inherent risks linked to the conceptual simplification and the possible monetization and hence substitution of ecosystem services should always be kept in mind (Calvet et al., 2015; Silvertown, 2015). The ecosystem services approach has constrained thought, particularly towards the monetization of nature, even when many ecologists and others oppose this trend (Silvertown, 2015). Furthermore, ecosystem services-based approaches can appear as a distant, academic mode of thinking to local stakeholders, and the dominance of the ecosystem services framing could lead to neglecting other relevant values (e.g. non-monetized ecosystem services such as regulating services (e.g. erosion control)) (Karjalainen et al., 2013). This lack of a uniform approach may lead to the instrumentalisation of EIAs, and to a bias in the selection of data in order to consciously delay or block certain management measures (Bisset, 1988), highlighting a political economy aspect for a more comprehensive understanding of the dynamics at work in such processes (reference?).

4.2. Representation of biodiversity

Although the utilitarian, instrumental framings and the associated ecosystem services concept dominate most of the studied EIAs, this is not translated directly into an ecosystem services-inspired

Table 2
Biodiversity-relevant characteristics of the analysed EIAs.

EIA Number/ country	Topic of the project on which EIA was applied	Considered biodiversity aspects in the EIA	Quality and level of detail of baseline data in the EIA	Use of baseline data in the EIA environmental management plan (EMP)
EIA 1/Benin	Paving of the access road to a landfill site	• Negative impacts: potential destruction of trees. • Fish 'resources' separated from other fauna in impact assessment. • Temporary increase of water turbidity could affect fish resources.	• Vegetation: plantations species identified. • Common birds: species or family level; • General names for fauna (scavengers, birds, rodents, insects). • Aquatic fauna: species-level. • Land use map with 4 vegetation categories (thickets, plantations, crops and fallows).	• Limited explicit linkages between baseline & EMP. • Uprooting of trees identified (acacia and teak), only *Acacia* mentioned in the baseline & EMP. • Reforestation as mitigation measure, with no information about the type of tree (except in teak and acacia areas). • Installation proposed far from a lake to avoid contamination, without reference to any biological data. • No biological data in the EMP.
EIA 2/Burkina Faso	Extension of thermal power stations	• Negative impacts: plant cover reduction, fragmentation and destruction of fauna habitats (with no specification). • Number of trees to be cut identified (% of vegetation cover loss quantified). • No information about fauna.	• Ecosystem types cited. • Mention of existing (non- project related) threats to vegetation. • Qualitative presence of some plant species. • Reference to the presence of plants that are useful for humans (no specifications). • No reference to fauna • Floristic inventory (as appendix, not available) includes sanitary state of trees.	• Reforestation as mitigation measure, with no information about the type of tree (only mention that it will be a mix of local and exotic species). • No biological data in the EMP.
EIA 3/Ivory Coast	Widening and asphalting of roads	• Mammals threatened by poaching, agriculture, bushfire. • Plant species impossible to determine in sacred forests. • Negative impacts: landscape alteration and degradation of plant cover; however: No significant impact on biological components as project in urbanized area. • Vegetation considered for its role against erosion and mitigation (replant trees with deep root systems).	• Qualitative description of vegetation types, forest categories and presence of sacred forests. • Mention of existing (non- project related) threats to mammals in the region: poaching, agriculture, bushfire. • Common name of most and least common mammals and birds, with reference to endemism. • Qualitative presence of groups ('amphibians', 'insects', 'reptiles'). • Mention of domestic animals presence in the area.	• EMP assumes that there is no flora or fauna of ecological interest in the area (unspecified in baseline). • Landscape design often cited in EMPS, never in the baseline. • Vegetation monitoring is part of the EMP.
EIA 4/Ivory Coast	Gas field expansion	• Reference to the complexity of marine food chains. • Negative impacts: imbalance of the marine ecosystem, habitat disturbance, contamination, damage to fish.	Based on field studies: • Phytoplankton: (taxa vary from species-level to class-level, number/m^3) + seasonality. • Benthic community: trophic categories, species assemblages, number of species for each ecological zone. • Fish: communities (incl. dominant species), habitat, seasonality. • Birds: list of important and migratory species. • Marine mammals + marine turtles: species, habitat, threats. • Ecosystems: forest types with dominant species. • Flora: number of woody species, list of endemic species. • Mammals and reptiles: species-level • National parks: description with important ecosystems/ species. • Threatened species.	• Explicit linkages (contamination risks mentioned in both baseline and EMP (e.g. mangrove fringes, coastal lagoons)). • Monitoring of marine mammals and marine turtles included in the EMP.
EIA 5/Ivory Coast	Obsolete Pesticides Management	• Negative impacts: loss of plant cover, loss of habitats contamination of fauna and flora if leaks. • Microphytes as important source of primary production for living matter usable for humans. • Floating hydrophytes as plague. • Decapods as resource for fishing and for their role in the ecosystem.	• Vegetation: type, area, pressure, dominant species, land cover map. • Qualitative presence of Macrophytes, phytobenthos, phyto- and zooplankton, crustaceans, birds, crocodiles − macrofauna at various levels (class to species-level). • Quantitative information only for fish, zooplankton, and extent of forests and national parks.	• No biological data in EMP. • Reforestation as mitigation measure against the loss of plant cover and habitats of high biodiversity value, with no information about the type of tree.

(continued on next page)

Table 2 *(continued)*

EIA Number/ country	Topic of the project on which EIA was applied	Considered biodiversity aspects in the EIA	Quality and level of detail of baseline data in the EIA	Use of baseline data in the EIA environmental management plan (EMP)
EIA 6/Ghana	Oil field development	• Preservation of natural resources as positive impact of pesticide decontamination. • List of species of fisheries interest. • Mention of dependencies or impacts of activities on ecosystem services (very detailed). • Negative impacts: loss & fragmentation of habitat, impacts on flora due to degradation of abiotic components of • ecosystems, introduction of alien species, disturbance and/or displacement of fauna due to pollution, increased mortality of wildlife, impacts on landscape, disturbance of marine fauna due to physical disturbance of seabed, etc..	• Interactions between species (crustaceans as food for fish). • Conservation status and endemism for a few species. • Very detailed baseline study based on field surveys with quantitative data, conservation status, habitat, seasonality, and species-level for most taxa, at project level (areas of influence). • 31 ecosystem services identified for each habitat type.	• Strong linkages between baseline data & EMP. • Monitoring Programs for fish & marine turtles included. • EMP includes sub-plans for marine fauna, vegetation and alien species, biodiversity and ecosystem services. • Biodiversity management plan includes: transplantation of important species, forbidding collection of specimens, avoidance, management, monitoring, repair and remediate. • Mitigation options mentioned for each ecosystem service affected.
EIA 7/Li“beria	Electricity expansion project	• No reference to a biological component in impact assessment. • Only biodiversity impact identified: sediment-laden storm water runoff can negatively impact aquatic flora and fauna.	• Qualitative presence of most common species for flora (9 cited) and fauna (mammals, birds, reptiles). • Conservation status. • Growth form, dominance and invasiveness information for plants. • National parks and Ramsar wetlands described at national level (none in the influence area of the project).	• No reference to biological data in the EMP: (quote: '*The pipeline exists in an industrial area away from any natural context*').
EIA 8/Mali	Obsolete pesticides management	• Fauna and flora assessed as affected environmental components of 'High' importance. • Positive and negative impacts identified only in general terms: ('*Activities will have a negative impact on soil, vegetation*'). • Threats identified on biodiversity at national level.	• At national scale: number of species of mammals, birds and fish. • Only for high-risk sites: very general mention of presence of domestic animals, flora (e.g. '*Some bushes and tall grass surround the site*') and fauna (e.g. '*presence of birds and rodents*').	• Weak link: only reference to general terms 'fauna "and 'vegetation" in EMP.
EIA 9/ Mauritania	Offshore gas field development, incl. production wells, subsea pipeline and onshore gas processing facilities;	• Differentiation between local and regional area of influence of the projec.t • Fish data (cf. baseline info) include information on fisheries (e.g. fleet, fish landings). • Seabed, marine ecology and terrestrial ecology are considered. • Negative impacts: noise disturbance to marine mammals; placement of subsea infrastructure may lead to impact to seabed and benthic fauna; occasional oil spills may cause impact to marine habitats and species.	• Detailed & systematic biodiversity survey incl. reference to use of IUCN, FAO & *FishBase* data. • Data on geographical distribution of primary productivity at sea. • Species-level info for plankton, benthic Annelida, marine mammals, sea turtles (incl. maps), birds (incl. seasonality), reptiles & mammals. • Reference to IUCN conservation status of selected species. • Terrestrial biodiversity survey includes land cover types and info on ongoing reforestation project. • Mention of protected areas locations.	• Limited linkage between baseline and EMP. • Pre- and post-installation survey and micro-routing of the pipeline to avoid sensitive habitats. • Careful site layout plus offsetting of vegetation loss, based on mapping of vegetation in baseline study.
EIA 10/Niger	Irrigation project in arid region	• Wild fauna as protein source (hunting). • Fauna as threat to people (jackals). • Negative (vegetation removal) and positive (regrowth downstream) impacts of irrigation infrastructure mentioned.	• No quantitative baseline data; fragmentary qualitative data on presence of macrofauna (mammals, birds). • Species-level data for trees, including references to national conservation status. • Mention of existing (non- project related) threats to fauna in the region: poaching, encroachment.	• No explicit linkages. • Hunting ban during construction phase linked to identified general poaching threat.
EIA 11/Nigeria	Bridge construction in National Park	• Soil microorganisms sampled because of their role in soil carbon storage; • Focus on iconic species: primates, limited mention of other mammals and birds; • Focus on improved national park management & conservation enforcement: through improved access; • Yet increased accessibility leads to increased human	• Fauna studies & vegetation studies mentioned, based on literature review and interviews. • Species-level presence data for primates only, incl. conservation status. • Limited presence list of selected other taxa (birds, mammals).	• In the EMP: mention of demarcation between forest farming and preserved area. • Potential loss of fauna during construction phase linked to conservation status of some species.

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Table 2 *(continued)*

EIA Number/ country	Topic of the project on which EIA was applied	Considered biodiversity aspects in the EIA	Quality and level of detail of baseline data in the EIA	Use of baseline data in the EIA environmental management plan (EMP)
		movement and hence increased illegal hunting cutting & encroachment by farmers;		
EIA 12/Nigeria	Building rice processing centre & access roads	• Cumulative negative impacts include: deforestation due to agricultural development. • Negative impacts of access road: biodiversity reduction, habitat destruction, impending of wildlife movement, increase in poaching and illegal removal of firewood. • Eutrophication and destruction of local ecological functionalities due to agriculture; • Proposal of actions to decrease demand for bushmeat. • Proposed collaboration with conservation groups.	• Qualitative ecosystem description. • List of economically important crop species. • Incomplete presence lists of mammals, birds and reptiles provided, with qualitative indications of degree of rarity.	• Set-up of vegetation clearing and biomass management plan linked to predicted biodiversity loss (qualitative).
EIA 13/Nigeria	Power plant & gas pipeline	• Basic information on the use and functions of mangroves (not site-specific). • Mention of importance of ecosystem for local communities' livelihoods. • Negative impacts on freshwater ecology rated very high as it is a breeding ground for fish, amphibians etc.. • Excavation of the pipeline trench is expected to disperse sediments which may smother benthic invertebrates. • Heavy metals released through sediment movement could bio-accumulate in the food chain. • Destruction of bird nests is expected impact. • Underwater noise may disturb marine mammals. • Mitigation includes the prohibition of hunting & selling of bushmeat & avoidance of fauna migration paths.	• Info on floristic composition and forest types, including standard comment on conservation status ('*there are no unique, rare or endangered species*'). • Genus-level information regarding invertebrates. • Low resolution of baseline data on e.g. birds where category such as 'songbirds' is used.	• Link between baseline section and EMP limited. • Mitigation measures include adapted drilling technique to avoid sediment damage; timing of construction work outside of main breeding season of birds. • Use of least intrusive dredging equipment and dredging during low tide when feasible, is advised.
EIA 14/Nigeria	Rehabilitation of an irrigation scheme	• Ponds and game reserves cited as tourist sites. • Vegetation in the baseline study associated to its local uses. • Fish as animal protein in baseline. • Negative impacts: increased de-vegetation, and loss of economically interesting plants and animals; discharge of sediment. • laden run-off and contaminants in water runoff may affect aquatic life. • Biodiversity aspects as a negative social impact (attack from dangerous animals during de-vegetation activities, increase of crop production thereby attracting higher density of pests, Increased presence of termite mounds, nematodes, Bat infestation, *Typha* grass invasion, *Quelea quela* invasion, grasshoppers invasion).	*At state level:* • Short qualitative description of vegetation, and number of domestic animals. • Sites of significance interest (tourist places): national parks, ponds. • Ecological problems include desertification, and environmental degradation (fuel wood). • *At project level:* • Species lists based on field survey for plant species. • aquatic plant species, fauna (only some mammals, birds, bats, termites, fishes) • Information on local uses of plant species • Quantitative data on increase/decrease of fish catch (%). • Qualitative summary of habitats types. • Damages caused by termites.	• No explicit linkage between baseline section and EMP. • Revegetation of cleared areas planned with beneficial. • local species known to mitigate against erosion. • Clearing should avoid areas with indigenous vegetation. • Training against attack from dangerous animals during de-vegetation activities as mitigation. • Anti-birds sprays, insecticides, rodenticides and physical disturbance of bats and birds as mitigation.
EIA 15/Nigeria	• Gas turbine power plant	• Minor negative impacts: disturbance & loss of wildlife considered minor. • Moderate negative impact: loss of vegetation & disturbance and loss of benthic organisms t. • Prohibit hunting & selling of bushmeat, train in fauna avoidance & migration paths. • In mitigation section: restore & revegetate, control invasive plants, design access roads to minimize destruction and fragmentation.	• Vegetation & wildlife & marine ecology (plankton, benthic macroinvertebrates, fisheries). • Details on p. 19 (habitats & vegetation) with focus on plants with edible fruits. • Species-level presence info on limited list of 35 animals based on interviews, tracks & fecal analysis. • Species-level info on plankton & fish, both in wet and dry season. • Vegetation survey, incl. vegetation type and distribution map. • Species-level flora info, including use; • Conservation status listed for selected mammal species.	• Limited linkages between baseline data & EMP. • Habitat disturbance estimate is provided (% of area disturbed per vegetation type & location) in the EMP.
EIA 16/Nigeria	Urban water supply & sanitation	• Focus on domestic species only.	• Vegetation assessment done only on cultivated fields (as the	• No explicit linkages between baseline

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Table 2 (*continued*)

EIA Number/ country	Topic of the project on which EIA was applied	Considered biodiversity aspects in the EIA	Quality and level of detail of baseline data in the EIA	Use of baseline data in the EIA environmental management plan (EMP)
	project	● Soil & water analysis is detailed. ● Biodiversity defined as 'terrestrial habitats' in the impact matrix. ● Mention of increasing human population that may lead to biodiversity loss.	site is heavily urbanized). ● Species-level fauna info limited: presence list of domestic animals and crops.	data & EMP.
EIA 17/Senegal	Road rehabilitation project	● Ecosystem services framework is presented. ● Mention of biodiversity linked to national policy (National Biodiversity Strategy & Action Plan). ● Mitigation strategies include hunting & firewood collection bans during construction phase.	● Indicative number of plant and bird species, compared to nationally present species totals. ● Species-level presence info for four mammals. ● Species-level presence info for vegetation, including conservation status according to National Forestry Law. ● Mention of nearby Marine Protected Area (MPA).	● No explicit linkages between baseline data & EMP, although mention of avoiding vegetation loss.
EIA 18/Senegal	Development of sewage system	○ Biodiversity mentions linked to National Biodiversity Action Plan and to National Environmental Law; Differentiated impacts with or without mitigation plans ('variance analysis') on fauna described. Flora: negative impact on photosynthesis due to dust during construction work. Impacts of the emission of wastewater in the lagoon is considered problematic for two reasons: crustacean populations (including nursery function of mangroves) & bathing water will be impacted.	● Species & genus-level presence data for Mollusca. ● Species-level presence data for mangrove trees. ● Vernacular names only for birds. ● Focus on MPAs information.	● Based on the biodiversity in the lagoon, abandoning the emission of wastewater in lagoon is proposed. ● Mitigation actions for the prevention of pollution of the marine protected area are listed.

representation of biodiversity data in EIAs. Baseline data sections are not compiled using a systematic process, e.g. reflecting biodiversity and ecosystem conditions, ecosystem functions and processes, ecosystem flows and benefits and values (as in Liquete et al., 2016), or reflecting known frameworks such as DPSIR (Benitez-Capistros et al., 2014) or Ostrom's (2009) socio-ecological systems framework. The lack of a systematic approach (such as a common vegetation classification; the use of a common/comparable selection of taxa, the systematic use of global databases, …) makes comparison between EIAs, or monitoring and evaluation by possibly different teams, difficult. Biodiversity baseline data are mostly represented by way of simple presence/absence lists at genus or species level. In most analysed EIAs, the focus is on visible, somewhat 'iconic'/charismatic species such as birds and mammals, while some extremely limited baseline data sections consider only domestic (agricultural/animal husbandry) biodiversity. One EIA (EIA #4) has a strong focus on iconic species. EIA #11 includes information on gorillas, another iconic species. While iconic species are mentioned when present, the focus is on relatively easily monitorable taxa such as −some- birds, and on animals who interact directly with humans (agricultural pests, human-associated species, game,.). None of the EIAs clarifies why some taxa were included and others left out, suggesting that the respective EIA teams' specialties are defining the focus. Six of the analysed EIAs (EIAs #4, 5, 6, 9 & 14, 15) provide detailed information on a wide range of taxa, including (planktonic) invertebrates. Most baseline data sections do not present a systemic perspective where ecosystem functions and processes are made explicit. Most EIAs do mention the conservation status of selected taxa, according to international (International Union for Conservation of Nature − IUCN) or national categories. Degrees of rarity are sometimes left undefined (general terms as 'rare' are used without definition). Four EIAs (EIA #3, 4, 5, 7) highlight information on endemic species. Furthermore, the baseline study area is often too small, making it difficult to link general and non-descript threats as 'habitat loss' with tangible project impacts. Only one EIA (EIA #9) makes a difference between the project's local and regional areas of influence.

4.3. Decision-making context

The multidimensional and multi-temporal nature of the influence of-environmental-impact assessment on decision-making is now increasingly recognized (Bond et al., 2013; Hugé et al., 2015). However the absence of systematically accessible data on the implementation and monitoring of the analysed EIAs' proposed mitigation measures made it impossible to comprehensively assess their influence on decision-making. As a proxy, we focused on the linkages between the biodiversity baseline data and the proposed or planned management or mitigation measures entailed in the environmental management plan (EMP). In most of the assessed EIAs, there are limited or no links between the biodiversity baseline data and the management or mitigation measures, reflecting either a symbolic inclusion of baseline data, a focus on easily retrieved or accessible data, ignorance about modalities for establishing such links, and/or a lack of systematic approach in designing mitigation measures. Even the presence of sound biodiversity baseline data does not guarantee consideration of biodiversity issues when tradeoffs have to be made. Ideally, biodiversity-relevant data (such as data describing ecosystem services) provide the greatest benefits in the early stages of decision-making, as recommended by SIDA (1998) and Mandle et al. (2016). In the literature, a lack of monitoring of and reporting on the actual effects of the mitigation efforts is mentioned as a recurrent weakness in implementing EIA mitigation strategies (Slotterback, 2008).

4.4. Reflections on methodology

The framing, representation and decision-making context of biodiversity was studied using qualitative coding of a specific dataset

Table 3
Consideration of biodiversity in the assessed EIAs along three dimensions of the conceptual framework outlined in Section 2. Table 3 is an interpretative synthesis of Table 2. Framings terminology is based on Holmes et al. (2017), Mace (2014), (2011), Tallis and Lubchenco (2014) as outlined in Table 1. Regarding decision-making context: the symbols refer to the links between the baseline data and the environmental management plan ('−': no link; "+": link; '++': strong link).

EIA number	Biodiversity framing	Representation of biodiversity	Decision-making context
EIA 1	• *Intrinsic value/Nature for itself*: species. • *Instrumental Value/Nature for people/Social conservationist*: ecosystem services (sacred forest, fish resources separated from fauna in impact identification).	• Qualitative presence data • Species-level (only for plantations, fishes, crustaceans, molluscs, birds)	+
EIA 2	• *Intrinsic Value/Nature for itself*: species, habitats). • *Nature despite people/Nature protectionist/Traditional Conservation*: habitat loss and overexploitation (threats on plants: agriculture, livestock, timber, firewood). • *Nature for people/Nearly New Conservation/Instrumental Value*: ecosystem services (plants useful for humans).	• Species-level for some plants. • Type of ecosystems present.	−
EIA 3	• *Intrinsic Value/Nature for itself*: species. • *Nature despite people/Nature protectionist*: habitat loss and overexploitation (threats on mammals: agriculture, bushfire, poaching). • *Nature for people/Instrumental Value*: ecosystem services (domestic species, sacred forests, plant cover against soil erosion).	• Species-level and endemism for birds. • Common names for mammals. • General names for other groups ('reptiles', 'amphibians' and 'insects'). • Vegetation types and forest categories.	−
EIA 4	• *Nature for itself/Intrinsic Value*: species, protected areas (habitats, ecology). • *Instrumental Value/Nature for people*: ecosystems. • *Nature protectionist/Nature despite people*: overexploitation (threats on marine turtles).	• Species-level. • Quantitative data for plankton, benthos, flora. • Habitat information. • Seasonality included. • Conservation status. • Endemism information. • Interactions between species (food chain).	++
EIA 5	• *Intrinsic value/Nature for itself*: species, protected areas. • *Nature protectionist/Nature despite people*: overexploitation and habitat loss (agriculture, bushfire, hunt). • *Instrumental Value/Nature for people/Nearly New Conservation*: ecosystem services (food resource, photosynthesis).	• Species-level presence for variety of taxa. • Quantitative information only for fishes, zooplankton, and extent of forests and national parks. • Conservation status and endemism (qualitative).	−
EIA 6	• *Nature for itself/Intrinsic Value*: species, protected areas. • *Nature protectionist/Nature despite people*: threats, threatened species, habitat loss, pollution and overexploitation. • *Instrumental Value/Nature for people*: ecosystems, ecosystem services (considered as receptor of impact and included in EMP).	• Species-level. • Conservation status. • Seasonality. • Migration information. • Quantitative data for all taxa. • Species of fisheries interest. • Ecosystem services (31) for each habitat.	++
EIA 7	• *Intrinsic Value/Nature for itself*: species, protected areas. • *Nature protectionist/Nature despite people*: threats, threatened species, pollution, overexploitation (mining, firewood, charcoal, fishing).	• Qualitative presence data. • Species-level. • Conservation status. • Endemism of plants.	−
EIA 8	• *Intrinsic Value/Nature for itself*: species, protected areas. • *Nature protectionist/Nature despite people*: habitat loss and overexploitation (logging, overgrazing, poaching, fishing, bushfire, chemicals, climate change), pollution (chemicals for pest control). • *Nature for the people/Instrumental value*: ecosystem services (domestic animals and crops).	• General descriptors used ('trees, bushes, birds') • Number of species of mammals, birds and fishe.s (national scale only).	−
EIA 9	• *Nature protectionist/Nature despite people*: overexploitation (hunting), habitat loss (vegetation loss, fragmentation). • *Instrumental value/Nature for the people*: ecosystem services (edible fruit crops).	• Ecosystems information (marine). • Species level data for plankton, fish, birds, mammals. • Seasonality included. • Conservation status.	+
EIA 10	• *Nature protectionist/Nature despite people*: overexploitation (poaching), habitat loss (encroachment). • *Instrumental Value/Nature for the people*: ecosystem services (protein source).	• Qualitative presence data. • Species-level info only for trees. • Conservation status.	−
EIA 11	• *Nature Protectionist/Nature for itself*: protected area (national park conservation enforcement). • *Nature protectionist/Nature despite people*: overexploitation (poaching), habitat loss (encroachment). • *Instrumental value/Nature for the people*: ecosystem services (carbon storage).	• Species level presence data for primates. • Conservation status.	+
EIA 12	• *Nature protectionist/Nature despite people*: threats (wildlife), habitat loss & overexploitation. • *Instrumental value/Nature for the people*: ecosystem services (economically important crops).	• Ecosystems information. • Qualitative data on mammals, birds, reptiles. • Conservation status (qualitative).	+
EIA 13	• *Intrinsic value/Nature for itself*: protected areas, species. • *Social conservationists/People and nature*: socio-ecological interactions (food chain bio-accumulation).	• Ecosystems information. • Genus-level data on invertebrates. • General descriptions birds. • Conservation status.	+
EIA 14	• *Intrinsic Value/Nature for itself*: species, habitats. • *Nature protectionist/Nature despite people*: overexploitation, pollution, habitat loss. • *Instrumental value/Nature for people/Social conservationists*: ecosystem services (protection against erosion, food, tourism).	• Species–level for plant species, aquatic plant species, fauna (only some mammals, birds, bats, termites, fishes). • Local uses of plant species. • Quantitative data on trends in fish catch. • Qualitative summary of habitats types.	+
EIA 15	• *Intrinsic value/Nature for itself*: species, protected areas. • *Instrumental Value/Nature for the people*: ecosystem services (fisheries).	• Ecosystems information (marine & terrestrial). • Extensive referencing to biodiversity databases.	+

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Table 3 *(continued)*

EIA number	Biodiversity framing	Representation of biodiversity	Decision-making context
		• Species level data for variety of taxa. • Conservation status.	
EIA 16	• *Intrinsic Value/Nature for itself*: species, protected areas • *Instrumental Value/Nature for the people*: ecosystem services (fisheries)	• Ecosystems information (marine & terrestrial). • Extensive referencing to biodiversity databases.	–
		• Species level data for variety of taxa. • Conservation status.	
EIA 17	• *Instrumental value/Social Conservationists/Nature for the people*: ecosystem services (framework presented as guide).	• Species level data for selected taxa	–
EIA 18	• *Nature protectionist/Nature despite people/Traditional conservation*: overexploitation, pollution, habitat loss. • *Intrinsic Value/Nature for itself*: species, protected areas. • *Instrumental Value/Nature for the people*: ecosystem services (food, clean water, recreation).	• Species and genus level data selected taxa. • Species level data trees. • Conservation: focus on Marine Protected Area.	+

generated by one major player, the World Bank, which inevitably involves a degree of interpretation by the researchers. In order to ensure a reproducible and verifiable coding, the framework of Dryzek (2005) was useful. It allowed to identify the descriptors of framings in a systematic way. The transparency of the methodology is further ensured by the provision of several tables with different degrees of data synthesis: Table 1 (presenting the raw data) and Table 2 (presenting the interpretation after coding). The study has obvious limitations: in order to obtain a more comprehensive overview of the entire EIA processes, ideally in-depth interviews would have to be conducted with a range of representative stakeholders for every EIA case in the World Bank dataset (including consultants, local communities, project proponents, partner country representatives and World Bank representatives), and possibly in other development aid agencies. This was however out of scope for this first explorative work. The use of the final EIA reports allows us to gather a lot of information, presented in a relatively standardized way, but further research should be conducted to delve deeper in context-, country- and agency-specific features of both biodiversity framings and representations, decision-making context and social-ecological systems. In our sample, we could not identify EIAs in which potentially contradictory framings co-existed, yet such a situation is certainly possible.

5. Widening the scope: recommendations regarding biodiversity integration in development cooperation by way of EIA and beyond

Building on the set of assessed EIAs discussed in Section 4, this section reflects on biodiversity integration or 'mainstreaming' in the wider context of the whole development cooperation sector and its wide variety of interventions. Indeed mainstreaming refers to the integration of biodiversity and development considerations across different levels of governance and entry points (e.g. national, sectoral, local) (Huntley and Redford, 2014), and unless biodiversity mainstreaming is well understood and conceptualized, mainstreaming fatigue could set in, which would hamper the set-up of urgent actions to address biodiversity loss (Kok et al., 2008).

Despite the recognition of the importance of integrating biodiversity in EIA (see Section 1), there is a lack of transparency regarding EIA documentation among development cooperation actors. There is also a lack of systematic consideration of biodiversity issues, as well as a lack of consensus on how to consider, frame and evaluate the quality of biodiversity integration. Moreover, the position of EIA within decision-making and the wider set of processes and tools focusing on biodiversity & development is often not sufficiently clear.

Our recommendations for EIA-actors are categorized along three tracks: i. EIA procedure & methodology, ii. responsibilities & capacity building in EIA; and iii. linkages between EIA and other biodiversity integration approaches.

5.1. EIA procedure and methodology

Track 1 concerns EIA procedures and methodology. Ideally, the providers should align their EIA systems to EIA good practices and they should acknowledge that EIA design, practice and implementation is a continuous learning process in which the partner countries should play an active role ("ownership", advocated by the Paris' Declaration on Aid Effectiveness (2005)). The striking heterogeneity regarding the access to information (transparency, harmonization), the level of detail and the scientific rigor quality of biodiversity considerations in the studied EIAs is an indication of a lack of overall quality control mechanisms regarding methodological rigor. Providers should define clear procedures in the decision-making process about how biodiversity can be integrated during the different stages of an EIA. Furthermore, the inclusion of biodiversity aspects in systematic monitoring and evaluation systems is required. Providers should also improve the transparency of project databases and their potential associated EIAs and management plans as an instrument for compliance control, and as a token of accountability towards citizens in both providing and partner countries (also promoted by the 2005 Paris Declaration In order to avoid that biodiversity gets 'drowned' into a mindless and pointless ticking box exercise which is not even intended to make a difference, but just perceived as a concession (and an alibi) to the advocates pressing for the mainstreaming of their orphan issues, a critical analysis and a systematic biodiversity integration approach in EIA needs to be developed.

5.2. Responsibilities and capacity-building with regard to EIA

The second track concerns responsibilities & capacity building with regard to EIA. The role of each stakeholder in EIA processes needs to be defined *ex ante* (without leading to a loss of flexibility regarding the inclusion of previously unidentified stakeholders and/or experts). This includes the clarification of the roles and responsibilities with regard to focal points, helpdesks, mandates, communication and hierarchies. An open dialogue between provider and partner is required to define accountability: who is responsible for which EIA aspect in the provider-partner context of development cooperation? Ownership of EIA by the development partners is one of the keys to success to effectively address biodiversity impacts of development projects (Drutschinin et al., 2015). Currently, both the amount of research carried out in the world's most biodiverse countries, as well as the (leading) involvement of scientists based in these countries are less than optimal (Wilson et al., 2016). The biodiversity data used in the studied EIAs point at a worrying heterogeneity in available data and/or information dissemination. We hence advocate the inclusion of local scientists in conducting EIAs, and the integration with capacity building measures in biological taxonomy, a promising field in the developing world (Samyn and De Clerk, 2012). This would strengthen local universities and research institutes in their

mandates and extension roles as service providers towards society. It would strengthen the biodiversity science-policy interface which is a major challenge in the Global South (Vanhove et al., 2017). It would also bring EIA practice in line with the capacity building needs defined under the Global Taxonomy Initiative (https://www.cbd.int/gti/) and would enable the valorisation of institutional capacity and human capital built under such initiatives. EIA can contribute in many ways to biodiversity science in the developing world. In an ideal scenario, digital biodiversity data would be available in an accessible and user-friendly format for EIA practitioners. EIAs should yield publishable, and ideally freely accessible, biodiversity data. These could be used in subsequent assessments and contribute to the knowledge base on biodiversity, which would be especially useful in developing countries as such information is often scarce. Such synergies would increase the EIA process' quality, transparency and credibility. Online tools such as the Global Biodiversity Information Facility (GBIF) are helpful (Cadman et al., 2011; King et al., 2012). Furthermore, EIA documentation disclosure would fit in the current momentum towards globally accessible knowledge (in line with initiatives such as the Global Partnership for Sustainable Development Data (http://www.data4sdgs.org/). Moreover, maintaining specimens in accessible and curated institutional collections in order to develop national reference collections is a powerful way to create institutional and national ownership of the baseline data of the own biodiversity, with voucher specimens as proof of reported occurrences. Institutional collections are of high potential to EIA in the South, but also here capacity building and other challenges remain regarding the handling and accessibility of associated information (Coetzer et al., 2012).

5.3. Linkages between EIA and other biodiversity integration approaches

The third track is centred on the position of EIA within the wider range of actions for biodiversity integration in development cooperation. Biodiversity conservation is now at a critical point as a societal (and politically relevant) issue: it is now beyond the stages of emergence and popularization, and has achieved the status of an intensely discussed societal challenge (Hill et al., 2013), along with climate change, as also reflected by the relatively recent creation (2012) of the 'Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services' (IPBES). The next step is the continued development of governance solutions to take on the 'high consensus/low effective action' situation of biodiversity conservation (Pielke, 2007). Determining what biodiversity integration in development cooperation should be is a dynamic, multi-actor endeavor (cf. Schusser, 2013). EIA as an instrument has its role to play, but also has limitations. Capacity building is needed, next to EIA, and we need to be open minded about other opportunities for mainstreaming. Capacity building in biodiversity research in developing countries is key at individual and institutional level (Van der Stocken et al., 2015). The origins of EIA as a process lie in correcting mistakes in project design, not in preventing them from the onset, e.g. at the strategic level, so EIA cannot do everything, and does not function in an institutional vacuum. The interplay between biodiversity integration at the project level (e.g. by way of EIA) and at the systems level is key (De Jong et al., 2012).

6. Conclusion

Integrating biodiversity in development cooperation can only work if the plurality of views regarding human-nature interactions are acknowledged. Many different framings of biodiversity in a context of development co-exist, and these framings explain motivations to act in a particular way. Ultimately using and highlighting framings contribute to understand how decisions are made. Environmental Impact Assessment (EIA) processes provide a unique opportunity to study how biodiversity is framed, represented and interacting with a particular decision-context.

Biodiversity is a value-laden concept, and its conceptualisation and realization are shaped by both rational and emotional arguments. Instead of attempting to artificially reduce biodiversity conservation to a merely data-driven or merely emotional concept, there is a need to 'unpack' the way biodiversity conservation is 'thought' and 'done' by recognizing and describing the plurality of framings of biodiversity. Framings do not just describe things, they also rule in certain ways of talking about a topic and they define acceptable behavior. Yet framings also rule out, limit and restrict other ways of talking and of conducting ourselves. This study applied a conceptual and methodological framework on a range of EIAs, which allowed us to make framings and representations of biodiversity transparent in different decision-making contexts. Our findings suggest that utilitarian framings of biodiversity, which stress its instrumental value, are the prevailing framings in the studied EIAs in West-Africa. Furthermore, the heterogeneous quality of the representation of biodiversity (baseline data), and the versatile linkages between baseline data and environmental management plans in EIAs point to a lack of methodological rigor in some cases.

Approaching EIAs through the interpretational lens of diverse framings of biodiversity allowed us to make a range of recommendations for EIA users and stakeholders. In doing so, this study aims to contribute to move beyond the gridlock that too often keeps biodiversity integration from moving from words to transformative action.

Acknowledgements

The authors wish to acknowledge the support granted through the CEBioS and KLIMOS-Acropolis programmes supported by the Belgian Development Cooperation (DGD). Jean Hugé is supported by the Belgian National Fund for Research FRS-FNRS. The authors wish to thank the reviewers for their key contribution to the improvement of this manuscript.

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