Mainstreaming, monitoring and measuring biodiversity in Dutch development cooperation

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Abstract

One of the current major challenges is the unprecedented pace of biodiversity loss. A letter sent by BHOS in early 2023 to the Dutch parliament raised the need to address unprecedented biodiversity loss which has detrimental impact on existing objectives of poverty reduction, improved food and nutrition security, water security, gender inclusion and human rights. This has made the mainstreaming of the biodiversity in overseas development assistance (ODA) increasingly important, thereby integrating environmental, social and economic concerns. This document addresses 1) *How can biodiversity be looked at in a meaningful way in interventions that aim to contribute at scale to food security, climate resilience and/or economic development?.* Chapter two outlines biodiversity as the variety of life on Earth, including all living organisms, as well as the ecological systems and processes that support them. These systems and processes are critical for maintaining resilience and 'nature's contribution to people. This contribution can be divided in regulating, material and non-material contributions. Biodiversity is driven, either directly or indirectly, by multiple interdependent drivers. These direct drivers are exploitation, land use change, pollution, invasive species and climate change. The indirect drivers are demographic, sociocultural, economic, technological innovation, institutions and governance, and conflict epidemics. The drivers that affect biodiversity (and its regulating, material and non material contribution) subsequently impact food & nutrition security and poverty reduction. Equally food & nutrition security and poverty reduction can impact the drivers of biodiversity. To operationalise biodiversity mainstreaming in ODA has been challenging due to institutional complexities. There multiple pathways towards mainstreaming biodiversity at project and programme level, here ten principles are suggested, namely: adopting an integrated spatial approach, conducting biodiversity assessments, developing biodiversity sensitive project designs, incorporating biodiversity positive actions, engaging stakeholders, fostering partnerships, monitoring and evaluating biodiversity outcomes, promoting knowledge sharing and capacity development, building innovative financial models, and stimulating biodiversity friendly trade policies.

Keywords: biodiversity, mainstreaming, development cooperation

This report can be downloaded for free at: https://www.nfpconnects.com/insights/mainstreaming-monitoring-biodiversity

Contents

Background

Among the world's pressing challenges is the unprecedented pace of biodiversity loss. Worldwide, there is growing acknowledgement that this challenge can only be overcome if coupled with solving concurrent challenges of food insecurity, chronic poverty and vulnerability to the effects of climate change. This acknowledgement is reflected in the four recent and interrelated international commitments of 2021-2022 which are the United Nations (UN) Decade on Ecosystem Restoration, the UN Food System Summit, the UN Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP 27), and the Convention on Biological Diversity's (CBD) Global Biodiversity Framework. All these commitments emphasise the need for a fundamental change of the global economy, pleading for an integrated approach to restore and recover damaged ecosystems, dysfunctional food systems, global warming and biodiversity loss. So far, tackling biodiversity loss has not received the same attention as the other challenges, although experts warn that the impact of biodiversity loss may even exceed the impact of any of the others. Stepping up international efforts to bending the curve of biodiversity and integrating biodiversity in overseas development assistance (ODA) has therefore become high on the global development agenda.

Mainstreaming biodiversity in ODA practice is not only urgently needed, it also offers an opportunity to combine the interrelated environmental, social and economic concerns into an integrated development agenda. In reality however, combining the three is hard, as they are entangled into different policy processes, driven by policy aims which are hardly compatible. Mainstreaming biodiversity in ODA is therefore a laudable yet ambitious aim, which requires further study on how biodiversity, food and nutrition security, poverty reduction and development are interconnected, and whether and how these seemingly incompatible policy objectives can be successfully combined. This forms the background of this document that aims to shed light on how biodiversity can be integrated and mainstreamed in the Netherlands' funded ODA.

1. Introduction

Early 2023, the Netherlands' Ministry of Foreign Trade and Development Cooperation (BHOS) sent a letter to the Dutch Parliament which states that it is not only climate change but also biodiversity loss that has a devastating impact on global and local food systems. Both production and consumption will have to be brought back to sustainable proportions, to avoid further degradation of natural environments, and protect even restore that what remains. The stimulation of more natural, regenerative and restorative production systems herein is key, through locally induced restoration practice such as farmer managed natural regeneration and other restorative practice within food systems. The success of such restorative practice however strongly depends on the socio-economic and socio-political context such as the level of transparency of governance systems regarding competing claims on natural resources, land tenure security, financial services and market conditions, and the socio-economic position of women and youth. An integrated area-based or landscape approach, so the letter concludes, allows for combining all of these, creating robust food systems and enhancing farmers' resilience within their specific often volatile environment (BHOS, 2022).

As compared to previous BHOS policy documents, the letter raises a number of new elements. Besides the already existing objectives of poverty reduction, improved food and nutrition security, water security, gender inclusion and human rights, the letter focuses on the need to address unprecedented biodiversity loss which has detrimental impact on all the aforementioned domains. Without maintaining a threshold level of biodiversity, so it is argued, none of the objectives are going to be achieved nor sustained in the future. Mainstreaming biodiversity within existing projects and programmes is therefore needed to secure their impact on these objectives. Steering on biodiversity however requires a new set of criteria to be taken into account for designing, managing and monitoring these projects and programmes. The desirability for such biodiversity mainstreaming including measurement criteria was subject to discussion during a *'Round Table Conversation'* between the Ministry and Wageningen University & Research (WUR), on the 25th of January 2023. During this conversation, the importance and the feasibility of mainstreaming biodiversity in projects and programmes were explored, as well as the way in which such mainstreaming could and should be done. In response to the questions from the Ministry, WUR offered to develop a document that would provide an overview of how biodiversity can be meaningfully integrated into development programmes and projects.

Key question to be addressed in this document would be the following:

1. *How can biodiversity be looked at in a meaningful way in interventions that aim to contribute at scale to food security, climate resilience and/or economic development?*

This document is aimed to start the debate on mainstreaming biodiversity within BHOS. To this end, chapter 2 defines what is biodiversity, and why this is relevant to The Netherlands' BHOS agenda. Chapter 3 provides an overview of the direct and indirect drivers of biodiversity change, many of which are related to international food systems and trade. Chapter 4 highlights the interconnectedness between biodiversity, food security and poverty reduction, and provides a framework for analysing these interconnections. Chapter 5 sketches the theory and practice of mainstreaming biodiversity in development cooperation and provides a list of principles that form a solid basis for departure in doing so.

2. Biodiversity

2.1. What is biodiversity?

Biodiversity refers to the variety of life on Earth, including all living organisms such as plants, animals, fungi, and microorganisms, as well as the ecological systems and processes that support them. Biodiversity encompasses the diversity of genes, species, ecosystems, and the interactions between them. Biodiversity is essential to the functioning of ecosystems, which in turn provide vital ecosystem services such as pollination, nutrient cycling, and water purification. The richness of biodiversity also has significant cultural, economic, and aesthetic value, serving as a source of inspiration for culture, art, music, literature, and religion.

The Convention on Biological Diversity signed at the UN Conference on Environment and Development in 1992 defines biological diversity 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.'* (UNEP, 1992). Since 1992, the concept of biological diversity has

further evolved, and currently many different, largely overlapping definitions exist. One commonly used definition for biological diversity is the variety and variability of living organisms, their habitats, and the ecological processes and systems of which they are a part. Another definition considers biodiversity as the totality of genes, species, and ecosystems of a region or the entire planet (Maclaurin & Sterelny, 2008). Thereby emphasizing the different levels of biodiversity; genetic diversity, species diversity, and ecosystem diversity.

A specific subset of biological diversity is that of genetic diversity, which refers to the variety of genes within a species. Genetic diversity is important to allow species to adapt to a changing environment and therefore ensure the survival of the species. Genetic diversity is crucial for the stability of an ecosystem and the continuous provision of ecosystem services. Genetic diversity is also key to global and local food systems, as it provides a basis for the provision of food, fibre, fuel, medicines and other valuable products. A long process of domestication, intensification and standardization of food production practice however has led to a rapid decrease of the genetic diversity of crops and livestock (Tuxill, 1999, Pilling, 2010). According to the Food and Agriculture Organization of the United Nations (FAO), nearly three-quarters of the varietal genetic diversity of agricultural crops has been lost in the past 100 years (FAO, 2008). Since the 1960s, it is estimated that countries like China and India have lost thousands of landraces of rice, while Mexico has lost more than 80% of its maize diversity (Tuxill, 1999). The same counts for livestock (ibid.). This is problematic, as diverse and genetically unique plant and livestock species are those that are more resilient to emerging diseases, meaning that over the past decennia the world's food systems have become vulnerable and prone to shocks and stresses caused by – among others – climate change (Pilling, 2010). Besides the consequences for global food and nutrition security, this biological loss is coupled with the loss of indigenous and local knowledge, due to culturally insensitive forms of development, international trade and cultural erosion within an increasingly globalised world (Pretty et al. 2008).

2.2. Why is biodiversity important?

Biodiversity is critical for maintaining the resilience of ecosystems and reducing their vulnerability to environmental shocks and stresses, such as droughts or floods. Biodiversity rich ecosystems have a diverse range of species and are more resilient to changes in climate than simplified ecosystems marked by monocultures with low species diversity. Preserving and restoring biodiversity is therefore essential for maintaining the regulating capacity and resilience of ecosystems.

The importance of biodiversity for human wellbeing is increasingly referred to by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) as '*nature's contribution to people'* (IPBES, 2019). Nature's contributions to people can be interpreted as either *positive* or *negative*. Examples of positive contributions include regulation of water quality and provision of food, whereas negative contributions may include diseases and wildlife attacks. Whether a contribution is positive or negative strongly depends on the spatial, temporal, social and cultural contexts, which may change over time. Access to and the distribution of nature's contributions determine to a large extent the wellbeing and quality of life of people. To improve wellbeing, it is therefore relevant to consider the distribution and access to the various contributions of nature to specific segments of society.

Nature's contributions to people encompass a wide range of human-nature interdependencies which are categorized as *material*, *non-material, and regulating*. Material contributions are the natural resources that provide people with food, fibres, energy and infrastructure. Non-material contributions relate to the cultural, spiritual or psychological values to be found in nature which are essential components of peoples' quality of life. They refer to the ability of organisms and ecosystems to regulate environmental conditions and generate (non-)material contributions, which in turn can be experienced by humans as both positive and negative.

IPBES recognizes fourteen categories of 'good' quality of life. The most well-known of these contributions are food, livelihood and income security. More specific contributions are for instance pollination and soil quality which are important to farmers whose crops rely on the fertility of the soil. Water regulation and quality are key to inhabitants of coastal zones and estuaries, and those who built their livelihoods on the richness of rivers and seas. Spiritual contributions of mountains, forests and rivers are essential for cultural and psychological wellbeing for many.

Nature's contributions, both negative and positive, are geographically distributed over space, creating flows of contributions between and within places. An example of such flows is found in upstream-downstream relations, in which upstream regulatory practice influences downstream impacts. Decision making power and property rights are some of the factors that influence the distribution of nature's contributions to people, meaning that the understanding of nature's contributions and their flows helps in designing more effective strategies for balancing power relations, poverty reduction and food and nutrition security (IPBES, 2019).

3. The drivers of biodiversity change

The relationships between biodiversity, food security and poverty reduction are not straightforward. Nature's contributions (regulating, material and non-material contributions according to (IPBES, 2019)) define to a large extent a food system's performance, and directly or indirectly influence the availability, access, stability and safety of food. Whereas biodiversity is interrelated to food security and poverty reduction, biodiversity in itself is driven by multiple drivers which are interdependent, and directly or indirectly drive biodiversity change (IPBES, 2019). Therefore, understanding the direct and indirect drivers of biodiversity change is key for understanding why mainstreaming biodiversity in all the components of BHOS policy is important, and how biodiversity mainstreaming can strengthen existing policy goals.

3.1. Direct drivers of biodiversity change

Direct drivers of biodiversity change are those that have an immediate impact on biodiversity, either positive, or negative, or both, depending on their context. According to IPBES, these direct drivers can be broadly categorized as *exploitation, land use change, pollution, invasive species* and *climate change.* Exploitation, coupled with land use change accounts for over 50% of all global biodiversity impacts, accelerating the other drivers of change.

Exploitation of natural resources is a direct driver of biodiversity change. Overexploitation occurs when natural resources are used at a rate that exceeds the ecosystem's ability to replenish, leading to a decline in population or even the extinction of species. When a species is

overexploited, its population size decreases, leading to a loss of genetic diversity and an increase of vulnerability of food systems. This can result in a cascade of extinctions and a loss of overall biodiversity as well as a loss of other ecosystem services, such as carbon storage, water purification, and soil fertility, which are bitterly needed.

Land use change or conversion of land use often refers to a replacement of natural ecosystems by agricultural or urban land. When natural ecosystems are converted to other land uses, habitats of animals and plants are destroyed, leading to habitat fragmentation, ecosystem degradation, and biodiversity loss. This in turn leads to increased inbreeding and decreased genetic diversity, which makes species more vulnerable to diseases, invasive species and further decline of biodiversity. In addition, land use change can alter the physical and chemical characteristics of ecosystems, such as soil quality, water availability, and nutrient cycling, which can have cascading effects on biodiversity.

Pollution directly affects biodiversity through the release of toxic pollutants such as heavy metals, pesticides, and industrial chemicals. These can accumulate in soil, water, and air, and have harmful effects on the health and survival of plant and animal species. Pollutants can impair reproduction, growth, and immune function, leading to population declines and even extinction. Pollution can also alter the physical and chemical characteristics of ecosystems, such as water pH, temperature, and oxygen levels, which affects the distribution and abundance of species. Air pollution causes acid rain, which lowers the pH of lakes and rivers, making them uninhabitable for some aquatic species. All this contributes to the degradation and loss of habitats, rivers, coral reefs, wetlands, and forests.

Invasive species are non-native species that are intentionally or unintentionally introduced into an ecosystem and have negative effects on native species and ecosystems. Invasive species compete with native species for resources such as food, water, and habitat, and can outcompete native species due to their ability to adapt. They prey on native species or introduce new diseases, and change the structure and composition of plant communities, altering the availability of food and habitat for native species. Invasive species can alter the physical and chemical characteristics of ecosystems, leading to reduced crop yields, damaging infrastructure, and impacting recreational activities such as fishing and hunting.

Climate change alters ecosystems and biodiversity and affects the adaptive capacity and resilience of food systems at large (Pörtner et al., 2021). Climate change causes environmental stresses such as droughts, floods, and extreme weather events, which in turn affect ecosystems and the species that rely on them. One of the most direct impacts of climate change on biodiversity is the change in temperature and precipitation patterns which changes the conditions for survival and reproduction. Climate change also leads to changes in the distribution and abundance of species, or otherwise exacerbate other threats to biodiversity, such as habitat loss and fragmentation, invasive species, and pollution.

3.2. Indirect drivers of biodiversity change

Indirect drivers are human decisions and actions that influence the direct drivers and can be regarded as root causes of changes in biodiversity (IPBES, 2019). These indirect drivers can broadly be divided into *demographic and sociocultural, economic and technological, institutions*

and governance, and *conflict and epidemics* (IPBES, 2019). Usually, these drivers are interrelated, and should be addressed simultaneously in order to be effective (Sage, 2020).

Demographic drivers such as population growth and urbanization are related to the direct drivers such as overexploitation and land use change, as a growing population increases global pressure on natural resources through production, resource depletion and habitat loss. Population growth and poverty are strongly related too, as declining poverty usually leads to declining fertility rates. At the same time, growth in per capita incomes leads to changes in consumption patterns and increased levels of consumption and greenhouse gas (GHG) emissions. This can have a negative effect on biodiversity and nature's contribution to people. Although the global urbanisation rate has slowed down, it is predicted that the number of people living in urban areas will continue to increase, having continuous impact on consumption, production and supply chains (FAO, 2019).

Also, **sociocultural** drivers and gender roles are closely related to food production. Women control as much as 60-80% of the world's food production and play an important role in both water management and forestry (Anisimova, 2021). In general terms, female farmers tend to grow a larger variety of crops compared to men which impacts biodiversity positively (Anderson et al., 2021). However, women own less than 20% of the world's titled land. This means that in general terms, many women do not have tenure security and are hampered in investing in farming practice, which lowers productivity, increases land pressure and negatively affects biodiversity (Sunderland, 2011; Koirala.S, 2022).

Economic drivers such as rising per capita incomes (FAO, 2019) usually result in changing consumption patterns and increasing demand for agricultural and forestry products, which leads to land conversion, expansion of intensive agriculture, animal husbandry and fisheries (Marques et al., 2019). This increases the pressure on material contributions of nature. Increased homogenisation and intensification of agriculture alters the biodiversity of ecosystems, increases the competition for natural resources, and further leads to fragmentation of habitats, declining species varieties, increased number of invasive species and further decline of biodiversity (Moranta et al., 2022; Sage, 2020; Otero et al., 2020).

Technological innovation drives efficiency gains in supply chains, herewith raising production, processing, transportation, GHG emissions, pollution and waste (Sage, 2020). Whereas pollution can directly affect ecosystems, GHG emissions spur climate change, which in turn aggravates biodiversity loss. Moreover, economic development often comes in conjunction with increased international trade, longer supply chains and complex geographic interconnections, increasing transportation and disconnecting production and consumption. The difficulty of telecoupling spatialised biodiversity impact over time and space further complicates public awareness and hampers the feeling of shared and remote responsibility (Marques et al., 2019).

Institutions & governance can either foster or hamper biodiversity loss, depending on the state of biodiversity, and on society's readiness to change. According to North (1990, institutions cover all the rules, regulations, norms and behaviours. This means that the institutional change that is needed for bending the curve covers a range of changes in rules and regulations, as well as in societal behaviour, both of which are lacking behind. Whereas 'nature-based solutions' to counter biodiversity loss is currently promoted by private sector and spurred by investments, a massive shift to nature-inclusive, biodiversity-positive and restorative

agricultural practices is not yet embedded in solid governance structures and policy frames. Whereas landscape-based or localised governance arrangements are gaining ground, the drivers of trade liberalisation and homogenization still prevail over trade regulation, supply management and legislation to restore, maintain or even halt biodiversity loss (CIEL, 2018; Di Pirro et al., 2020).

Conflict & epidemics: Decreased biodiversity is increasingly linked to higher risks of diseases and epidemics (Morand & Lajaunie, 2017). A high variety in species and a high genetic variety within species reduce the lowering the transmission of diseases or pathogens. Intensified agriculture and deforestation have led to closer contact between humans, domestic and wild animals, which has led to the spread of zoonoses such as Avian Flu and COVID 19. Given the current rate of biodiversity decline the occurrence of such zoonoses are expected to grow in the coming decades (FAO, 2019). Whereas the Global One Health community is growing and promoting an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems, there are still too many hurdles towards policy integration between the three domains at the community, subnational, national, regional and global levels, and long is the road towards shared and effective governance, communication, collaboration and coordination (WHO, 2023).

4. The complex relations between biodiversity, food security and poverty reduction

In order to get grip on the complex interrelation between biodiversity, food and nutrition security and poverty reduction, we propose a framework that visualizes the indirect and the direct drivers of biodiversity, and their impact on nature's contributions to humans, especially food security and poverty reduction (see figure 1). The framework is inspired by existing frameworks of IPBES and the Netherlands Environmental Assessment Agency (PBL) and helps to understand that mainstreaming biodiversity in development cooperation will require policy action in all the domains that either directly or indirectly drive biodiversity.

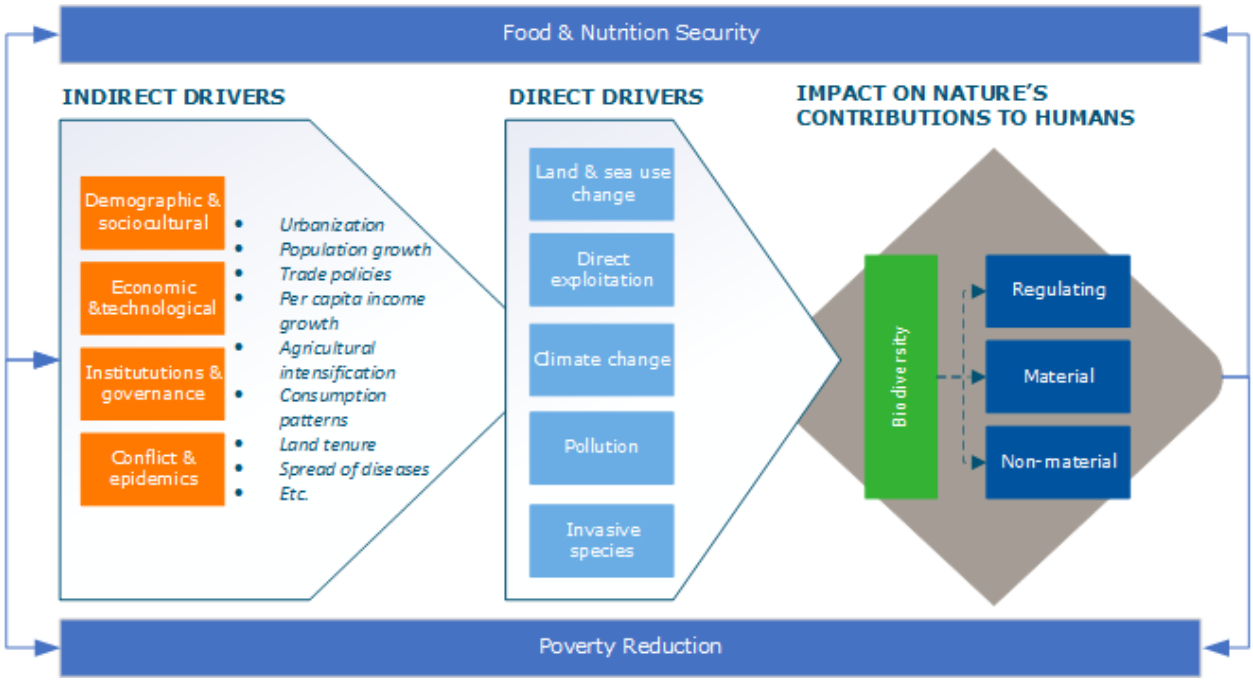

FIGURE 1 - DRIVERS OF CHANGES IN BIODIVERSITY, NATURE'S CONTRIBUTIONS TO HUMANS AND EVENTUALLY FOOD AND NUTRITION SECURITY AND POVERTY REDUCTION.

Source: Based on IPBES (2019), Béné et al. (2019) and PBL,2015.

The lefthand side of the framework reflects the existing IPBES conceptual framework, which has much in common with the framework of PBL, both connecting poverty levels with biodiversity. The additional framework of Béné (2019) describes transitions in food systems in relation to biodiversity and was also added. All these frameworks suggest that through changes in biodiversity, the contributions of nature to people are also affected. Eventually, people's wellbeing and livelihoods, and in particular food and nutrition security and poverty levels are affected by developments (either losses or increases) in these contributions.

As mentioned before, the five direct drivers having impact on biodiversity are land use change, direct exploitation, climate change, pollution, and invasive species, whereas land use change is probably the strongest (IPBES, 2019). Land use change directly impacts on ecosystems. Ecosystems regulate water quantity and quality, wetlands and forests help to filter pollutants, absorb excess nutrients, and maintain ecological balance which, as mentioned, is key to maintaining biodiversity. Ecosystem restoration is therefore key to maintaining and restoring biodiversity, the balance of different chemical and biological processes in water bodies. Forests, for example, help to regulate water flow and prevent soil erosion, while wetlands store and release water during different seasons. This means that preserving and restoring ecosystems is critical for maintaining the availability and quality of water resources and ensuring that they are safe for human use and resilient to the impacts of climate change., while coupled with direct exploitation it accounts for over 50% of all global biodiversity impacts. It must however be emphasised that the exact biodiversity impact differs per geographical context. This, because both the direct drivers and the indirect drivers are based on societal processes, values, norms and behaviours, and the hitherto described trends in demographics, sociocultural, economic and technological trends, institutions and governance, and the presence of conflicts and epidemics.

5. Operationalising biodiversity mainstreaming

Biodiversity mainstreaming is a relatively new topic within development cooperation. Within literature, biodiversity mainstreaming is generally understood as ensuring that biodiversity, and the services it provides, are appropriately and adequately factored into policies and practices that rely and have an impact on it. Biodiversity mainstreaming in policy - often referred to as biodiversity policy integration (BPI) - assesses the consideration of biodiversity in all levels of policy as a precondition for effective implementation (Zinngrebe 2018). Mainstreaming biodiversity means that biodiversity is effectively integrated in all sectoral policies that are relevant to biodiversity, and all the direct and indirect drivers of it (see chapter 4). From BPI literature we learn that BPI is problematic, as it is about cross-sectoral interaction, and it entails the negotiation of policies between different sectors pursuing alternative often conflicting objectives (van Oosten et al., 2018; van Oosten, 2021). Less ambitious however are policy coordination - which implies that sectoral policies are maintained but coordinated where they relate to biodiversity - or policy harmonisation - where it is tried to bring biodiversity objectives on equal terms with sectoral objectives (ibid.). True biodiversity policy integration is most effectively done at the local or landscape level, which is the level where policy and practice interact, and where multiple sectoral policy makers and practitioners meet and communicate on a regular basis. This is also called 'spatial' policy integration, which builds on localised multi-level actor networks having a stake in biodiversity and able to negotiate policy integration to happen (van Oosten, 2021).

Despite interesting examples, little progress has been made with biodiversity mainstreaming, because of the institutional complexities described above. In general terms there is limited societal interest to overcome these difficulties, as the perceived urgency of climate change over biodiversity loss generally prevails (Runhaar, 2016; Visseren-Hamakers and Kok, 2022). The National Biodiversity Strategies and Action Plans (NBSAPs) which are part of the Global Biodiversity Framework have a special role in addressing and overcoming these barriers and are therefore meant to guide biodiversity mainstreaming through spatial policy integration. However, the ability of NBSAPs to foster the institutional changes that are needed for this is generally considered low, reflecting a low priority and legal status given to biodiversity (Pröbstl et al., 2023).

5.1. Mainstreaming biodiversity in development cooperation

Development is usually seen as the main vehicle for improving living conditions for humans, while biodiversity conservation is considered a stand-in-the-way of short-term economic opportunities. There still is widespread doubt about the immediate economic utility of biodiversity, including genetic diversity and ecosystem diversity, and trade-offs are generally weighted on the basis of their financial implications. Decoupled growth - where technology-based solutions provide efficiency gains that lead to reduction in resource use and pollution - is increasingly assumed to offer an alternative pathway, but there is little evidence that this would work (Otero et al., 2020; Clémençon, 2021).

Should the Netherlands' BHOS make a start with coupling trade, development and biodiversity, it would be a frontrunner in the race towards new sustainable growth models in the national and international context. So far, BHOS has been focused on food and nutrition security, water

security, and the prevention of conflicts, by reducing instability and insecurity in an increasingly complex world. Problems like poverty, conflict, terrorism, migration and human rights, all coupled with water security and climate change, have spearheaded policies, programmes and projects in the Sahel, the Horn of Africa, the Middle East and North Africa. Efforts in support of stability, poverty reduction and food- and nutrition security have led to localised successes, yet poverty, instability and politically sensitive migration pertains, while impacts on biodiversity have not been measured.

Looking at the framework sketched in chapter 4, the current BHOS programme covers large parts of the direct and the indirect drivers of biodiversity change and would therefore be a good entry point for mainstreaming biodiversity. It would continue to address food security, poverty reduction and human rights, yet also take into account the drivers of (over)exploitation, land use chains, pollution, invasive species, climate change and the indirect drivers behind. It would allow for coordination, harmonization and integration of biodiversity policy goals, and contribute to alternative pathways of biodiversity positive development. The road towards such pathways however is not clearcut and requires explorative investigation and policy learning. Based on a set of clear-cut principles however would help making a good start.

5.2. Ten principles for operationalising biodiversity mainstreaming

There are multiple ways in which biodiversity can be 'mainstreamed' in overall development cooperation. Built on the complex relation between biodiversity and its direct and indirect drivers which are related to production, socio-economic development, food chains and international trade, mainstreaming biodiversity can only be done if consequently integrated in all relevant sectors, and in line with the international agreements, the Global Biodiversity Framework in the first place. Taking biodiversity as the key entry point and strengthening coordination, harmonisation and collaboration between sectors through optimal sharing of knowledge and experiences herein is key. But more strategic than collaboration at international and national levels is the mainstreaming of biodiversity within programmes and interventions within their areas of operation. Such an area-based or landscape approach has proven to be the best way for mainstreaming biodiversity, and integrating sectoral actions within a single spatial frame (van Oosten et al, 2018; van Oosten, 2021; Carmenta et al., 2023).

Across literature there are multiple pathways towards mainstreaming biodiversity at project and programme level. Based on this, we distilled and formulated ten principles that could form a solid basis for starting biodiversity mainstreaming throughout BHOS policy.

1. **Adopt an integrated spatial, area-based or landscape approach:** Addressing biodiversity loss in a systemic manner requires a connection with all the direct and indirect drivers, many of which can be related to food security and poverty reduction. As the landscape usually is the best level where actor networks and sectors meet, it is at this level where biodiversity can be most easily mainstreamed. As area-based or landscape approaches aim at combining multiple policy goals related to production, consumption and protection, it is at the landscape level where mainstreaming can best be done.
2. **Conduct a biodiversity assessment**: Before designing and implementing a project or programme, it is essential to conduct a biodiversity assessment to identify potential impacts and opportunities for enhancing biodiversity. This can include assessing the potential

impacts on ecosystems, habitats, and species, as well as identifying opportunities to promote biodiversity conservation and restoration.

3. **Develop biodiversity-sensitive project designs**: Projects and programmes should be designed in a way that promotes biodiversity conservation and restoration. This should be done in a way that minimises their impacts on biodiversity, as well as integrating biodiversity conservation and restoration activities. Incorporating biodiversity into strategic environmental planning processes can also help to ensure that biodiversity considerations are given equal weight alongside economic and social factors.

4. **Incorporate biodiversity-positive action:** Across the food system, biodiversity-positive action is to be promoted through the promotion of biodiversity-positive agricultural and forestry practices, improved land-use planning, and the support to protected areas, conservation and restoration initiatives. Biodiversity-positive action may include crop rotation, strip- and inter-cropping, agroforestry, agro-ecology, soil health, water management and all types of nature-based restoration practices. Such practices are often already embedded in local or indigenous knowledge systems and may not need to be introduced but solely strengthened and improved (Mrunalini et al. 2022).

5. **Engage stakeholders:** Engagement with stakeholders, including local communities, civil society organizations, and biodiversity experts, is essential for mainstreaming biodiversity into projects and programmes. This can involve consultation and collaboration with stakeholders to identify biodiversity conservation challenges and opportunities, and to develop strategies to enhance biodiversity outcomes.

6. **Foster partnerships and collaboration**: Collaboration among different stakeholders is essential for mainstreaming biodiversity into foreign affairs and development policies. This can involve partnerships with local communities, civil society organizations, academia, and the private sector. Collaboration can help to identify and address biodiversity conservation challenges, promote best practices, and leverage resources.

7. **Monitor and evaluate biodiversity outcomes:** Monitoring and evaluating biodiversity outcomes is essential for ensuring that projects and programmes achieve their biodiversity conservation objectives. This can involve developing biodiversity indicators and monitoring plans, as well as integrating biodiversity outcomes into project and programme evaluation frameworks.

8. **Promote knowledge sharing and capacity development:** Promoting knowledge sharing and capacity building is essential for mainstreaming biodiversity into projects and programmes. This can involve sharing best practices and lessons learned, as well as providing training and technical assistance to project and programme staff and stakeholders.

9. **Build on innovative financial models:** Nature-based solutions are usually high-risk investments that discourage private investors to invest. But new market-driven instruments for biodiversity allow for accounting positive and negative impacts on biodiversity - as credits and debts - and integrated in economic-decision making. Whereas biodiversity offsets are used to compensate for biodiversity loss, biodiversity credits allow individuals

and companies to invest in environmental projects that contribute to a richer biodiversity. Exploring such public and private financial options for biodiversity finance may offer new opportunities for financially sound project and programme design.

10. **Stimulate biodiversity friendly trade policies**: Real biodiversity mainstreaming not only requires integration of biodiversity goals in production, consumption and protection, but also in trade. Biodiversity-friendly trade regulations and incorporation of biodiversity in processes of due diligence processes could influence the direct and indirect drivers of biodiversity change. The European Union's (EU) trade regulations for full traceability in beef and soy value chain guaranteeing de-forestation-free products could be exemplary in this.

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