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Policy **Brief**

Sustainable Land-Use Transitions: Moving beyond the 30×30 Target and the Land Sparing/Land Sharing Debates

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BACKGROUND

The climate, biodiversity, water and health crises raise the crucial question of how we protect land while also producing food, fibre and biomass. Although this topic was addressed at the UN Food Systems Summit and at COP26 in 2021, the debate revolves around only two options presented as polar opposites: land sparing - high input, intensive farming that allows large portions of land to be "spared" for nature; and land sharing - biodiversity friendly low-input farming that shares land more equitably between nature and humans.

In parallel, the Post-2020 Global Biodiversity Framework, to be discussed at the 15th Conference of the Parties to the Convention on Biological Diversity (CBD), targets the protection of 30% of land and marine areas by 2030 (30 × 30 target). This target is fiercely debated because of: 1) its declarative nature, i.e., with no commitments on means and indicators; 2) its decoupling from the use of agricultural and forest areas, i.e., what is to be done with the remaining 70%? and 3) questions of State sovereignty, people's land rights and environmental justice, i.e., in what geographic areas of the world and according to which forms of governance will the extension of protected areas be carried out?

This policy brief reformulates the terms of the debate on land use within the framework of the Sustainable Development Goals. It shows that conservation policies are inseparable from the future of agriculture and food systems. It delivers four key messages:

KEY **MESSAGES**

1 - We must push thinking beyond the false binary of preservation vs. production

2 - Different regions of the world do not face the same sustainable land use challenges

3 - The notion of 'free land' is a fallacy

4 - Sustainable land use transitions should be assessed according to multiple sustainability criteria

KEY MESSAGE 1

We must push thinking beyond the false binary of preservation vs. production

The 30×30 target revives historical policies that supported the preservation of nature. The first policies promoted nature preservation through 'enclosed areas' that prohibited human activities and, according to a colonial logic, excluded local populations. However, in 1992, the CBD recognised the notion of sustainable use and enhancement of biodiversity - that is, the protection and even enrichment of biodiversity human societies can bring to natural environments. This approach has been supported in the Millennium Ecosystem Assessment with the conceptualisation of ecosystem services.

Thus, while land use changes related to agriculture are recognised as the primary factor in biodiversity loss (IPBES, 2019), some forms of agriculture are also seen as a central option for restoring degraded ecosystems and ecological functions (Vidal *et al.*, 2020). In this sense, nature-based solutions are a 'conservation' approach that has gained recent public attention.

The 30×30 target thus revives the lively international debate around land sparing and land sharing options (Loconto *et al.*, 2020), as sustainable land use must contribute to increasing biodiversity and food security while addressing climate change and other sustainability goals.

The productivity gains of intensive agriculture have led to an increased production of food, especially for animals, and of agrofuels and bio-based materials. However, it has not slowed down the conversion of natural ecosystems (e.g., deforestation). The growing demand for animal proteins related to rising living standards has been the main driver of both agricultural expansion and industrial intensification (IPBES, 2019). Livestock uses crop feed and herbage over 80% of agricultural land, with huge variations between extensive and intensive systems. Bending the growth curve of unsustainable animal products consumption and production is therefore a key issue in the debate over biodiversity conservation.

Land Sparing and Land Sharing

Land sparing - *saving land by separating production and preserved areas.*
A first answer to the food security challenge - feeding a world of 10 billion people by 2050 (Borlaug, 2002) - comes from the Green Revolution. The approach is to intensify agriculture to make it more productive without consuming more land. Specialized monocultures with standardized rotations (e.g., maize and soy), the intensive use of synthetic inputs, irrigation and biotechnology are seen as the most efficient way to meet the increased demand for cheap food. This approach promotes the preservation of protected areas outside of agricultural production zones.

Land sharing - *spreading out and combining agricultural production and biodiversity conservation in the same areas.*
A second answer lies in the search for an environmental and social alternative to industrial agriculture. It is built on an 'ecology of reconciliation' between biodiversity and agriculture, i.e., on the interactions of humans and 'other living beings' within complex agricultural systems. It uses more labour and demands a diversification of agricultural production zones without necessarily extending them. Land sharing also promotes changes on the demand side such as improved diets and reduced food losses and waste.

In both approaches, smaller portions of land can still be preserved under indigenous or community management.

KEY MESSAGE 2

Different regions of the world do not face the same sustainable land use challenges

In order to design the basis for partnerships and international alliances, it is necessary to distinguish between the expectations and priorities in terms of land sparing/land sharing, according to the characteristics of the main world regions. Thus, while agricultural yields in the richest countries seem to have reached their limits under industrial agriculture – soil degradation, reduced landscape biodiversity and climate change mark this limit – progress in yield are still possible in poor and middle-income countries, where the starting point of existing farming systems varies greatly.

Every agricultural situation is unique. Land fertility, topography, soil type and quality, and climate determine productivity thresholds. Yet labour availability and productivity, land status, access to markets, world views, the type and importance of needs (for food, income and jobs) related to demographic and economic realities also contribute to the feasibility of different options. At the local level, the issue is to conciliate biodiversity gains and agricultural benefits. At the international level, it is to reconcile the protection of the planet, the fairness of trade (for agricultural and forestry raw materials) and the access to resources. In particular, the export of biomass from agricultural-based countries where their local economy is minimally diversified to the richest countries must be questioned in terms of equity, social justice, environmental integrity and the protection of human, plant and animal health (Chotte and Orr, 2021).

Indeed, while a certain number of ecoregions cover relatively intact natural environments that could be suitable for conservation, other areas may be more suitable for increased economic activity (urban green belts). It is then a question of thinking in terms of functional biodiversity. Creating large stable habitats and sufficiently strong 'meshworks' to protect specific areas and facilitate exchanges and ecological continuity is an important approach. These 'meshworks' preserve ecological functions (e.g., pollination, soil fertility) and management methods (i.e., derived from the socio-cultural context) that support production processes. In many cases, production systems integrated

Biodiversity conservation in Europe: the land-sharing perspective

In Europe, a large share of biodiversity associated with agriculture is a legacy from extensive farming systems over centuries. The stock of all kind of species (flora, fauna and micro-organisms) in semi-natural open landscapes results from the historical evolution of extensive agropastoral mixed systems.

Agricultural development since the mid 20th century, based on intensification in synthetic inputs, increased production up until the end of the 1990s. However, it brought with it negative impacts on biodiversity on a large scale. Thus, following an intensification pathway for future production is a risky option for biodiversity conservation. First, because a plateau in yields seems to have been reached, increased use of inputs will no longer lead to higher yields. It is only an increasingly expensive way to maintain them. Second, the spatial expansion of intensive farming systems would further threaten the existing "High Nature Value" systems that currently contain high levels of biodiversity within the agricultural production zones.

Aligned with the EU Green Deal, a promising pathway stands in reducing the dependency on synthetic inputs by maximizing the ecological services of mixed production systems, notably in terms of nitrogen fixation, resilience to pests and water shortage. Research from organic farming shows that these systems can be rather productive, 3-4 times more than industrial systems. Modern agroecological systems might be less productive than the current intensive ones, but they are much more resource-efficient and more resilient, both climatically, ecologically and socio-economically. The main change would be the shift from intensive livestock systems fed on imported soya to more extensive livestock systems able to value European-grown legumes. Overall grain-fed livestock production would need to drop, but this leads to positive outcomes for consumers' health (Aubert *et al.*, 2019).

into complex landscapes are highly productive while being rich in biodiversity (UN, 2010). The objective of land sparing – producing a lot on a scarce area – can thus be reached through highly efficient low input farming systems, spontaneously associated with land sharing. In that case, labour with adequate skills and equipment including low tech and high tech innovations replaces the use of expensive inputs and heavy machinery.

Africa: Adapted agricultural models to tackle unique structural challenges

Diversity is a high value asset. The continent is vast, straddling several climatic zones; it is unevenly inhabited with both sparsely populated and historically densely populated areas. But a major demographic transition is underway: the population is predicted to double by 2050 to reach around 2.5 billion people. This growth will take place in cities, but the rural population will continue to grow for a long time, unlike in other regions of the world. A major distinction must be made between North Africa and South Africa on the one hand (i.e., largely urbanised with slow population growth and diversified economies) and the rest of sub-Saharan Africa on the other (i.e., where, despite pronounced differences, agriculture is the first sector of workforce occupation and rural population is the majority). This 'middle Africa' corresponds to 70% of the continent's surface area and 77% of its population. Available data estimate that the area suitable for agriculture is between 247 and 456 million ha (when including forests) for an additional 250 million rural people by 2050. This prospect of rural densification could have serious consequences for fragile ecosystems subject to the impacts of climate change. In many countries, agricultural growth based on land extension is impossible and farm sizes are shrinking rapidly due to generational repartitioning among a growing population. Tensions on resources are thus increasing. Migration, which has already begun, will accelerate towards the less populated areas with agricultural potential, with strong pressure on forests (Losch, 2016). The identification of sustainable agricultural and food models that provide decent jobs is the major challenge to be solved by African societies.

KEY MESSAGE 3

The notion of 'freed land' is a fallacy

Climate policies shed new light on the land sparing /land sharing debate. Claims have been made that free land could be used for large-scale bioenergy production. However, total substitution of fossil fuels by biomass production is impossible due to its high impact on land consumption (Pörtner *et al.*, 2021). Likewise, proposals to compensate for greenhouse gas emissions through massive tree planting or REDD+ mechanisms are prohibited by the physical limits of the planet.

The idea that there is 'free land' out in the world somewhere that can be used to establish new protected areas is a colonial vision. Even forest classification systems have reinforced this fallacy (Cheyns *et al.*, 2020). It ignores the sovereignty of States and the rights of indigenous and local populations. IPCC, IPBES, IUCN and FAO emphasize the importance of indigenous people, who occupy 28% of land and manage 80% of terrestrial biodiversity. Rather than creating sanctuaries of their territories through preservation or imposing afforestation, it is paramount that they maintain secure rights over their land and autonomy in decisions over its use. The Global Indigenous Agenda for the governance of indigenous lands, territories, waters, coastal seas and natural resources launched at the World Conservation Congress in 2021 is part of the solution to both the climate crisis and the erosion of biodiversity.

In this context, intensifying the restoration of degraded land while learning from local and indigenous knowledge is of outmost importance.

KEY MESSAGE 4

Sustainable land use transitions should be assessed according to multiple sustainability criteria

The scientific literature on land sparing/land sharing shows contrasting performances according to the criteria used to assess the profitability of farms, the effectiveness of conservation activities, and the benefits of biodiversity. However, most of these assessments based on modelling are not satisfactory.

First, models tend to favour surface area and agricultural production because data are more easily accessible than for agricultural and non-agricultural biodiversity, water flows, carbon stocks, etc.. The labelling of products and their ecological footprints (calculated in terms of space consumed, biomass production and GHG emissions) barely take into account biodiversity (limited to the identification of a few key species), land degradation and the effects of synthetic inputs. Moreover, analyses include yields of only a few industrial crops (wheat, rice, maize, soya, sugarcane, etc.), for which data exist. This means that leguminous crops, fruit and vegetables and the possibility of crop combinations with several cycles per year are not counted. Consequently, intensive monoculture appears to be better for the environment than land sharing (Blamford *et al.*, 2021). Although several recent syntheses provide quantitative elements on land sharing (Aubert *et al.*, 2019; DeClerck *et al.*, 2021), developing and informing approaches based on "field" data and local cultivation practices are still needed in order to have a complete picture of land sharing production systems and biodiversity effects.

Second, global modelling does not take into account the diversity of farming systems. Agroecology, in particular, cannot be reduced to a set of specifications. It is a project that implies major socio-economic changes, including a different vision of the relationship between agriculture and biodiversity. This project brings into play all the synergies between humans and other living beings within ecosystems. It also considers the social, institutional, political and technical interactions over the long, or even very long, term.

In the end, the type of agri-food systems that will be promoted in the coming decade will determine what can be achieved from an environmental viewpoint (i.e., climate, water, biodiversity, human and ecosystem health) and from a nutrition and health perspective. This vision will directly influence the overall economic, demographic and

Agroecology, a game changer for India?

During the 1960s, as in Europe, India embarked firmly on an industrialisation of its agriculture, later called the Green Revolution (GR). It encouraged specialisation in monocultures – wheat, rice, sugarcane – with massive upstream subsidies for "modern" inputs (i.e., credit, laboratory seeds, irrigation, fossil fuel for pumping water, chemical fertilisers, etc.) and downstream price supports to producers and consumers. Today the Indian GR basins achieve annual food calorie yields far exceeding those of Western Europe. But in 50 years, the active Indian agricultural population has continued to grow and farm sizes have shrunk (1 ha on average in 2015). Indian farmers have therefore not been able to increase their production and income by enlarging and mechanising their farms as in Europe. The overall results of the GR raise concern on several counts: farmer income - increasing cost of inputs, yields and economies of scale capped or decreasing; nutrition - chronic under-nutrition and malnutrition despite massive imports of pulses and vegetable oils, far too expensive fruit and vegetables, over-abundant production of carbohydrates, etc.; national budget - several tens of billions of euros per year in subsidies; and the environment – its effects on soil, water, air, biodiversity is a real ecological suicide. In India, where land is particularly scarce and expensive, technical and institutional innovations are nevertheless flourishing. They aim to exploit the astonishing local productive capacities of nature and mankind. As in Andhra Pradesh (53 million inhabitants and 10 million farmers in 2020) where, in less than six years, nearly a million micro-farmers have adopted a complex form of agroecology called "Natural Farming" (Dorin, 2021).

social transformations of all countries around the world. Agroecological systems have a fundamental comparative advantage to contribute to more inclusive and job-intensive agri-food systems, particularly in countries where employment alternatives are limited.

To support sustainable land use transitions and to identify agricultural models benefiting biodiversity and other sustainable development objectives, we make the following recommendations:

- Assess exhaustively the environmental impacts of food systems, in local agricultural areas and beyond (e.g., water, local and remote pollution, carbon and nitrogen cycles, GHG emissions). When possible, these assessments should reference energy equivalents, production cycles, diversity and abundance of species or even food quality, impact on diets and health, number and types of jobs created, modes of governance and reduction of inequalities. Multiple criteria can better capture the true impacts of production.
- Develop different sustainability trajectories informed by research and inclusive stakeholder dialogues. Projections should not be made to meet assumed consumption needs. Rather, land use scenarios should be compatible with planetary boundaries. In this regard, it is essential to look at how diets can be rebalanced (e.g., among legumes, dairy, and meat as protein sources) and how supply chains can be diversified in order to distribute benefits more fairly.
- Stop thinking only in terms of supply and demand. Supply is no longer the first pillar of food security which is mostly a question of access to food for low-income populations.
- Everywhere today, consumption patterns are essentially driven by the food industry and international trade. Food systems can be improved using the potential of local dynamics and innovations. Instead of adopting expensive techniques associated with land sparing, agro-ecological techniques reduce costs and increase resilience and opportunities for producers. Public regulations and support systems, like payments for ecosystem services, will be needed to facilitate the transition towards sustainable land-use.
- Develop multifaceted risk-assessment thinking, where the compared impacts of land sparing/ land sharing scenarios on soil functioning and functional biodiversity, on locked-in markets and on-farm economies, are assessed against risks of ecosystem resilience loss.
- In any debate on where and how we use land, what biomasses we produce and for whom, the local socio-economic dynamics and societal dimensions are critical. The concerns of people must be fully part of the sustainability discussion.

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