

# GLOBAL LAND OUTLOOK

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Working Paper



United Nations  
Convention to Combat  
Desertification

## LAND RESTORATION FOR POST COVID-19 RECOVERY





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## Land Restoration for Post COVID-19 Recovery

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# Contents

<b>Key messages</b>	<b>iv</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. Root cause of the COVID-19 crisis: Land degradation and habitat loss</b>	<b>3</b>
2.1 Wildlife trade	3
2.2 Industrial livestock	4
2.3 Expansion of agriculture	4
<b>3. Socio-economic and environmental impacts and vulnerabilities</b>	<b>6</b>
3.1 Jobs and livelihoods	6
3.2 Poverty and inequality	7
3.3 Food security	8
3.4 International trade and supply chains	9
3.5 Migration	10
3.6 Land degradation, protected areas and wildlife	10
3.7 Summary of impacts	11
<b>4. Stimulus measures and packages: From grey to green</b>	<b>12</b>
4.1 National initiatives	12
4.2 Integrated governance	13
<b>5. Framework for decision making: Multi-functionality of land ecosystems</b>	<b>14</b>
5.1 Bring sustainable land use into public-health policy	14
5.2 Phase out wildlife trade	15
5.3 Restructure industrial livestock	16
5.4 Build resilient and territorial food and nutrition systems	17
5.5 Regulate responsible consumption	18
5.6 Drive green job transition	19
5.7 Roadmap zero-carbon transition	20
5.8 Summary	21
<b>6. Nature-positive transformation</b>	<b>22</b>
6.1 Pillar 1: Political and institutional transformation: A new political alliance for nature	22
6.2 Pillar 2: Capital transformation: Resource decoupling and sustainable investment	23
6.3 Pillar 3: Land re-transformation: Restore land ecosystems	25
Endnotes	28



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## Key messages

Strong linkages exist between the emergence of infectious diseases and changes in land use. More than 60% of new infectious diseases of humans are transmitted by animals, and most originated in wildlife. The risk of transmission of viruses from animals to humans is higher than ever as people clear forests and fragment habitat to grow crops, keep livestock, and harvest timber and other natural products. Land-use change is the most frequent driver of the emergence of infectious diseases. The hotspots of zoonotic infectious diseases significantly overlap with the hotspots of land degradation.

Global efforts to avoid the next big pandemic need to focus on **combating land degradation** – the most important root cause of emerging infectious diseases. Global and national initiatives to halt land degradation must work hand-in-hand with post-COVID-19 health initiatives to focus on the “upstream,” underlying causes of infectious diseases, and bring together policies of sustainable land use and public health.

**Phasing out the wildlife trade** – a major source of human exposure to zoonotic viruses – and building regional, national and global capacity to monitor and sanction illicit activities are key to reducing the risk of zoonotic diseases. For low-income countries that are subject to a high volume of wildlife trade, a phase-out action plan with alternative livelihood activities, costing and compensation needs to be developed.

**Industrial livestock production**, especially near the edges of tropical forests, is an alarming source of emergent diseases. Restructuring of industrial livestock production must become part and parcel of sustainable land use and global health policy. A range of simultaneous developments are needed to de-link land-use change from livestock production.

**Food systems built on short, territorial supply chains**, nutrition-sensitive production and trade policies (promoting nutritionally rich foods and dietary diversity) are also key to building future resilience. Responsible consumption should be combined with a reduced land footprint – especially through substitution of ruminant meat and transition towards vegetarian diets.

**Consumer behavior change** in both developing and developed countries is needed to sustain planetary health with its vital ecosystems. Effective economic, behavioral, and regulatory incentives are needed to keep consumption within planetary boundaries.

**Restoring degraded land and forests** creates millions of **green jobs** over the short term, which are critical for quick economic recovery, especially for low-income societies that have been disproportionately affected by the crisis. It also generates substantial long-term social and economic benefits from a range of ecosystem services that can provide better disaster resilience, higher crop yields, carbon storage, poverty alleviation and enhanced livelihoods.

**Limiting global warming to below 1.5°C in line with the Paris Agreement and achieving net-zero emissions** (as currently targeted by more than 100 countries) require large-scale CO<sub>2</sub> removal from the atmosphere by land restoration and afforestation, and by avoiding deforestation. Land-based mitigation options offer low-cost and highly scalable decarbonization opportunities for climate-proof recovery.

**Multi-level institutional development** should be driven by the change in societal values, interests and relations. These should define new rules, regulations and the accompanying allocation of resources for large-scale ecosystem restoration. This should be one of the pillars of the post-COVID-19 transformation to build back better.

**Corporations** are increasingly aware that the collective impact of the drive to maximize shareholder profit is self-destructive in the long run. The decoupling of economic development and corporate growth from land degradation will be a key aspect of transformational change.

**Long-term private financing** for ecosystem restoration will be key to achieving global and national targets. The rapidly growing field of environment, social and governance investment seeks a mix of environmental, social and financial returns. It offers a huge potential for financing large-scale land-restoration projects that are commercially feasible. The post-COVID-19 market environment will further strengthen the case for responsible and sustainable investment.

A mix of volunteer and gradually binding **regulations and governance structures** should be developed and implemented at the national and international levels to regulate, monitor, and verify corporations' commitments and progress in relation to the protection and restoration of land ecosystems.

The COVID-19 pandemic has highlighted the importance of **small and medium enterprises** as the backbones of job creation, resilience, and stability. In the post-COVID-19 era, these enterprises could be the focus of de-linking economic development from the extraction of natural resources. They could play a critical role in decoupling and rebuilding resilience.

Progressive and differentiated decoupling, accompanied by large investment in ecosystem restoration that supports sustainable jobs and livelihoods, would significantly reduce **global inequality**.

Decisions taken now to design the COVID-19 recovery will shape our relationship with nature for decades. Policymakers have the opportunity to utilize large-scale land restoration as a transformational tool to build a sustainable future.

The global vision of building back better, and the transformation of the 21st century that the current crisis is likely to have triggered, will depend on our success in combating land degradation and in achieving widespread land restoration.



# 1. INTRODUCTION

What the world has experienced since the beginning of the COVID-19 pandemic has demonstrated the fragility of our very existence as we know it. In the matter of weeks, the spread of the virus has threatened almost the entire human population in terms of health; the world has moved from an outlook of global prosperity to an unprecedented depression and uncertainty. Despite colossal efforts, the spread of the virus has continued, illustrating the limits of our control over natural phenomena. What appears to be the cause of the crisis, a simple unsustainable practice in a local wild-animal market, has brought enormous global damage. Yet more concerning has been the realization of the potential existential implications of our widespread and systemic destruction of nature, which has been the norm for decades. It is a simple and logical, yet existential, conclusion that going back to the pre-COVID-19 “normal” is not an option.

The COVID-19 crisis has confirmed that we need to transform the way that we interact with nature. Over-commodification of natural resources on the one hand, and the under-valuation of ecosystem services and widespread disregard of the interconnectedness of every living and non-living thing on the other hand, underline the foundations of our broken relationship with nature. Societies and individuals must now realize how much we depend on each other as well as on other species for our health, food systems and livelihoods. We cannot continue to operate with the same set of values and isolated solutions that have brought us to the current ecological, economic and social crisis in the first place. Recovering from the crisis and building long-term resilience mean it is necessary to design and implement new political and policy paradigms, develop alternative economic models, and stimulate institutional and behavioral change at the society and individual levels. The COVID-19 pandemic has shock-spread the recognition that humans are an intrinsic part of nature. We need to change the way we interact with it.

The crisis has triggered social, economic, and political processes that are likely to lead to what will be marked as the nature-positive transformation of the 21<sup>st</sup> century.

*“With the right actions, the COVID-19 pandemic can mark the rebirthing of society as we know it today to one where we protect present and future generations. It is the greatest test that we have faced since the formation of the United Nations, one that requires all actors – governments, academia, businesses, employers and workers’ organizations, civil society organizations, communities and individuals – to act in solidarity in new, creative, and deliberate ways for the common good and based on the core United Nations values that we uphold for humanity.”<sup>1</sup>*

We need to “build back better.” But how? What are the fundamental drivers of this transformation? What institutional structures do we need to facilitate it? How can societies collectively build lasting resilience for people and the planet? What are the main building-blocks of action? What are the environmental, social, and economic costs of action and inaction?

Climate change, land degradation and desertification, water pollution, deforestation and the loss of biodiversity are some of the immediate and enormous challenges that the world needs to address as part of the COVID-19 recovery. Yet tackling these challenges will necessitate decisive policy action and the mobilization of vast resources. The current crisis has demonstrated that governments and businesses can respond to a global emergency of this magnitude in a rapid way.

Many governments and international organizations have announced “green” packages and measures of recovery. They primarily include the energy, transport, and food sectors, while also covering large-scale land-based solutions aiming at providing short-term relief and long-term socioeconomic and environmental benefits. Whether and to what

extent the existing response measures will initiate transformational change will depend on the scale and direction of these measures and their long-term impacts on sustainability. A green recovery through the protection and restoration of land ecosystems offers major potential to set a long-term trajectory of sustainable development.

Substantial evidence exists on the multiplier effects and the co-benefits of investing in sustainable land use.<sup>2,3,4,5,6</sup> Land-based production, conservation and restoration activities are the basis for jobs, enterprises, and livelihoods. They deliver essential goods and services such as food and medicine that can prevent future pandemics and contribute to human health, nutrition, and resilience. They provide safety nets for the world's poorest and most vulnerable communities. They also deliver vital services for reducing the risk of disasters and for mitigating and adapting to climate change. Hence land ecosystems (i.e., soil, water, forests, and biodiversity) can play a central role in both short-term recovery and long-term transformational change.

This paper crystallizes the role of ecosystem restoration in relation to the global vision of building back better. It addresses these questions:

- How can protecting and restoring land ecosystems drive sustainable recovery?
- What institutional mechanisms are required to facilitate this role?
- To what extent can the multi-functionality of land resources at spatial scales (local, national, regional and global levels) be feasibly unlocked to contribute to transformative change?

The paper undertakes a preliminary assessment of the underlying causes of the COVID-19 crisis. It reviews the scientific evidence of strong linkages between the emergence of infectious diseases and land-use change. It assesses the impacts of the COVID-19 crisis on socio-economic and ecological trends, including jobs and livelihoods, food security, poverty, gender and inequality, biodiversity and land ecosystems. It highlights some existing

recovery stimulus measures and packages. It then identifies institutional entry points and windows of opportunity, coordination among economic sectors and public institutions, and financing in both developing and developed countries. It lists institutional and governance lessons about managing crises at the local, national, and global levels while investigating polycentric government responses and financial flows.

We then propose a framework for decision making with concrete policy measures that pivot land restoration as a vital tool to prevent future pandemics and improve species and community resilience. The policy components of this framework to build back better include measures on wildlife trade, restructuring livestock industry, building territorially resilient food systems, regulating consumer behavior, and promoting land-based employment as an engine of job recovery. Since momentum is building to reach the objectives of the Paris Agreement, the paper also highlights the opportunities for land-based mitigation that would substantially contribute to the prospect decarbonization of the global economy.

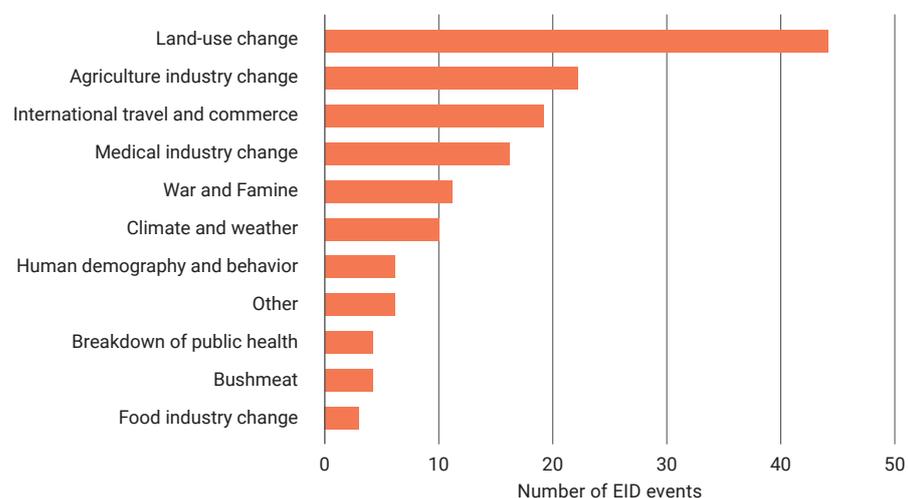
In light of the analysis of the impacts of COVID-19, green recovery packages and the need for a paradigm shift in the way we interact with nature, we conclude by setting out a vision for a nature-positive transformation. This includes a normative foundation, namely "a new political alliance for nature" for social, economic, and political change. The new alliance is based on a global commitment to undertake concrete actions by proactively addressing the interconnected and immediate threats to people and the planet. Based on the recognition that the current model of economic development has reached its limits and curtailing the prospect of further economic growth, this vision also encompasses a capital transformation and a shift of investment priorities, corporate governance, and actions. This nature-positive transformation, based on the restoration of land ecosystems, envisions and maps out a pathway to enhancing species and community resilience and preventing future pandemics.

# 2. ROOT CAUSE OF THE COVID-19 CRISIS: LAND DEGRADATION AND HABITAT LOSS

Research has revealed strong linkages between the emergence of infectious diseases and land-use change. An analysis of 335 emerging infectious disease events between 1940 and 2004 found that the number of such events has increased

significantly over time.<sup>7</sup> More than 60% of the emerging diseases were transmitted by animals, the majority of which (71.8%) originated in wildlife. Land-use change was the most frequent driver of emerging infectious diseases (Figure 1).

**FIGURE 1**  
Main drivers of emerging infectious disease (EIDs) based on the number of previous emergence events



Source: Loh *et al.* (2015)<sup>8</sup> and Jones *et al.* (2008)<sup>9</sup>

Particularly, the edges of tropical forests are a major source of transmission for novel human viruses. These edges grow longer as people clear forests and fragment habitat to build infrastructure and produce and extract agricultural, livestock, timber and other natural products. So too does the “edge effect” – the risk of disease transmission.<sup>10</sup> The longer the edges, the more frequent the human interaction with wild animals, either directly through their interaction with primates, bats and other wildlife, or indirectly through farm animals. Research models of the transmission of pathogens between species demonstrate a strong relationship between the proportion of land converted and the interaction between human and host populations.<sup>11</sup> While the risk of transmission is highest at intermediate levels of habitat loss, the largest yet rarest epidemics were associated with the extremes of land conversion.<sup>12</sup> As both intermediate and extreme levels of habitat loss continue to occur throughout the world, the risk of zoonotic viruses infecting humans is higher than ever.<sup>13</sup>

## 2.1 Wildlife trade

Global demand for wildlife is enormous. It drives an international trade of an estimated billions of wild live animals and animal products.<sup>14</sup> While the volume of legal wildlife trade is estimated at USD 300 billion,<sup>15</sup> the Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES) estimates the value of the illegal trade at over USD 20 billion.<sup>16</sup> The United Nations Office on Drugs and Crime reports that nearly 6,000 species subject to illicit trade were seized between 1999 and 2018, with the number of seizures increasing continuously and involving almost all countries.<sup>17</sup> The United States, the European Union and emerging countries in East Asia are the largest global importers of wildlife.<sup>18</sup>

Even under legal trade, the limited enforcement of rules and regulations on transit conditions, and the lack of health screening at export/import facilities and live animal markets, lead to favorable

conditions for the transmission of viruses. The entire supply chain — from people entering forests to collect wildlife for sale to the final consumer markets — creates a large sequence of exposure to zoonotic virus transmission between wild animals and humans.

## 2.2 Industrial livestock

The interaction between wild and domestic animals is another transmission channel through which zoonotic pathogens infect humans. One review identified 1,415 species of infectious organisms that are pathogenic to humans.<sup>19</sup> Among those, 61% are zoonotic. Zoonotic pathogens are twice as likely to lead to emerging diseases than are non-zoonotic ones.<sup>20</sup> The risk of animal transmission also varies depending on geographical location too. Animal reservoirs are reported to be significantly more frequent in the tropics than in temperate zones.<sup>21</sup> Hence livestock, especially those near the edges of tropical forests, are alarming sources of emergent diseases.

The industrial livestock sector is a set of large global chains with intensive production of large numbers of animals of similar genotypes, predominantly in confinement. The model is built around the practice of intensive feeding and rapid population turnover at a single production site.<sup>22</sup> Industrial livestock supply chains are a major driver of deforestation, as forests and other ecosystems are cleared to create pastures for cattle and arable land to grow feed. Because of the rapid growth in the livestock population over the last two decades in tropical zones, humans increasingly share the risk of disease transmission from animals.<sup>23</sup>

Livestock grazing occupies more than 25% of the world's ice-free land, and more than 30% of the world's croplands is used to produce feed for livestock.<sup>24</sup> The production of animal products is thought to have been the main driver of land-use change between 1961 and 2011, accounting for 65% of the total change in land use.<sup>25</sup> Rising population, economic growth, urbanization and related changes in diets increase the demand

for animal-based proteins, leading to the expansion of agricultural areas and a shift in arable land from food to feed production.<sup>26</sup> Dietary change is expected to become to be the overriding factor behind land requirements.<sup>27</sup> Industrial livestock supply chains are a major source of risk of emerging infectious diseases as they cause widespread deforestation, especially on the edges of tropical forests.

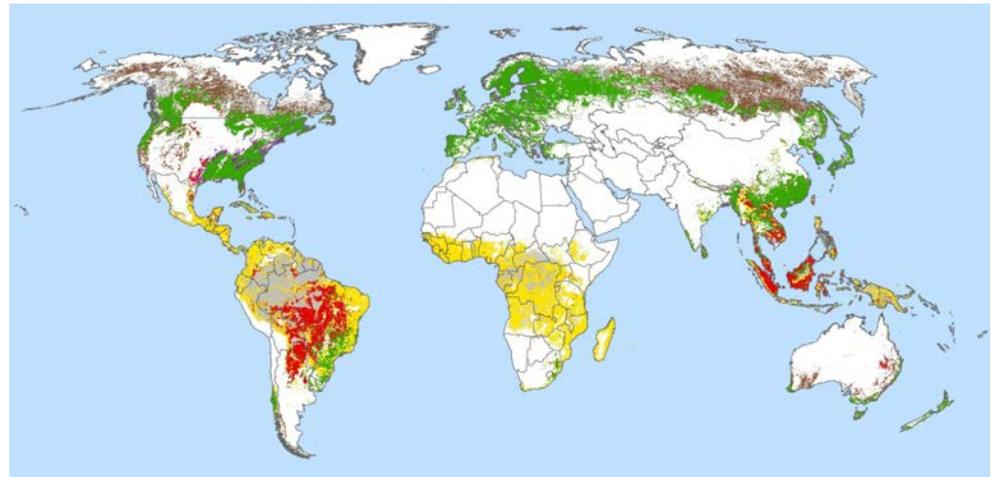
## 2.3 Expansion of agriculture

An analysis of satellite data from 2001–15 attributed up to one-third of global forest loss to commodity production-led land-use change, while shifting agriculture was responsible for one-quarter of global forest loss.<sup>28</sup> A meta-analysis found that deforestation is likely in areas where agriculture offers good economic returns; this is often driven by growing demand for commodities from urban and international markets.<sup>29,30</sup> Deforestation lowers the costs of transportation by creating road networks; in favorable agro-ecological areas it may lead to the expansion of agriculture and deforestation.<sup>31</sup>

The driving factors differ from one region to another. In Central and South America, forests have been lost to commercial agriculture and cattle grazing. The expansion of agricultural lands for palm-oil production is thought to be the major cause of deforestation in Southeast Asia, while in sub-Saharan Africa it is small-scale subsistence farming (Figure 2).<sup>32,33</sup> The increasing demand for agricultural commodities, driven mainly by income and population growth, leads to the expansion of agriculture into other ecosystems, increasing the risk of exposure to emerging infectious diseases.

The hotspots of zoonotic infectious diseases significantly overlap with hotspots of land degradation, especially in Central and Eastern Europe, Southeast Asia, Eastern and Western Africa and Central America (Figures 2 and 3). Recent diseases, including MERS, SARS, H1N1, HIV and COVID-19, are all transmitted through human interaction with wildlife and have caused enormous social and economic damage.<sup>34</sup>

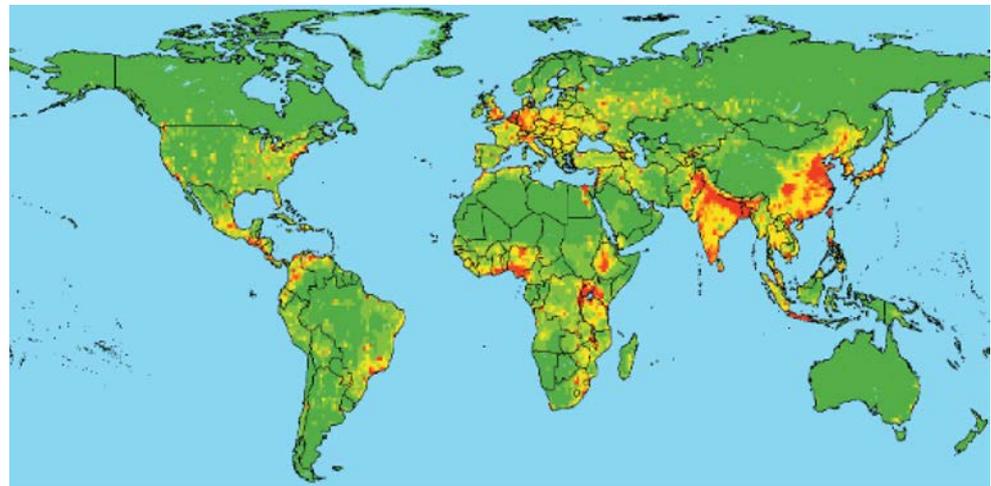
**FIGURE 2**  
Primary drivers  
of forest cover  
loss, 2001–2015



Commodity driven deforestation    Shifting agriculture    Forestry    Wildfire  
Urbanization    Zero or minor loss

Source: Curtis *et al.* (2018)<sup>35</sup>

**FIGURE 3**  
Global map of  
the risk of  
emerging  
infectious  
diseases due to  
zoonotic  
pathogens from  
wildlife



Note: Risks increase from green (low values), to yellow (medium values) and red (high values)

Source: Jones *et al.* (2008)<sup>36</sup>

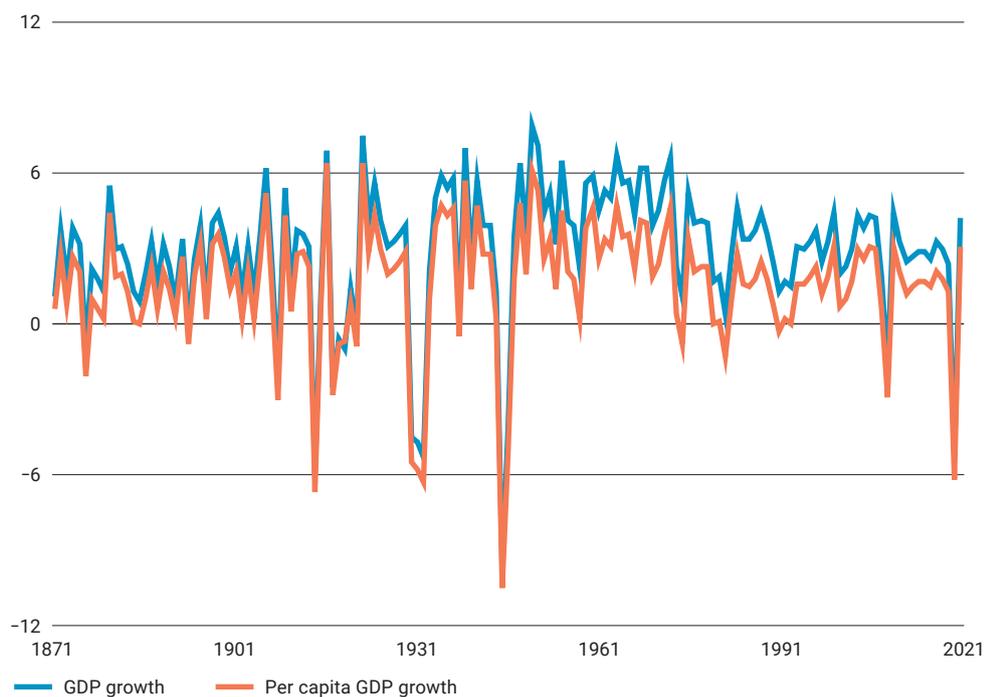
# 3. SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS AND VULNERABILITIES

## 3.1 Jobs and livelihoods

The pandemic plunged most countries into recession in 2020. Global per capita output recorded one of its largest proportional contractions since 1870 (Figure 4), and the highest number of countries fell into recession over the past 150 years.<sup>37</sup> As a result, more than 90% of the world's workers were affected by the crisis due to workplace closure and work restriction

measures.<sup>38</sup> It is estimated that more than 150 million full-time-equivalent jobs were lost due to the loss of 5.4% of global working hours in the first four months of 2020 (Figure 5). Working hours losses almost tripled during the second quarter of 2020. Projections suggest that the recession will continue, working-hours losses will remain in the range of 5–12% in 2020, and the global working hours are unlikely to recover quickly.<sup>39</sup>

**FIGURE 4**  
Global GDP growth (%), 1871–2021

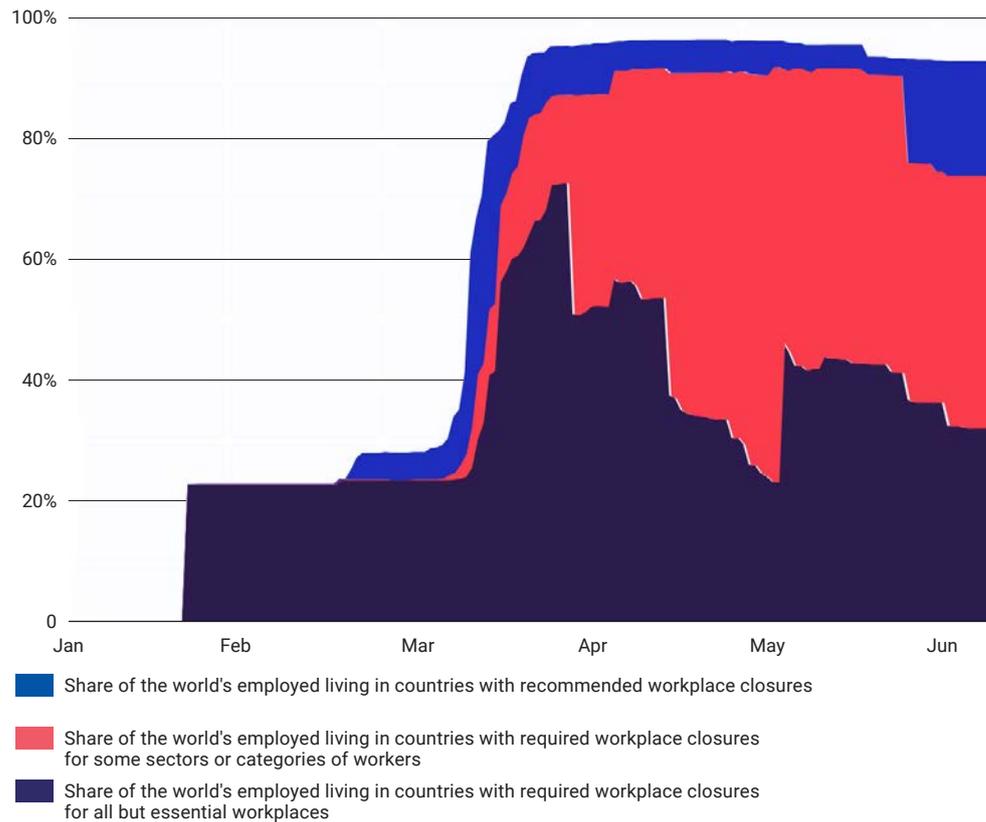


Forecast data for 2020-21 (cited in World Bank 2020).<sup>43</sup> Vertical lines indicate global recessions. Source: Bolt *et al.* (2018);<sup>40</sup> Kose, Sugawara, and Terrones (2019, 2020);<sup>41</sup> <sup>42</sup> World Bank.

The employment impacts have been disproportionately felt by women workers. Around 40% of all employed women (510 million in total) work in heavily affected sectors, including health, social care, food and nutrition, accommodation, retail and tourism. The participation of women in these sectors is higher in Central America, Southeastern Asia, Southern Europe and South America.<sup>46</sup> In addition, 70% of workers in

the health and social services are women, exposing them to exhausting working conditions and the direct risk of infection. Women also face the increased burden of unpaid care due to the closures of nurseries and schools. As a result, the crisis seems to have eroded some of the gains achieved recently in gender equality and women's empowerment.<sup>47</sup>

**FIGURE 5**  
Share of global labor force in countries with workplace closures, 1 January–15 June 2020 (percentage)



Source: ILOSTAT database, ILO modelled estimates, November 2019 (ILO 2020);<sup>44</sup> Oxford COVID-19 Government Response Tracker (cited in ILO 2020)<sup>45</sup>

Jobs and livelihoods in developing countries with large informal sectors have been affected most adversely by the crisis. The informal sector contributes to a third of GDP, and more importantly, nearly 70% of total employment in emerging and developing countries (Figure 6). Workers and small enterprises in this sector lack of access to public health services and formal financial services.<sup>48</sup> They have higher exposure to risk of infection as they live and work in crowded places. They have had limited or no access to government help in the form of unemployment benefits or emergency funds during the crisis.<sup>49</sup> Workers in the informal sector, who comprise up to 90% of the total labor force in some countries in sub-Saharan Africa, have limited resources for emergencies to compensate for temporary income loss or sick leave. Many are pushed deeper into poverty during crises.

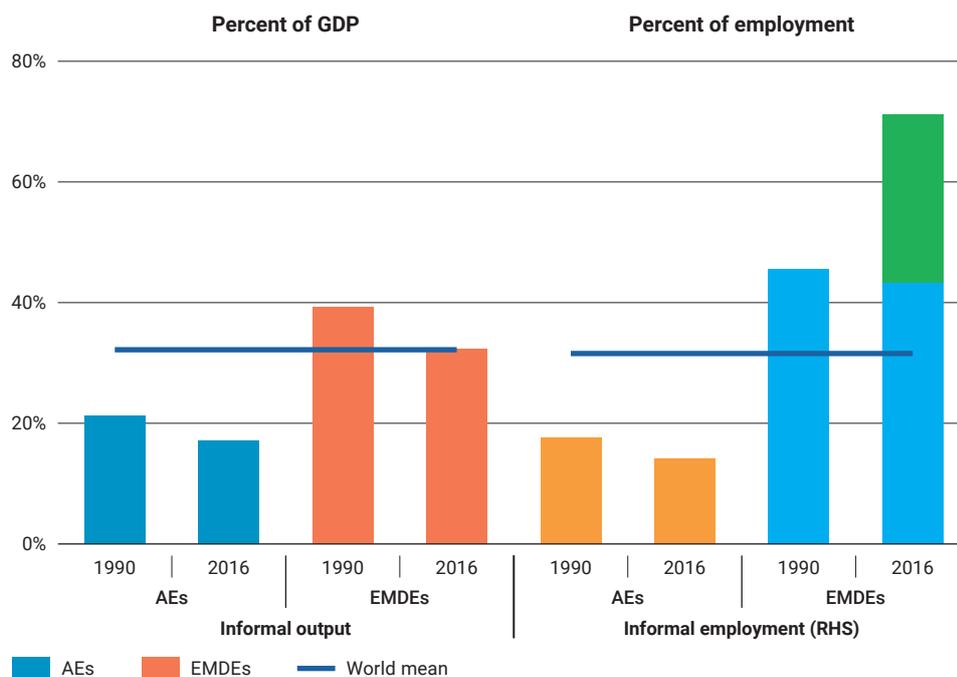
### 3.2 Poverty and inequality

The pandemic has amplified poverty around the world, potentially reversing a decade in progress in poverty alleviation. A study by the United Nations University estimated that up to the number of people living in poverty could rise by 4% if the world economy contracted by 10%. A more severe contraction of 20% would boost the numbers of poor by 8%, which would mean 420–580 million additional people in poverty.<sup>52, 53</sup> The locations of the biggest effects depend on the definition of poverty.

If a USD 1.90/day poverty line is used, almost 80% of the total new poverty is expected in sub-Saharan Africa and South Asia. But if the threshold is USD 5.50/day, more people in East Asia and the Pacific fall below the line; they account for 40% of new poverty due to the crisis (Figure 7).<sup>54</sup> The World Bank's baseline scenario suggests that an additional 70 million people could be pushed into extreme poverty in 2020; its more pessimistic scenario warns of up to 100 million.<sup>55</sup>

The pandemic has led to increased inequality too. First-order impacts on job losses disproportionately affect low-skilled labor and the informal sector. The potential secondary impacts on inequality are likely to be long-lasting. Pandemics over the last two decades have increased inequality, measured by the Gini coefficient, by increasing the income shares of higher-income segments of society while reducing it for lower-income segments.<sup>57</sup> For Latin America and the Caribbean, at least one member of 70% of families in the lowest-income quintile have lost their job; for the highest-income quintile the figure is only 20%.<sup>58</sup> Higher-income households are more likely to have at least one member teleworking. The crisis may result in households facing food insecurity and child malnutrition. Impacts on education include school closures and drop-outs, disproportionately harming the formation of human capital in poor households. Low-skilled laborers may find it harder to re-enter the job market when economies begin to recover. While initial economic shock has already

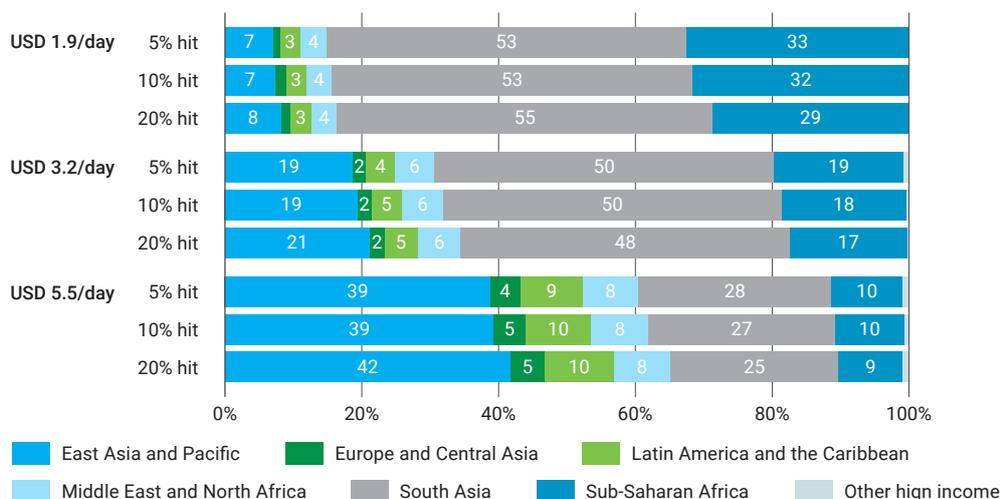
**FIGURE 6**  
Informality in advanced and in emerging and developing countries



The figures are based on unweighted averages. Informal employment in blue on the right-hand side of the figure uses self-employment shares with additional informal employment shares in green. World averages between 1990-2016 are shown in dark blue lines. AEs = Advanced Economies, EMDEs = Emerging Markets and Developing Economies (World Bank 2020b).

Source: Elgin *et al.* (forthcoming);<sup>50</sup> International Labour Organization; World Bank, World Development Indicators (cited in World Bank 2020)<sup>51</sup>

**FIGURE 7**  
Predicted distribution of COVID-19 induced poverty by region



Source: Sumner, Hoy, and Ortiz-Juarez (2020)<sup>56</sup>

been greater on the poor, it is highly likely that the secondary shockwaves will worsen global and national inequality.<sup>59</sup>

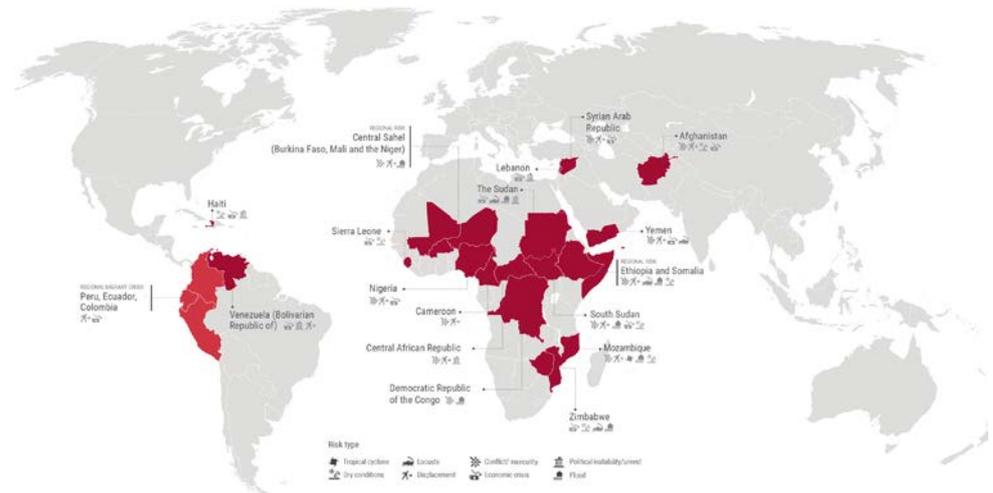
### 3.3 Food security

The pandemic has also threatened global food security. The fall in incomes, loss of remittances, and food price hikes, have made it harder for people to access food, especially in countries with prevailing food insecurity. An additional 83 million people – or up to 132 million in the worst-case

scenario—may go hungry in 2020 due to the pandemic.<sup>60</sup> This would add to the approximately 700 million people who already suffered from food insecurity, with 135 million of them needing urgent humanitarian assistance.

The Integrated Food Security Phase Classification (IPC), a warning system on nutrition, warns of worsening food insecurity in countries already facing other stresses. For example, Sudan has recorded 9.6 million people facing food crisis (June–December 2020), the highest number recorded.<sup>61</sup> Since the beginning of the pandemic,

**FIGURE 8**  
FAO-WFP global map of acute food insecurity hotspots, July 2020



Source: FAO-WFP (2020)<sup>64</sup>

In addition 1 million people have been added to the more than 10 million suffering from acute food insecurity in Afghanistan. The crises of food insecurity have been severely exacerbated due to climatic shocks, declining economic growth and COVID-19 measures in other countries, such as Lesotho, Eswatini, and Yemen.<sup>62</sup> FAO and WFP have identified 27 countries suffering from COVID-19-driven/aggravated food crises and hunger (Figure 8).<sup>63</sup>

The pandemic has underlined the importance of the smooth functioning and sustainability of the global food system. This involves a complex web of producers, consumers, upstream and downstream input suppliers, logistic providers, and market channels. Many UN bodies and NGOs urged governments to address the pandemic without disrupting the food-supply chain. Yet we have observed a range of disruptive measures in the form of border closures, quarantines, and export bans that have restricted access to food. For example, the Russian Federation, the world's largest exporter of wheat, imposed an export quota on grains for April–June 2020 amid the COVID-19 pandemic and drought conditions in its wheat-producing regions. Ukraine and Romania followed with their own restrictions. Vietnam and Myanmar restricted their rice exports; Thailand banned exports of eggs. As experienced during the food crisis of 2007–8, these restrictions create price hikes and volatility which disproportionately affect people who are already vulnerable to poverty and food insecurity.<sup>65, 66</sup>

The pandemic has long-lasting implications for food and agriculture. The most vulnerable groups include small-scale farmers (nearly 500 million across the world), agricultural workers, and pastoralists in rural areas, as well as low-income urban residents who tend to spend a large share of their income on food. Since the poor often lack social and economic safety nets, they have been widely exposed to the impacts of the crisis. Due to income losses,

physical restrictions on movement, labor shortages, reduced trade and investment, producers might not be able to plant in 2020 as normal. The world may face a serious production shortfall in 2021.<sup>67</sup>

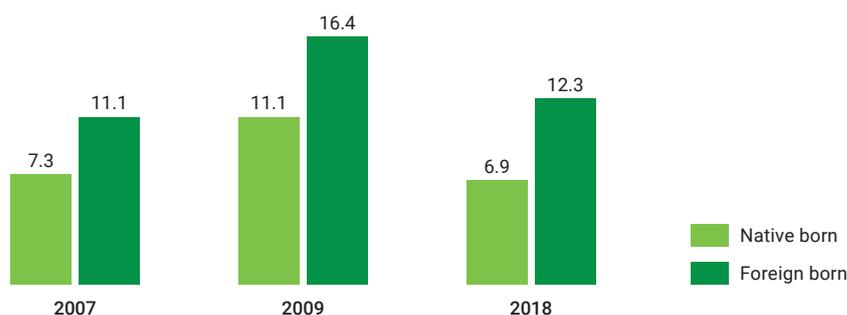
### 3.4 International trade and supply chains

The pandemic has affected the product profiles, volumes and patterns of international trade in agricultural commodities. The World Trade Organization reports that agricultural and food exports increased by 2.5% during the first four months of 2020, despite trade restrictions imposed by some countries.<sup>68</sup> Depending on the product profile, trade impacts varied. While the exports of staple food, processed fruits and vegetables initially increased, partly reflecting panic-buying at the household level and stockpiling at the governmental level, non-food agricultural products dropped substantially. The export volumes of higher-value fresh products, dairy and meat decreased as demand for them is driven by the services sector. High-value perishable products have been most adversely affected due to logistic difficulties and plummeting demand.<sup>69</sup>

Trade impacts have also varied across regions. Asia, Europe and North America have experienced declines in agricultural exports, while South America's exports have risen, driven by Asian demand for soybeans, sugar, and meat.<sup>70</sup> Overall trade in food and agricultural products seems to have been buoyant, mostly due to high food stocks and harvests in 2020. Yet given the risks of production failures in 2021 due to various direct and indirect effects of the crisis, and given policy disruptions under stressed conditions, such resilience is likely to be tested again in 2021.

**FIGURE 9**

Unemployment risks for migrant workers during an economic crisis

**Unemployment rate (%), EU-28, during global financial crisis 2008-2009**

Source: Eurostat data, cited in (World Bank - KNOMAD 2020)<sup>81</sup>

### 3.5 Migration

COVID-19 has affected migration patterns, especially for economic reasons. According to the ILO, migrant workers comprise nearly 5% of the global labor force, with this share being markedly higher in some countries.<sup>71</sup> Migrant workers have been among the most vulnerable social groups. They are concentrated in sectors such as frontline health and care, so are disproportionately affected by the crisis. As their jobs are often temporary and informal, they lack social protection and health care. In the Association of Southeast Asian Nations, for example, 97% of foreign migrants have no access to social security.<sup>72</sup> Migrants also suffer from worsening working conditions, reduced pay or non-payment of their wages, and early termination of their employment contracts. They are more likely to lose their jobs than native-born workers (Figure 9).<sup>73</sup> Increased violence against women migrant workers has been reported. Migrants have been excluded from COVID-19 support measures in their host countries. Some have been trapped by travel restrictions; many have moved back to their home countries once restrictions were eased. For example, it is estimated that 100,000 migrants have returned to Cambodia.<sup>74</sup> Most of these migrants are expected to consider remigrating when health and economic conditions allow.

Internal migrants far outnumber (by up to 2.5 times) international migrants, with China and India each having over 100 million internal migrants.<sup>75</sup> Most work in the informal sectors, and many live in overcrowded slums, where they are vulnerable to the health and economic impacts of COVID-19. Though disruptions to public transport and lockdown measures restricted their ability to return home, the crisis led to massive internal population movements in India, China and Latin America. Facing the loss of their livelihoods in the city, internal migrants have been pushed to return home.<sup>76</sup> Urban–rural infrastructure has been overburdened. Natural resources in rural areas have been exposed to large inflows of internal migrants.

Both internal and international migrant laborers play a vital role in agri-food systems and the management of farmland. Millions of migrant laborers provide essential services in global food chains. The crisis has affected them severely – as many work under conditions where they are highly exposed to infection risks.<sup>77</sup> Since they often work under informal arrangements, they lack access to official safety nets and health services. Lockdowns and border closures have prevented many agricultural laborers from reaching their work destinations, disrupting food supplies. They can send less money back home to their families.<sup>78</sup>

The effects of COVID-19 on migration are expected to be persistent. In host countries, the recovery of sectors such as health care, agriculture, construction, and tourism depends on the availability of migrant workers. In home countries, the decline in remittances, estimated to be around 20%, will create significant macroeconomic difficulties at the national level and hardship for households.<sup>79</sup> Migration flows are likely to fall in the short term. But the crisis is likely to deepen the income gap – the main driver of migration – between low-skilled and high-skilled labor force and between countries: average incomes in high-income countries are over 50 times those in low-income countries.<sup>80</sup>

### 3.6 Land degradation, protected areas and wildlife

COVID-19 lockdown measures and revenue losses incurred by the public and private sectors have restricted activities to conserve ecosystems and biodiversity. This has led to concerns of increased illegal waste-dumping, hunting and logging.<sup>82</sup> There have been reports of an uptick in deforestation and poaching incidents during lockdowns.<sup>83</sup> Similarly, due to the loss of livelihoods and the internal migration of large numbers of people to rural areas, cases of unsustainable harvesting of natural resources have been reported.<sup>84, 85, 86, 87, 88</sup> While conservation activities continued in many countries despite physical and financial difficulties, the long-term feasibility of conservation efforts is

threatened if the current crisis is prolonged.<sup>89</sup> Concerns have also been raised regarding the risk that international funding might be diverted from environmental protection and restoration to more immediate health and economic concerns.<sup>90</sup>

Policy measures to relieve the impacts of the crisis are reported to have adverse impacts on land ecosystems. For example, Brazil's economic recovery measures came with deregulation of land use in the Amazon to stimulate agriculture, logging and mining. A legislative initiative that covers 9.8 million hectares of unrecognized indigenous land to be exposed to legal claims by the de-facto occupants who are engaging in resource-extraction activities.<sup>91</sup> In response to COVID-19, one-third of enforcement agents were asked to stay at home, crippling the fight against illegal deforestation and poaching.<sup>92</sup> Deregulation of existing restrictions on land-use change and the curbing of law-enforcement capacity in the tropics would certainly result in additional biodiversity loss and ecosystem damage.

Other examples of environmentally damaging COVID-19 measures come from Australia. In Queensland, the government provided a permit for coal and gas exploration on 7,000 km<sup>2</sup> of land in an effort to boost the fossil-fuel industry. Victoria has reportedly deregulated its conservation laws to support the logging industry.<sup>93</sup>

### 3.7 Summary of impacts

The pandemic has brought traumatic socio-economic damage across the globe. The first wave plunged most countries into a recession, which then was prolonged by the second wave in the latter part of 2020. The pandemic has amplified poverty, income inequality and food insecurity, reversing a decade in global progress in these areas. The employment and livelihoods impacts have been felt disproportionately in developing countries and by low-skilled laborers working in the informal sector, by women and by migrant workers. Many such workers are exposed to high health risks at work, have lost their jobs, or lack access to emergency support and services. COVID-19 lockdown measures and revenue losses have restricted environmental conservation efforts. While few national authorities have resorted to measures that may lead to environmental damage, some incidents of over-exploitation of natural resources by the public have also been reported. Whether these severe impacts persist or fade away will depend on the effectiveness of the response measures instituted by governments and the response by societies to the underlying causes and implications of the crisis.



# 4. STIMULUS MEASURES AND PACKAGES: FROM GREY TO GREEN

As of the beginning of 2021, most recovery packages primarily include fiscal measures and policies designed to mitigate the short-term economic impacts of the crisis. Some packages include “green” measures, largely aiming at the energy and transport sectors, while a few exclusively address nature-based solutions in relation to land restoration. According to the assessment undertaken by the OECD Secretariat covering 30 countries, governments had concentrated their green measures on short- and medium-term objectives in renewable energy, electrification of passenger cars and public transportation. Agriculture, forestry, and waste management had been less prioritized.<sup>94</sup> The focus in this section is on the recovery packages and measures that include land-based solutions, initiatives, and incentives. The size, scope and the potential impacts of these measures in providing short-term relief and long-term social, economic and environmental benefits are likely to vary substantially across countries.

New vertical institutions have also emerged in response to the crisis to manage operations across different levels of governance. Response measures have highlighted some institutional entry points and windows of opportunity in relation to coordination among economic sectors and public institutions, and the financing of shovel-ready projects in both developing and developed countries. Tax reduction and grants/loans have been the predominant policy tools that governments used. Some governments have provided support to businesses with environmental conditionalities attached. Subsidies to research, development, and skills training have also been provided.<sup>95</sup>

## 4.1 National initiatives

**Pakistan.** The country’s green recovery package is supported by funding from the World Bank. The five-year package includes nature-based solutions and measures that aim to alleviate land degradation and to reduce risks associated with climate change.

The measures aim to complete the 10 Billion Tree Tsunami afforestation project, which includes large-scale tree plantations. The package also includes the promotion of local livelihoods through honey, fruit and olive production. More than 60,000 unemployed laborers are reported to have been employed under the project.<sup>96</sup> The project is underway on 6,000 hectares of land near Islamabad, mainly employing women and young unemployed people who had migrated from urban areas during lockdown.

**India.** The country has allocated USD 780 million to an afforestation program designed to stimulate the rural economy by creating jobs and provisioning ecosystem services. The package includes a component to create jobs in plantation work, forest management, wildlife protection and afforestation. The green package also aims to improve the livelihoods of vulnerable tribal communities.<sup>97</sup>

**South Korea.** The country had designed and implemented a green stimulus plan to recover from the 2008 financial crisis by allocating USD 60 billion to environmental projects such as forest and river restoration, rail transportation and renewable energy.<sup>98</sup> Amid the COVID-19 crisis, the “Korean new deal” has been announced, which aims at economic recovery through green initiatives. It is reported that the green spending will amount to USD 61 billion between 2000 and 2024 and is projected to create nearly 700,000 jobs.<sup>99</sup>

**Ghana.** Ghana has initiated a process to develop a National Adaptation Plan to “build back better.” This envisages post-COVID-19 recovery investments and stimulus packages to enhance the country’s climate resilience to extreme weather. The package focuses on food security and the agricultural sector, which provides livelihoods for around 65% of the population. It also aims to develop a cross-institutional approach to addressing both climate change and post-COVID-19 recovery.

**Egypt and Morocco.** With EUR 225 million of funding from the African Development Bank, Egypt aims to bolster economic resilience and sustainability. The funding will mainly support improvements in the electricity infrastructure to support the private sector.<sup>100</sup> The European Union and the European Bank for Reconstruction and Development have approved EUR 61.3 million in funding to promote green and climate-resilient investments in Egypt and Morocco.

Chile. Chile has committed to become carbon-neutral by 2050. The plan prioritizes nature-based solutions and sets a goal to cut forestry emissions. It builds around a “social pillar” framework which aims to address inequality and the protection of vulnerable societies.

## 4.2 Integrated governance

Institutional governance, policy management and coordination had to improve dramatically across operational levels during the COVID-19 crisis as governments faced major uncertainties and trade-offs between competing priorities for health, economic and social needs. Crisis management required governments to create multi-level coordination bodies that bring together representatives from national, regional, and local levels to coordinate operations. National governments also needed to enhance cooperation across municipalities and regions. Given the heterogeneity of the local impacts of the crisis, they developed flexible and regionally differentiated measures. The crisis also demonstrated the importance of digitalization and e-governance in managing multi-level operations.<sup>101</sup>

Because the crisis hit the vulnerable segments of societies disproportionately in both developing and developed countries, targeted public-service delivery to vulnerable groups has become a policy priority. This required the development of effective and inclusive approaches to identifying target groups and their need gaps, and to provide them

with easy access to support measures. The crisis has also placed a heavy fiscal burden on local and national governments. The effectiveness of financial management had to improve across institutional levels. Governments explored new fiscal and financial management tools and external financing channels.<sup>102</sup> They re-allocated resources and increased spending rapidly to priority areas to contain the spread of the pandemic and to mitigate its immediate impacts.

Governments developed vertical emergency management and operation bodies to foster cross-level cooperation across national and subnational entities. For example, the government of Chile established a Social Committee for COVID-19 with representatives from local municipal associations, government authorities, academics and health professionals. It also transferred funds to compensate municipalities. South Korea activated its Central Crisis Management Committee, which developed the “whole-of-government approach”, including the Prime Minister, central government ministries, and representatives from provinces and major cities. In Latvia, eight municipalities have established strong cooperation by joining their efforts and sharing supplies. Cross-border cooperation efforts have also been observed. For example, France, Germany, Switzerland and Luxembourg cooperated on cross-border transfers of COVID-19 patients.

Efforts of digitalization and e-governance in managing multi-level operations have intensified in response to the crisis. A range of e-platforms have been developed and deployed by numerous governments. For example, the South Korean government has invested in e-governance and management of large data under the COVID-19 Smart Management System. The city of Milan in Italy has collaborated with a telecommunications company to provide free internet access to vulnerable families. Governments are likely to continue to accelerate their digitalization efforts and widen e-governance platforms.

# 5. FRAMEWORK FOR DECISION MAKING: MULTI-FUNCTIONALITY OF LAND ECOSYSTEMS

An important lesson from recovery efforts after the global financial crisis of 2008 is that short-term fiscal stimulus is not enough and that long-term commitments to public spending are key to achieving robust recovery. Another important lesson was that the lack of collective action to make substantial progress in the Sustainable Development Goals, especially in relation to biodiversity, land degradation and climate change, has exposed the world to the increased risk of pandemics. As of the beginning of 2021, most COVID-19-related institutional measures that have been designed to mitigate the immediate health and economic impacts of the crisis. The short-term needs of the societies and sectors that have been impacted, and the large scale with which emergency support needed to be provided have curtailed the efforts to institute transformational initiatives for sustainable recovery.

Right after the initial impacts of the crisis are addressed and societies see the prospect of recovery, governments will be in a position to develop political and policy mechanisms for transformational change. The multidimensional complexity of the crisis has necessitated the emergence of some new institutional forms and approaches which could be utilized for post-COVID transformation. In light of the lessons from the crisis and the widespread awareness it is likely to have raised, it is reasonable to expect a momentum to build for transformational change.

An analytical framework is needed for decision making through which policy measures would have the biggest impact in preventing future pandemics and increasing species and community resilience. The policy approach put forward in this section brings sustainable land use into the forefront of public-health policy at the global, national and local levels. It is centered around the multi-functionality of land ecosystems and identifies policy options that could operationalize land restoration in post-COVID-19 transformation. It positions sustainable land use as a pivot for health policy to avoid future pandemics, phasing out of wildlife

trade, building resilient food systems, restructuring of industrial livestock production, creating green jobs, and decarbonizing the global economy.

## 5.1 Bring sustainable land use into public-health policy

Despite the problem of underreporting and surveillance of infectious diseases, tropical developing countries are hotspots of transmission of zoonotic pathogens from wildlife. Hence, public resources for surveillance and prevention need to be relocated to high-risk areas where the next pathogen is most likely to emerge: tropical Africa, Central America, South and East Asia.<sup>103</sup> Zoonotic pathogens from wildlife in these hotspots are a seriously increasing threat to global public health.<sup>104</sup> Global efforts to avoid the next big pandemic need to focus on combatting land degradation – the most important root cause of transmission.

The new policy framework must bring together sustainable land use with sustainable public health policy. Policies must focus on the “upstream” underlying land-use determinants of infectious diseases, rather than responding to specific risk factors.<sup>105</sup> Substantial resources for research and institutional development need to be allocated to estimate, avoid, and manage health risks in relation to land-use actions (especially deforestation and infectious diseases) at the global, regional and local levels.

Avoiding land degradation, especially deforestation in the tropics, should become a global and national health policy. This offers the largest return on investment in reducing the risk of virus emergence. A study estimates that a 50% reduction in deforestation from 2005 to 2030 would cost USD 17–28 billion annually.<sup>105</sup> The annual cost of reducing tropical deforestation is estimated at USD 9.6 billion; this would reduce the size of areas (i.e. edges) at highest risk for virus transmission by 40%.<sup>106</sup> Considering both the costs of the COVID-19 pandemic (trillions of dollars in GDP) and the grow-

ing risk of emerging diseases, investing in protecting forests offers the largest return in avoided costs. It also offers substantial co-benefits in the form of enhanced ecosystem services provided by forests. A transition to sustainable land management practices would bring up to USD 1.4 trillion in the form of higher crop productivity; without taking into account the cost of COVID-19, the annual economic losses associated with land degradation amount to USD 10.6 trillion.<sup>108</sup>

The local social and economic costs of forest protection should be compensated by the international community to avoid poor communities bearing the costs of supplying global public goods.<sup>109</sup> In resource-poor and tropical countries where the risk of disease transmission is high, land-use change can alter patterns of infectious diseases. Timely and targeted policy interventions at relatively low cost can prevent such diseases, which pose local, regional and global health threats.<sup>110</sup> A lesson from COVID-19 is that global public goods in the form of protecting and restoring ecosystems benefit the entire human population, way beyond local and national boundaries.

Poor local communities could be assigned as land and forest stewards, and the global community could provide the appropriate resources necessary for large-scale protection and restoration of land ecosystems. A great deal of experience has been accumulated through the UNFCCC's efforts in reducing emissions from deforestation and forest degradation in developing countries (REDD+). Similarly, the Clean Development Mechanism (CDM), which is likely to be extended beyond 2020, offers examples of financial and institutional mechanisms that could be applied or incorporated into a framework to reducing emissions and biodiversity loss from land degradation in developing countries. Service or compensation payments for such an initiative by official funds or market-based mechanisms could be made directly, or through national authorities, to the individuals or communities that preserve and restore land.

## Initiatives

- Make a rapid country/regional assessment of the risk of emerging infectious disease events due to zoonotic pathogens, with its potential impacts on human and natural systems, and on institutional capacity.
- Determine the extent of the land-restoration gap to reduce the risk of an emerging infectious disease event in the country/region.
- Establish vertical and horizontal channels of cooperation across municipalities and regional administrative units to develop/implement risk-reduction strategies.

- Develop appropriate administrative, legal, and operational procedures and coherent guidelines that would define roles and responsibilities.
- Develop local stewardship programs that would provide adequate social and economic incentives to support protection and restoration efforts. Design the programs to be focal points of green-job generation for low-income households and women.
- Make a local assessment of social who could contribute to protection and restoration efforts by joining stewardships programs. Develop appropriate training programs and facilities.
- Provide adequate funding to local units to execute their mandates. Allow local governments to have access to external financing and to have flexibility in developing and engaging in innovative financing. Develop financial review mechanisms to strengthen transparency and accountability.
- Provide international funding dedicated to nature stewardships programs in low-income countries. Considering the experiences of REDD+ and CDM, globally and regionally assess how much international funding is needed, how it could be raised through public and private financial mechanisms.

## 5.2 Phase out wildlife trade

Wildlife trade should be brought under severe restrictions to reduce the risk of future zoonotic pandemics. Closing illegal and unregulated markets would substantially reduce the trade of wildlife products and would in turn reduce human exposure to zoonotic viruses. Recent measures taken by some countries in reaction to COVID-19 in the form of temporary bans may allow for restructuring of wildlife trade, which is also major driver of biodiversity loss.<sup>111</sup> Complete bans may undermine local livelihoods that depend on wildlife trade. Hence efforts need to be intensified to develop alternative livelihoods at the local level around protected wildlife areas and species. The key to long-term success is to develop livelihoods for local people and traders that are less dependent on wildlife trade.<sup>112</sup>

Demand-side measures are critical in restricting wildlife trade. The literature suggests that the size of the consumer demand – driven by preferences in relation to the perceived health, social status and other cultural attributes associated with wildlife products – has determined the size of wildlife trade, surpassing the efforts to regulate it.<sup>113</sup> Economic evidence indicates that the demand for highly threatened species is price-inelastic, signaling high willingness by consumers to pay, which may

hamper the effectiveness of trade restrictions unless there is complete ban on imports or exports of these products.<sup>114,115</sup> Most forms of wildlife trade need to be phased out rapidly to avoid the huge pressure that it places on global biodiversity. This is a must to reduce the future risk of pandemics which have repeatedly proven to be many times more costly than the entire size of the sector.

Controlling wildlife trade is an area of severe underinvestment both at the global and national levels. Global institutions, such as the Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES), and countries with limited institutional resources, need rapid and large investment in capacity development. CITES is also limited to regulating only the wildlife species that it lists, and it covers international trade but not the domestic commercialization of these species.<sup>116</sup> Hence for each country, especially low-income ones subject to high volumes of legal and illegal activities, a roadmap to phasing out wildlife trade with appropriate costing, compensation and action plan needs to be developed.

## Initiatives

- Ban commercial wildlife trade entirely as a drastic measure to reduce the risk of zoonotic diseases. Ban domestic consumption of wildlife and impose a ban on imports and exports.
- Phase out the trade and utilization of wildlife for medicinal purposes. Deauthorize the use of species, such as bats, primates and birds, that are highly risky in relation to disease transmission.<sup>117</sup>
- Increase international funding dedicated to monitoring and restricting illegal wildlife trade.
- Address corruption to prevent illegal wildlife activities.<sup>118</sup>
- Deploy national/regional smart technologies and forensic science to help monitor detect and prosecute illegal activities.
- Develop effective risk-management practices and border controls by profiling and targeting to detect shipments that may involve wildlife products.<sup>119</sup>
- Substantially increase the global operational capacity of CITES.
- Enlarge the mandate of CITES to cover all wild species, while also allowing it to monitor the illicit domestic wildlife markets in member countries.
- Increase local capacity of low-income countries to develop alternative livelihoods for local populations who benefit from wildlife trade.

- Engage in cross-border cooperation on natural systems beyond national boundaries.
- Develop and implement demand-reduction initiatives based on culturally sensitive, evidence-based insights, and by targeting country/community and species-specific objectives. Engage civil society organizations in demand reduction initiatives.<sup>120</sup>

## 5.3 Restructure industrial livestock

Restructuring of industrial livestock must become part and parcel of sustainable land-use policy. A range of potentially simultaneous developments are needed to de-link land-use change from income growth-induced dietary change, which includes high productivity growth in livestock production, a significant substitution of ruminant meat, a transition towards vegetarian food, and reducing food waste in both developed and developing countries.<sup>121</sup>

The ecological restructuring needs to focus on the tropical hotspots of intensive interaction between livestock and wildlife. Buffer zones for livestock production need to be established to minimize the impact of livestock on land on the one hand, and reducing the risk of wildlife interaction on the other. For example, Chile, as part of its land-degradation neutrality measures, is considering an assistance program for landowners whose land is adjacent to protected areas, to provide buffer-zone reserves.<sup>122</sup> The economic and social costs of restructuring – e.g. loss of income, export revenues, employment – and its global and local nutritional implications need to be factored into policy formulation.

## Initiatives

- Assess the country/regional risk of wildlife interaction with livestock.
- Create buffer zones for livestock production to minimize the risk of interaction with wildlife.
- Create regional zones to limit the expansion of the livestock sector.
- Develop national/international certifications/labeling on the land/forest footprint of livestock.
- Impose import and export restrictions and border-adjustment measures on livestock products that come from land degradation zones.
- Impose taxes to reduce excessive meat consumption in high income countries.

## 5.4 Build resilient and territorial food and nutrition systems

The COVID-19 crisis has illustrated once again the fragilities of the global food system. Despite sufficient output levels in primary food products in 2020, tens of millions of people have fallen into food insecurity due to loss of income, price hikes, widening inequality, failing social-safety nets and supply-chain disruptions brought about by lockdowns. Poverty, inequality and lack of endowments are primary factors that inhibit access to adequate food for up to a billion people. On the other hand, excessive food consumption, well beyond daily nutrient requirements, has been pushing the food system to continuously invade more land from natural habitats. As a major driver of land degradation, industrial agriculture has been growing asymmetrically and producing ever increasing volumes of output at the expense of vital ecosystems, while failing to feed those in need. The COVID-19 crisis has made it obvious that food-system linkages from the production stage to distribution, consumption and waste need to be restructured.

In view of population growth and economic development, it is vital to avoid additional pressure on land resources by shifting the policy focus to nutrition security, sustainable agriculture and livestock, and responsible consumption. The triple burden of food security – undernutrition, micronutrient deficiency and obesity – needs to be tackled, while promoting sustainable agriculture.<sup>123</sup> International trade in food is both a transmission belt from surplus to deficit regions and a mechanism to enhance resource efficiency. But it also aggravates existing asymmetries and land degradation.

Many local initiatives have been developed to overcome the disruptions caused by the COVID-19 crisis. Inter-city distribution networks emphasizing local markets that are designed to shorten supply chains also generate local jobs and promote responsible consumption. Integrated territorial food systems create conditions that are conducive to economic and social development and environmental sustainability in both urban and nearby rural areas.<sup>124</sup> As showcased by the FAO's city region food systems initiatives from different parts of the world, territorial food systems provide people with local access to nutritious food, and they contribute to food and nutrition security. They also enhance the livelihoods of small-scale farmers in rural areas near cities. If integrated with waste management and recycling, regional/local food hubs could also contribute to resource recovery. Since these hubs are often developed in the form of multi-stakeholder and participatory initiatives, they also foster fair and equitable distribution of the benefits that they generate.<sup>125</sup>

The concept of sustainable cities is now strongly associated with sustainable food network initiatives that lower food-related ecological footprints and promote urban agriculture and reduced food waste.<sup>126</sup> The crisis has heightened the importance of digital technologies and e-commerce that shorten and optimize supply chains while also avoiding existing power asymmetries that stem from the predominance of large supermarket chains and distributors.

### Initiatives

- Identify the risks of emerging infectious disease associated with national/regional food systems. Identify vulnerable segments of the food chain.
- Establish zones that limit the expansion of agricultural land. Promote sustainable land-use practices in agriculture.
- Promote sustainable and nutrition-sensitive intensification of production (one that promotes nutritionally rich foods and dietary diversity). Develop and implement a differentiated approach to nutrition security at the spatial level. Consider agro-ecological variations and different needs of local social groups.
- Identify vulnerable and marginalized societies and develop and implement targeted social safety net programs for them to improve their access to healthy and nutritious foods. Consider gender implications of food security interventions.<sup>127</sup>
- Increase the diversity of national/regional distribution systems. Shorten supply chains and promote territorial markets.<sup>128</sup> Provide support for local procurement of food, for reduction/reuse of food waste, and for the redistribution of safe food for human and animal consumption.<sup>129</sup>
- Provide financial, legal and infrastructure support for city-region food systems. This would require defining the boundaries of a city-region, collecting data on the economic, social and environmental risks, dependencies and vulnerabilities of the regional food system; and employing a participatory, multi-stakeholder process for the design and the governance of the food system.<sup>130</sup>
- Reduce agricultural subsidies that lead to adverse environmental impacts on ecosystems.
- Identify risk of supplies from international markets for essential food imports. Promote nutrition-sensitive trade policies that address nutritional deficiencies.<sup>131</sup>

## 5.5 Regulate responsible consumption

Responsible consumption is based on the principle of “improving the quality of life without increasing environmental degradation and without compromising the resource needs of future generations.”<sup>132</sup> It requires decoupling of consumption growth from environmental degradation by reducing actual and implicit intensity of material, energy, emissions and waste relating to a consumption action. Changes in consumption behavior are needed towards goods and services that are impact-neutral. Policy initiatives need to be developed, such as certification, labeling and taxation, based on a life-cycle approach that accounts for the entire ecological footprint of a consumption action.

The material footprint per capita has increased from 8.1 t of natural resources in 1990 to 12.2 t in 2017.<sup>133</sup> Consumers in high-income countries had a per capita material footprint of 27 t per person; in upper-middle-income countries the figure was 17 t, while in low-income countries it was just 2 t.<sup>134</sup> The lifestyles of consumers in middle- and high-income countries places a heavy pressure on natural resources. Hence the burden of responsibility to reduce the global material footprint lies with those consumers.

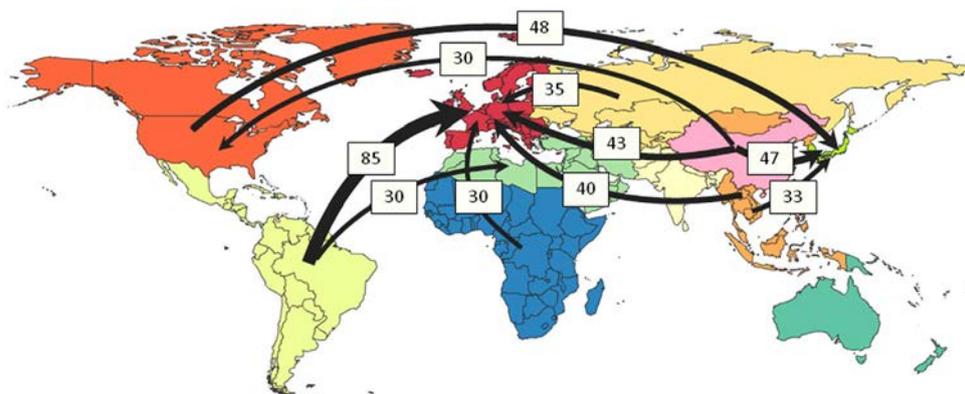
The land footprint of consumption is substantial, and the largest part of the footprint arises from food and agriculture. Income growth is the main driver of the expanded land footprint, the main cause of biodiversity loss. A substantial proportion of the land footprint of consumers in high-income countries is felt in low-income countries, because richer consumers rely on imported materials – in effect, outsourcing their land-use impact to poorer countries. More than 35% of an average EU citizen’s footprint comes from agricultural and food products, much of it in the form of imports (Figure 10).<sup>135</sup> Australia, Canada, China, Russia and the USA, among others, also have a high land footprint.<sup>136</sup>

The role of international trade on responsible production and consumption will be vital in the post-COVID-19 era. The largest portion of food trade takes place among middle- and high-income countries, yet low-income countries that need vital nutrients the most are at the margins of international trade. Europe cannot be self-sufficient without substantially reducing its food consumption. It has the largest net demand on foreign land—264 million hectares—mainly from low and medium-income countries in Latin America and Southeast Asia (Figure 10).<sup>137, 138</sup> The rules and practices of international trade need to be re-oriented to protect and restore land, water and forest ecosystems to achieve sustainability in global food supplies.

It is vital that consumers in middle- and high-income countries are aware of the land impacts of their consumption behavior. While companies need to measure and report their land/water/carbon footprints and have targets to reduce them, market-based incentives and disincentives should be in place to influence consumers’ choices. Certification schemes, taxation, ecological subsidies and cap-and-trade are among the policy options that could provide incentives for companies and individual consumers to reduce their resource footprint.

Nevertheless, approaching sustainable consumption by assuming that economically motivated individuals who are not informed and educated enough to make conscious choices about the social and environmental impacts of their preferences overlooks the importance of structural barriers and inhibitors that influence the actual behavior of consumers.<sup>139</sup> Public policy and governance in redesigning the economic system and incentives, associated infrastructure, and reconfiguring power relationships that impose certain consumption patterns are also important components of promoting and ensuring responsible consumption.

**FIGURE 10**  
Land use displacement through international trade (million hectares per year)



Arrows show the net area of land effectively transferred from one region to another through consumption  
Source: Weinzettel et al. (2013)<sup>140</sup>

## Initiatives

- Assess land material footprints of domestic consumption at the spatial and sub-sectoral levels.
- Identify heavy footprint consumption patterns for targeted policy interventions.
- Develop and implement market-based incentives and disincentives to influence consumers' choices, including certification schemes on land footprints, taxation of resource impacts, and ecological subsidies to reduce footprints.
- Develop and promote soft and hard targets for companies. Develop appropriate administrative, legal and operational procedures and coherent guidelines and enforcement mechanisms.
- Set regional/sectoral/national targets that would effectively decouple land footprints from population and income growth.
- Develop border-adjustment measures to address the outsourcing of footprints (i.e. international leakage) and the impacts of traded consumption goods on land ecosystems.
- Develop public awareness and educational campaigns that would encourage consumer behavior change.

## 5.6 Drive green job transition

Green jobs are central to the response to the current economic crisis while enhancing environmental protection and social inclusion. In the near future, structural changes in employment will accelerate due to the impacts of COVID-19 and the recovery packages, ongoing technological developments, and climate change. The ILO estimates that new jobs and job families will emerge, affecting at least half the global workforce – nearly 1.5 billion people.<sup>141</sup> Green job transformation will require “greening” of both private and public sectors. While these efforts may create decent job opportunities for the educated and skilled segments of the labor force (often white-collar), they may also have negative impacts on workers with lower education and skill levels. Jobs are critically important for the poor: COVID-19 has shown that people continue to work in sectors that have high exposure to health risks. Hence while enhancing resource efficiency and building low-carbon economies, green job transformation should also be equitable and gender-neutral in creating opportunities for the poor.

Public and private investment will be vital for the COVID-19 recovery by creating green jobs to restore degraded land, preserve and protect forests, biodiversity, and wildlife, and combat erosion. The nature of these jobs may differ from conventional formal employment. They may include state or

donor employment schemes and privately funded environmental restoration projects that could provide seasonal cash, food and alternative income streams for livelihood diversification.

Land-restoration activities could be an engine of green job creation. Under countries' commitment to the Bonn Challenge (a global initiative to restore degraded and deforested lands), restoration interventions in the form of watershed protection, natural forest regeneration and planted forests have already created large number of jobs. Land-restoration activities created 151,000 jobs per year in Brazil, approximately 15,000 part/full-time jobs in El Salvador, with a labor intensity of 0.17 jobs per hectare.<sup>142</sup> The total number of jobs created through a restoration project in Quintana Roo in Mexico was around 22,480 between 2011 and 2017, with a labor intensity of 0.1–0.37 jobs per hectare restored. In Rwanda, 22,300 short- and long-term jobs, divided almost equally between male and female laborers, were created in 2017–18.<sup>143</sup> In the United States, approximately 55,000 jobs have been generated annually through forest landscape restoration projects.<sup>144</sup>

One study estimated an employment multiplier effect of between 1.48 and 3.8 jobs supported in the upstream and downstream sectors by every restoration job in the USA.<sup>145</sup> Restoration activities provide largely localized benefits as projects tend to employ local labor.<sup>146</sup> Based on labor-intensity estimates (Table 1) and the area of land that needs restoration, tens of millions of short-/long-term, and direct/indirect green jobs could be created through large-scale land restoration. Compared with jobs created in traditional economic sectors, green jobs to protect and restore nature provide a much larger set of co-benefits in the form of social inclusion, gender equality, food security and access to education.<sup>147</sup>

## Initiatives

- Undertake a country/regional assessment of the employment implications of land-based green recovery.
- Identify sectors and sub-sectors that can act as engines of green-job creation in both rural and urban areas.
- Assess the employment intensity of alternative ecosystem interventions (Table 1).
- Develop a roadmap for a just transition from sectors and activities that are not sustainable (wildlife trade, industrial livestock, fossil fuel industry, etc.) to green jobs.
- Assess the potential impacts of jobs related to land protection and restoration on poverty, gender equality and education at the local/regional levels.

**TABLE 1**  
**Labor needs by forest landscape restoration technique, El Salvador**

FLR technique	Labour needs for implementation (FTE employment per ha)	Labour needs management (FTE employment per ha per year)
Diversified coffee plantation	0.148	0.700
Coffee agroforestry system	0.148	0.084
Conservation agriculture	0.272	0.138
Agroforestry system with staple grains	0.176	0.294
Cocoa agroforestry system	1.120	0.452
Silvopastoral system	0.608	0.128
Green harvest in sugar cane	0.056	0.056
Organic agriculture	0.064	0
Natural forest regeneration	0.204	0.064
Enhancement of natural forest	0.140	0.064
Reforestation of natural forest	0.188	0.064
Reforestation of riparian forest	0.400	0.068
River channel dredging and clean up	0.176	
Fire prevention	0.144	0.048
Enrichment planting of secondary forest and scrub	0.144	0.064
Secondary succession in scrubland	0.112	0.048
Enhancement of scrubland	0.144	0.064
Reforestation in bare soil, cities	0.192	0.084
Mangrove ecological restoration	5.200	1.212

Source: Dave *et al.* (2019)<sup>148</sup>

- Develop special and specific employment measures to address poverty and inequality through ecosystem restoration. Prioritize women, youth, and the most vulnerable social groups for employment opportunities.
- Provide appropriate funding and capacity to education, training and extension services.

## 5.7 Roadmap zero-carbon transition

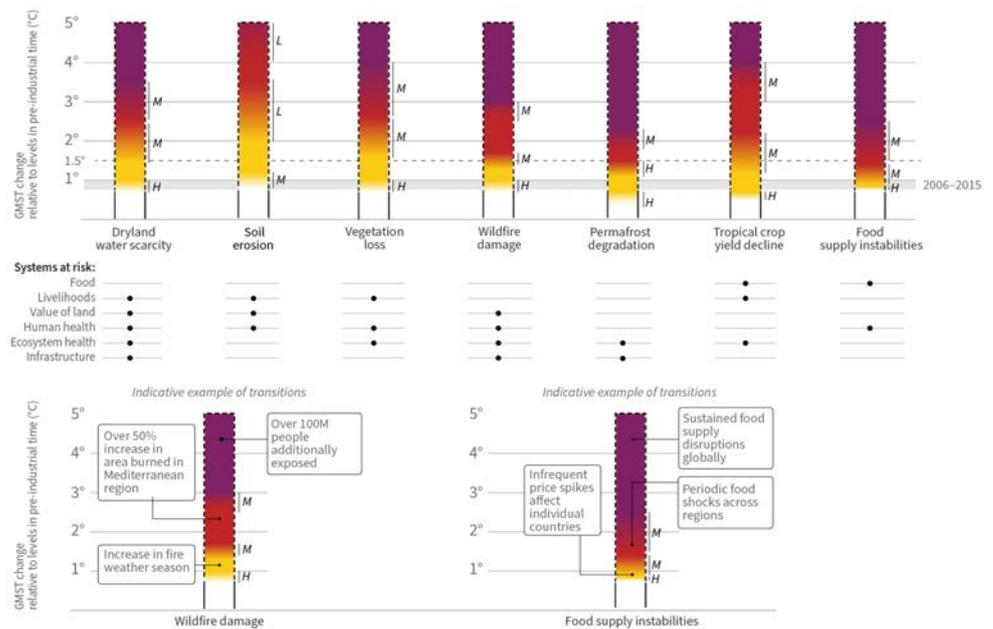
Climate change has substantial impacts on land ecosystems. The Intergovernmental Panel on Climate Change has pointed out that climate change accelerates the existing land-degradation trends. It exacerbates desertification and soil erosion as it leads to vegetation loss, wildfires and lower crop yields (Figure 11).<sup>149</sup> Climate change acts as a major stressor with impacts on multiple

systems and sectors, creating cascading risks in many natural and human systems.

On the other hand, land ecosystems can play a major role in climate-change adaptation and mitigation, with significant co-benefits in combating desertification and land degradation.<sup>150</sup> The reverse is also true: many actions designed to combat land degradation may contribute to climate-change adaptation, mitigation and the protection of biodiversity by enhancing soil fertility and increasing its carbon content and biomass.<sup>151, 152</sup>

Land systems function both as a source and a sink of greenhouse gas emissions. According to the IPCC, emissions from agriculture, forestry and other land use amount to 21–37% of global anthropogenic emissions (2007–16).<sup>154</sup> But land also absorbs carbon in response to human-induced environmental change, leading to a net sink

**FIGURE 11**  
Risks from the impacts of climate change on land-based processes



Source: IPCC (2019)<sup>153</sup>

equivalent of 29% of total CO<sub>2</sub> emissions in 2007–16. The total mitigation potential from land-based activities—which includes a range of sustainable-farming and livestock practices, soil-management measures and agroforestry—is estimated to be in the range of 2.3–9.6 Gt CO<sub>2</sub> eq/year by 2050.<sup>155</sup> This enormous carbon sequestration potential is critical to achieve the goal of achieving a net zero-carbon economy by 2050 in line with the Paris Agreement. Each country's optimal land-based carbon sequestration pathway needs to be estimated and factored in its post-COVID-19 climate commitments to become zero-carbon by 2050.

## Initiatives

- Assess regional/country potential for carbon storage in different ecosystems.
- Identify which types of restoration are most feasible for carbon storage in different parts of the country. Given the heterogeneity land degradation at the local level, regionally differentiated measures are required.
- Set regional/sectoral/national targets for land-based carbon storage.
- Channel government investments and develop new financial tools and market-based incentive mechanisms, along with non-market network solutions building on voluntary multi-stakeholder collaboration.
- Provide adequate funding to local government units to execute their mandates. Allow local governments to have access to external financing and to have flexibility in developing and engaging in innovative financing. Develop financial-review mechanisms to strengthen transparency and accountability.

- Enable linkages between local/regional governance and international climate finance.
- Make a country/regional assessment of social groups who could contribute to carbon-storage efforts.
- Leverage private investment for land-based carbon storage.

## 5.8 Summary

The policy framework and measures described in this section bring together land restoration and public health policy. Considering the huge economic costs of the COVID-19 pandemic, investing in the protection of land ecosystems offers large financial returns in avoided costs while fostering local development. Phasing out wildlife trade, and building regional, national and global capacity to monitor and sanction illicit activities are key to reducing the risk of zoonotic diseases. Land-based employment as an engine of green-job creation, and land-based mitigation options for the decarbonization of global economy, offer great opportunities for sustainable recovery. Emerging food systems built on short, territorial supply chains, nutrient-sensitive production and trade policies, and restructuring of industrial livestock to limit its enormous pressure on land ecosystems, combined with responsible consumption with reduced land footprints are also key components of the policy framework to build future resilience. Operationalizing such an extensive policy agenda based on ecosystem restoration will require a transformational change of existing political alliances, institutional settings and economic systems.

# 6. NATURE-POSITIVE TRANSFORMATION

Large-scale change in land use started first with the transformation of ancient societies in the Fertile Crescent from hunting and gathering to farming approximately 11,000 years ago. The domestication of animals followed, resulting in a new form of closer interaction between humans and animals and marking the beginning of the era of emerging zoonotic diseases.<sup>156, 157</sup> Since then, humans have altered more than three-quarters of the land-based environment mainly through agricultural activities and have degraded about one-quarter of the world's land area.<sup>158</sup> Land-use change and land degradation are the largest drivers of the destruction of natural habitats and related global biodiversity losses. If current trends continue, the Earth's land surface untouched by direct human impact will further drop to less than 10%, while the consequent biodiversity loss is estimated to reach 38–46% by 2050, substantially increasing the risk of future pandemics.<sup>159</sup>

Costing trillions of dollars in economic value, placing a huge toll on nations across the globe, the COVID-19 pandemic should mark the end of the pathway of unsustainable development. We are now at the crossroads of another major transformation. Over-commodification of natural resources on the one hand, and undervaluation of ecosystem services and widespread disregard of the interconnectedness of every living and non-living thing on the other, underline the foundations of our broken relationship with nature. Recovering from the crisis and long-term resilience require designing new political and policy paradigms and implementing new institutional approaches and business models.

The nature-positive transformation that envisioned in this paper builds upon three pillars.

- The first pillar is a political foundation, namely “a new political alliance for nature” for social, economic, and institutional change. It proposes a global political commitment to undertake concrete actions by proactively addressing the interconnected and immediate threats to people and the planet.

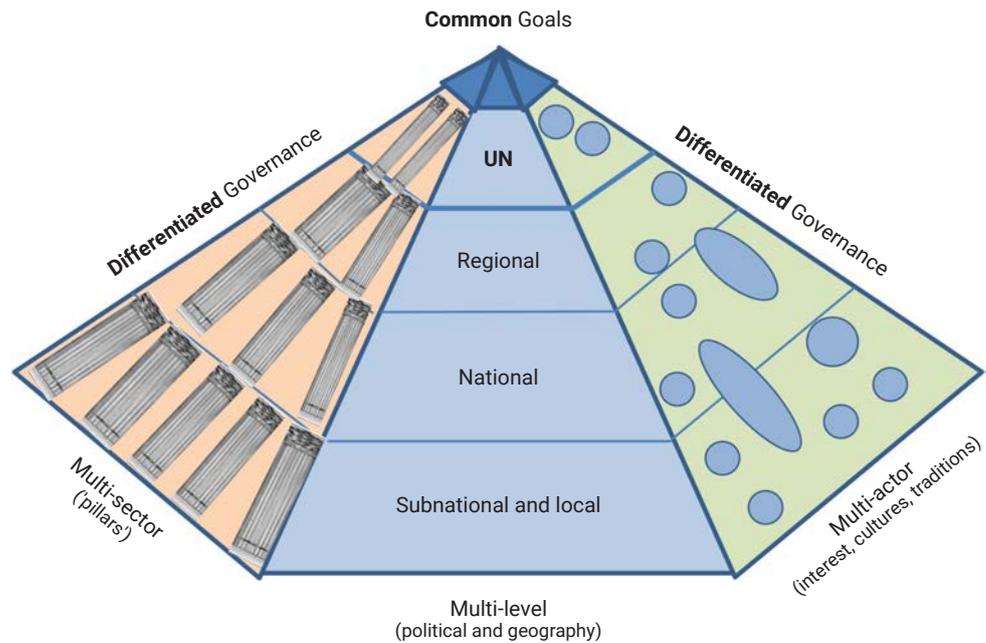
- The second pillar is about decoupling corporate growth from land degradation, embracing environmental, social and governance investing by the private sector.
- The third pillar promotes large-scale land restoration in line with the UNCCD's land-degradation neutrality targets and other international goals.

## 6.1 Pillar 1: Political and institutional transformation: A new political alliance for nature

The nature-positive transformation envisions a pathway to enhancing species and community resilience and preventing future pandemics. It requires a new political alliance around new values and principles of wealth, mutual interests, and collaboration, which would recognize that humans are an intrinsic part of nature and our long-term wellbeing and survival depends on its sustainability.<sup>160</sup> A multi-stakeholder alliance including international organizations, national states, civil society, the scientific community, and the private sector, each playing a role in contributing to the provisioning of public goods and incentives, is required to make post-COVID-19 transformations politically feasible. The initiation and direction of transformations could be both top-down, involving broad international alliances between states, and bottom up, driven by civil-society organizations through mass mobilization.<sup>161</sup>

A transformation of values that drive human interaction with nature would lead to change in the interests, power relations, social orders and eventually institutions that define organizational rules and regulations (formal and informal). In the terms of the Weberian institutional development, new institutions represent the structuring principles of the new value system.<sup>162</sup> They change the rules of the game to regulate, limit, and enforce new boundaries for all actors in society. Integrated governance structures with multi-sector/actor

**FIGURE 12**  
Multi-level  
institutional  
approach



Source: Meuleman and Niestroy (2015)<sup>164</sup>

formation need to be built at all levels of governance (Figure 12).<sup>163</sup> In light of the lessons from the COVID-19 pandemic, multi-level institutional development, driven by the change of societal values, interests and relations, would define new rules, regulations and the accompanying allocation of resources for large-scale ecosystem restoration. This should be one of the pillars of the post-COVID-19 transformation to build back better.

## 6.2 Pillar 2: Capital transformation: Resource decoupling and sustainable investment

One major lesson learned from the COVID-19 crisis is that the economic costs of environmental destruction are enormous for corporations and the private sector in general. While driven by the objective of maximizing shareholder profit, corporations are increasingly aware that the collective impact of such a myopic drive is self-destructive in the long run. The current model of economic development, which depletes natural resources and causes major environmental damage, has reached its limits and now curtails the prospect of further economic growth. Hence the post-COVID-19 transformation will involve changes in the structure and direction of private-sector development.

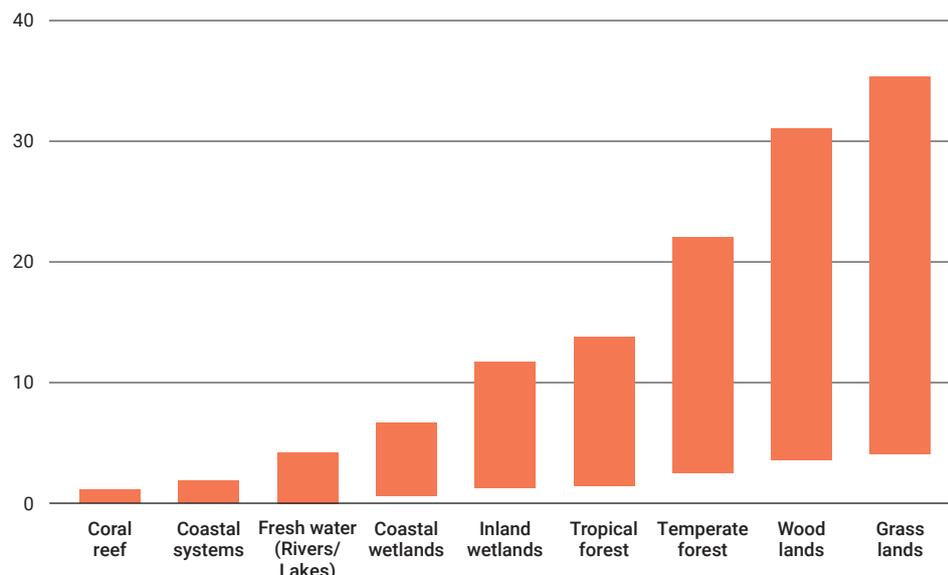
Ecosystem restoration and the decoupling of economic development from land degradation will be key aspects of this transformational change. It will require major shifts in investment priorities, corporate governance, and actions. In many

ecosystems, restoration activities are commercially feasible. According to a report by the Economics of Land Degradation, a range of projects in the field of land-ecosystem restoration have yielded economic rates of return between 12 and 40%.<sup>165</sup> They include projects on soil and water conservation, sustainable irrigation, pastoralism, forest management, and soil carbon storage.

Showcasing a range of successful cases, the Economics of Land Degradation initiative makes a strong business case for land restoration. Investing in ecosystem-regeneration practices to address the depletion of soil nutrients in 42 African countries, which results in an annual loss of 280 million tons of cereals, could generate USD 62.4 billion per year, and become an engine of rural economic growth.<sup>166</sup> A forest-restoration project in Mali is estimated to have generated more than USD 5 in benefits for every dollar spent. A study on dryland pastoralism in the IGAD region estimated that the economic benefits of land-ecosystem goods and services amounted to USD 1,500–4,500 per hectare.<sup>167</sup>

In Jordan, it is estimated that scaled-up adoption of traditional pasture management would generate global benefits, including land-based carbon sequestration, valued at EUR 172–347 million. An IUCN study on Sudan estimated that integrated sustainable land use and reforestation could sequester an additional 10 t of CO<sub>2</sub>-equivalent per hectare per year, valued at EUR 766 per hectare in total benefits and avoided costs.<sup>168</sup> A systematic review of more than 200 studies found that the cost–benefit ratio of ecosystem restoration could be as much as 1:35 if all market- and non-market-based benefits are taken into account (Figure 13).<sup>169, 170</sup>

**FIGURE 13**  
Benefit-cost  
ratio of  
ecosystem  
restoration



Source: De Groot *et al.* (2013)<sup>171</sup>

The strategy of the UN Decade on Ecosystem Restoration (2021–30) assesses that roughly USD 1 trillion is needed over the next 10 years to provide the scale needed to achieve the global restoration goals.<sup>172</sup> Similarly FAO and the Global Compact of the UNCCD estimates that USD 36–49 billion are required per year to achieve forest and landscape restoration targets.<sup>173</sup> The public sector may not be able to provide funding in such volumes, so private-sector investment is essential for major upscaling in investments in restoration. Long-term private financing for ecosystem restoration will be key to achieving the global and national targets.

The rapidly growing field of environment, social and governance investment seeks a mix of environmental, social and financial returns. It offers huge potential for financing large-scale land-restoration projects that are commercially feasible. According to the Global Impact Investing Network, the volume of global impact investment increased from USD 502 billion in 2019 to USD 715 billion in 2020.<sup>174</sup> To what extent the increased volumes yield positive and tangible environmental and social impacts is not clear, yet the growing volume of responsible investment by the private sector is encouraging.<sup>175, 176</sup>

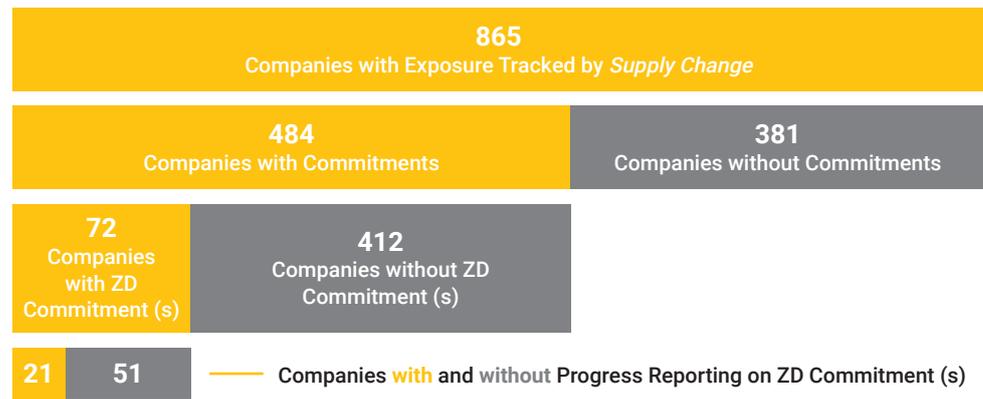
Similarly, in the post-COVID era, environment, social and governance issues which have recently gained momentum are likely to be increasingly important in performance assessment and the valuation of investment portfolios.<sup>177, 178</sup> Recent reports suggest that indices that track corporations' environment, social and governance ratings have outperformed conventional indices in developed and emerging markets.<sup>179</sup> The post-COVID-19 market environment will further strengthen the case for responsible and sustainable investment.

The post-COVID-19 transformation will require strong and measurable commitments from the private sector on decoupling. Out of 865 companies that have exposure to deforestation through their supply chains, nearly 500 have made commitments to reduce or halt their impact on deforestation.<sup>180</sup> But as of 2019, only 72 (8% of the 865) have committed to achieve zero deforestation (34 of these operate in the food and beverage sector). Just 21 companies have actually published reports quantifying progress towards their commitments (Figure 14).<sup>181</sup> There seems to be a huge gap between commitments and actual progress. De-coupling economic development from deforestation will require the elimination of 5–12 million hectares of conversion each year from supply chains, particularly from food and agriculture.

In the post-COVID-19 era, corporations need to scale-up their efforts rapidly. A mix of volunteer and gradually binding regulations and governance structures should be developed and implemented at the national and international levels to regulate, monitor, and verify corporations' commitments and progress in relation to the protection and restoration of land ecosystems.

The discussion of resource decoupling and land restoration often takes place in relation to large multinationals, yet another lesson from COVID-19 is the importance of small and medium enterprises as the backbones of job creation, resilience, and stability. Hence the transformation of the private sector needs to be oriented towards smaller enterprises too. In the post-COVID-19 transformation to build back better, such enterprises could be the focus of de-linking economic development from the extraction of natural resources, and especially land degradation.

**FIGURE 14**  
Corporations' commitments and progress on deforestation



Source: Rothrock, Weatherer, and Zwick (2019)<sup>182</sup>

While small and medium enterprises often have limited financial resources and managerial skills, they are flexible, versatile, and innovative. An enabling environment that provides them with the right guidelines, incentives and resources through local, national and international development programs could allow them to play a critical role in decoupling, ecosystem restoration, and rebuilding resilience.<sup>183</sup>

Decoupling of economic development from natural resources and scaling-up land restoration could enhance equity within and between nations. The economic development path of the last century has produced long periods of continuous economic growth, yet it has led to enormous concentrations of wealth and power. In 2019, the richest 10% of the world's population owned 82% of global wealth (the top 1% alone owned 45%), while the bottom half of the world population collectively owned less than 1% of the total.<sup>184</sup> These figures largely reflect consumption-based inequalities as well. Affluent societies should assume the main responsibility and the associated financial burden to achieve resource decoupling. This would benefit all people and the environment while also reducing global inequality.<sup>185</sup>

Resource decoupling would also help enclave economies to avoid the "resource curse", which is associated with factors such as over-appreciation of local currencies, underinvestment in alternative sectors, rent-seeking and corruption. These largely explain why export-oriented resource-extraction economies are stuck with low incomes.<sup>186</sup> Progressive and differentiated decoupling, aiming largely at high-consumption societies, accompanied by large investment in ecosystem restoration, which supports sustainable jobs and livelihoods, with specific measures to address poverty, would reduce global inequality significantly.<sup>187</sup>

In summary, the rapid decoupling of private-sector growth from land degradation and large environment, social and governance investments would realize substantial business opportunities in ecosystem restoration. These will be key aspects

of the post-COVID 19 capital transformation. Small and medium enterprises could play a versatile and effective role in this process by co-delivering significant economic, social and environmental benefits at the local level. Capital transformation through decoupling with fair burden-sharing and a rapid growth of ecosystem restoration would also reduce global and local inequalities. The growing number of commitments by corporations on several targets and their increasing willingness to invest responsibly are encouraging. Yet, at international and national levels, measurable, transparent and binding regulations, and monitoring and enforcement mechanisms need to be institutionalized to ensure that the private sector's commitments are structured across industries and are duly met in line with the timeframe of the sustainable development goals and other international goals.

### 6.3 Pillar 3: Land re-transformation: Restore land ecosystems

The area of land ecosystems that need protection and restoration is immense: over two billion hectares.<sup>188</sup> The Bonn Challenge targeted restoring 150 million hectares by 2020. The New York Declaration on Forests extended the target to 350 million hectares by 2030.<sup>189</sup> Other regional and national targets have been launched, such as the Initiative 20x20 and the African Forest Landscape Restoration Initiative (AFR 100), which aims to restore 100 million hectares in Africa.<sup>190</sup> As of February 2021, a total of 124 countries have committed to setting voluntary targets, by engaging in UNCCD's targets to achieve land-degradation neutrality by 2030.<sup>191</sup> Widespread and rapid progress to achieve these targets will contribute to a range of objectives that are key components of the post-COVID-19 nature-positive transformation (Table 2).

Limiting global warming to below to 1.5°C (or well below 2°C) in line with the Paris Agreement, and

**TABLE 2**  
**Role of land-degradation neutrality targets in post-COVID-19 transformation**

LDN targets	Post-COVID-19 transformation						
	Reduce risk of zoonotic viruses	Increase resilience against pandemics	Mitigate climate change	Adapt to climate change	Enhance biodiversity	Generate green jobs	Provide nutrition security
Restore/increase Forests	■	■	■	■	■	■	■
Restore/improve Cropland	■	■	■	■	■	■	■
Restore/improve grasslands/savannas	■	■	■	■	■	■	■
Improve management of wetlands	■	■	■	■	■	■	■
Increase soil fertility and soil organic carbon stock	■	■	■	■	■	■	■
Improve management of protected areas	■	■	■	■	■	■	■
Improve management of coastal areas	■	■	■	■	■	■	■

Level of support: ■ Strong ■ Significant ■ Less significant

Source: Author's assessment based on Global Mechanism of the UNCCD and CBD (2019)<sup>196</sup>

achieving net-zero emissions, requires large-scale CO<sub>2</sub> removal from the atmosphere through sustainable land management, afforestation and avoided deforestation. Halting deforestation and forest degradation could reduce emissions by 0.4–5.8 Gt CO<sub>2</sub>/year.<sup>192</sup> Achieving land-degradation neutrality by restoring and rehabilitating 12 million hectares of degraded land a year could reduce the emissions gap (to remain below 1.5°C) by up to 25% in 2030.<sup>193</sup> Short-term measures to conserve high-carbon ecosystems, such as rangelands, and longer term restoration measures of land-based mitigation, such as afforestation, offer low-cost and highly scalable decarbonization opportunities. Land restoration in line with the land-degradation neutrality targets will be an important pillar of post-COVID-19 climate-proof transformation.

Measures to achieve land-degradation neutrality include the protection and restoration of land ecosystems through pasture and rangeland management, reforestation with native plants, sustainable agriculture, protection of peatlands,

creation of protected areas, water harvesting and micro-irrigation, fire management and avoiding soil erosion through building and reinforcement of structures. These measures also provide climate-change adaptation benefits. Reducing and reversing land degradation improve soil fertility, which increase agricultural productivity, thereby protecting livelihoods and reducing vulnerabilities to climate-induced food insecurity. They are also key to foster sustainable development and the provision of ecosystem services that enhance social and economic resilience against the impacts of climate change.<sup>194</sup> Achieving the land-degradation neutrality targets will contribute to the resilience of livelihoods, poverty alleviation and equitable distribution of resources.<sup>195</sup>

Restoring degraded land and forests in line with the land-degradation neutrality targets could create millions of jobs. It would have strong multiplier effects, which are critical for sustainable recovery, especially for low-income societies that have been disproportionately affected by the COVID-19 crisis.

While enhancing resource efficiency and building low-carbon economies, green job transformation needs to be equitable and gender-neutral in creating opportunities for the poor. Green jobs that could be created through large-scale land restoration would also provide many more co-benefits in the form of social inclusion, gender equality, food security and access to education. Both public and private investments towards achieving land-degradation neutrality by restoring degraded land, preserving and protecting forests, biodiversity, and wildlife, promoting sustainable agriculture and livestock, will create millions of jobs which will be a vital component of the post-COVID-19 transformation.

Restoration will strengthen the resilience of landscapes and will re-build ecosystem services and multifunctional assets that generate substantial local and national socio-economic benefits.<sup>197</sup> It will also sustain the biodiversity that is critical to reduce the risk of future pandemics. Global efforts to avoid the next big pandemic need to focus on combating land degradation – the most important root cause of transmission. Large-scale restoration of land ecosystems driven by strong political will and commitment, and managed by versatile and dynamic institutional approaches will be fundamental to crisis recovery and building resilience against future pandemics.

*The transformation of the 21st century to build back better will depend on our success in widespread land restoration.*



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