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Post 2020 Global Biodiversity Conservation

POST 2020 BIOSECURITY: GLOBAL EMERGENCY TO ECOLOGICAL CIVILIZATION[1]

July 2020

EXECUTIVE SUMMARY

This Working Paper provides an overview of matters critical to success in moving from the struggle with COVID-19, one of the world's most serious emergencies, towards a sustainable future with action covering several global emergencies. The document is tailored to specifically consider some needs and approaches related to China. However, much of the content is based on international experience. Emphasis is on maintaining the web of life (biodiversity and ecosystems) that supports human existence, economy and health.

COVID-19 has dramatically reminded us of how even the tiniest life forms can wreak untold damage to our societies. That is why the Working Paper title includes the term 'Biosecurity'. Here the term is used in a broad context—how we can work with nature to survive and live well as a species. That is the fundamental premise of China's grand goal for transitioning to an 'Ecological Civilization' by 2035-2050. These and other terms such as 'resilience' are considered in detail, since they are being used liberally and often inconsistently in responding to societal emergencies.

The COVID-19 Pandemic is likely to influence social, economic and environmental outcomes for years or even decades to come. Arrival of the disease coincided with the much-anticipated global 'Super-Year of the Environment' with a focus on Nature, Climate Change, ocean sustainable use, and improving progress on achieving the UN 2030 Sustainable Development Goals (SDGs). China was to host the Global Convention on Biological Diversity COP 15 meeting in Kunming, where a new plan to stop global biodiversity losses during this decade would be negotiated. Most global negotiations, including this one, have been delayed until 2021. Now, a half-year into the pandemic, there is a growing need to fully understand the consequences beyond the immediate, very substantial human health, financial and economic impacts. It is also an opportunity to use the extra planning time to define what a 'better future' would entail. Terms such as 'building better', a 'just and resilient recovery', and a 'green recovery'

[1] This Working Paper was produced by CCICED Member and Co-team leader of the Special Policy Study on Post-2020 Biodiversity Conservation Arthur J. Hanson, with some inputs from Li Lin, Alice C. Hughes and comments of others. Originally prepared in March-April 2020, it has been updated in July 2020. Views expressed are those of the author.

are now being considered by many significant organizations and various governments throughout the world.

A full recovery must take into account the 'other global emergencies', including poverty elimination, environmental degradation and unsustainable development, and living within ecological planetary boundaries. These must be "dovetailed" so there is a transition from the COVID-19 emergency with its short-term stimulus packages to multi-objective plans with synergies and a transition to longer-term integrated programs. The transition must recognize short-term (2 to 5 years), medium-term (5 to 10 or 15 years) and longer-term efforts that will require 10 to 30 years. An example of short-term effort is the 14th Five Year Plan of China. The longer time frames are consistent with goals such as the 2030 SDGs, China's 2035 and 2050 Ecological Civilization goals, and emerging global, regional and some national goals for 2050 decarbonization of the economy. Principles, components of plans, and financial approaches of various recently proposed initiatives are considered in the Working Paper. Certainly, what is now the 'Super-Year of the Environment' should be followed by a 'Super-Decade of the Environment 2021-2030'.

Globally there is insufficient appreciation and use of existing biological knowledge and earlier experiences involving wild animal transfer of disease to humans. The very valuable but underused 'One Health' initiative linking animal health, human health, and ecosystem health is an important global example. Highlighted are the 'Berlin Principles' that could have broad application. Other ways in which ecosystem health, natural capital and especially ecosystem resilience can be improved are discussed. These are particularly important for China, which has made important advances in recent years, but still has significant need for improvement, such as behavioral change of people and regulatory agencies towards wildlife consumption, management of local markets and improvements towards the greening of traditional Chinese medicines.

Some observers talk of 'pressing the reset button'. Surely not for returning to globalization as it was, or for the continued erosion of biological wealth and rising levels of climate change, or for a return to unsustainable production and consumption systems. We need to consider how to live within Planetary Boundaries, and in a comprehensive fashion reduce environmental risk, including the risks to both human health and ecosystem health. This is essential if we are to reach a new level of global biosecurity to involve all forms of life, and to meet the goals of sustainable development. Only then will we achieve the vision of 'Harmony between People and Nature' and as noted for the theme of CBD COP 15, *Ecological Civilization: Building a Shared Future for All Life on Earth.* Five recommendations for China are suggested:

Recommendation 1. During the 14th Year Plan Period significantly reduce the level of environmental and ecological risks that can lead to human, plant or animal disease outbreaks, epidemics or pandemics.

Recommendation 2. Establish and lock-in new baseline or reference levels of pollution taking into account air, water and perhaps other forms of pollution reduction experienced during the current coronavirus pandemic.

Recommendation 3. Ensure economic stimulus and recovery packages support green development and protection of nature. Also, do not relax environmental and ecological standards either nationally or in areas hard hit by the disease outbreak. If necessary, provide subsidies or other incentives on a temporary basis. Green stimulus packages

specifically aimed at climate change and many types of biodiversity conservation should be medium or longer-term (5 to 15+ years).

Recommendation 4. Strengthen China's commitment to building ecological resilience as a medium and long-term transformative approach towards national biosecurity.

Recommendation 5. Assist China's Belt and Road Initiative partner countries to green their COVID-19 recovery packages especially through investments that enhance natural capital and ecological infrastructure.

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INTRODUCTION

The 2020 crisis created by the Coronavirus (SARS-CoV-2) spreading COVID-19 disease reminds us once again that even the smallest forms of biodiversity can bring about devastating impacts for people, our globalized economies and society. In global governance, 2020 was expected to be a 'Super-Year for the Environment'. Included was the Global Convention on Biodiversity (CBD) COP 15 meeting in Kunming designed to set new decadal goals for halting the alarming loss of species and ecosystem damage. Other important progress had been anticipated for Climate Change, the Ocean, and for accelerating efforts to meet the UN 2030 Sustainable Development Goals (UN2030SDGs).

By the end of Q1 2020, all nations are facing massive expenditure to control the disease and global economic turndown of historical significance. The world we know will change—perhaps beyond our imagination. But action on the global environmental emergency must not be sidelined as a consequence. Indeed, action must be strengthened even as damage from COVID-19 continues to spread.

McKinsey & Company[2] note that "the coronavirus is not only an immense health crisis—it's also an imminent restructuring of the global economic order…Our answer is a call to act across five stages…to find an economically and socially viable path to the next normal." They describe these stages as: "Resolve, Resilience, Return, Reimagination, and Reform". Such 're' language can be interpreted in various ways, including 'returning to an original or former state' (rebuild), 'do again in a better way' (refine), and 'make new' (regenerate). Their perspective is dominated by considering primarily socio-economic factors. In this regard, perhaps the most important observation is the need for reform, not going back to what was there before the pandemic struck.

In our opinion, the response must address national and global ecological and environmental factors that have brought the world to a state of planetary health

[2] McKinsey & Company. March 2020. *Beyond Coronavirus: The Path to the Next Normal.* https://www.mckinsey.com/~/media/McKinsey/Industries/Healthcare%20Systems%20and%20Services/Our%20Insights/Beyond%20coronavirus%20The%20path%20to%20the%20next%20normal/Beyond-coronavirus-The-path-to-the-next-normal.ash

emergency. Indeed, the current pandemic is part of the broader signal from Nature that it is time to Rethink and Realign our behavior, investments and patterns of development and collaboration.

The sustainable path ahead to full national and global Recovery must be transformative. Some call it a 'Nature-Positive Recovery.' It will have to take into account not only the experience with this particular disease, but also the broader framework set out by China and many others for a new, more Harmonious Relationship between People and Nature. This relationship is captured by the ideas and action proposed in China's efforts for an Ecological Civilization[3] by 2035, by the global community's goals under the UN2030SDGs, and through the vision of the global environmental conventions, particularly those related to biodiversity and to climate change.

The danger is that large-scale financial decisions and other actions taken over the coming months and years could reinforce return to a previous, still largely unsustainable situation globally and in many countries. If so, we are likely to see additional pandemic disease outbreaks, further ecological disruption, negative effects of perverse financial subsidies, and other barriers to green development progress. Also, once acute pandemic health issues are satisfactorily dealt with, past experience suggests that often there has not been enough effort given to addressing root causes and longer-term preventative action. The term 'Biosecurity' is used in the title of this paper because it links ecological risks and benefits, plant and animal disease, and public health needs and impacts. This term[4] has various meanings (see Annex 1) some related narrowly to matters such as pathogen laboratory safety, bioterrorism[5], or to specific instances of infectious diseases in livestock or plant crops. But it should now be applied in a broad framework related to harmony of people and nature, for the security of both.

The purpose of this paper is to examine what can be done in China and globally in the near-term future (e.g., China's 14th Five Year Plan), medium-term (e.g., 2020 to 2030/2035) and for setting longer-term goals (to 2050) to ensure new ecologically

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[3] See Arthur Hanson. December 2019. *Ecological Civilization in the People's Republic of China: Values, Action, and Future Needs.* Asian Development Bank, No. 21 Working Paper Series. https://www.adb.org/sites/default/files/publication/545291/eawp-021-ecological-civilization-prc.pdf

[4] FAO concisely defines Biosecurity as: 'a strategic and integrated approach that encompasses the policy and regulatory frameworks for analyzing and managing relevant risks to human, animal and plant life and health, and associated risks to the environment'. See also, Schoch-Spana, Monica, et al. 2017. *Global Catastrophic Biological Risks: Toward a Working Definition.* Health Security 15(4): 323-328. https://www.liebertpub.com/doi/full/10.1089/hs.2017.0038

[5] In a statement to the UN Security Council on 9 April 2020, UN Secretary General Guterres noted eight risks associated with the new pandemic. One is "the weaknesses and lack of preparedness exposed by this pandemic provide a window onto how a bioterrorist attack might unfold—and may increase its risks. Non-state groups could gain access to virulent strains that could pose similar devastation to societies around the globe. https://www.un.org/sg/en/content/sg/statement/2020-04-09/secretary-generals-remarks-the-security-council-the-covid-19-pandemic-delivered

and environmentally sustainable paths can be maintained in the aftermath of the present COVID-19 global crisis. The assumption linking back to the Super Year of the Environment is that all elements of the global environmental emergency must be addressed with more success in the coming years, compared to the first two decades of this century. China has led progress on the global War on Poverty, and is turning the curve in its domestic War on Pollution. It is well positioned to help win this new global War involving COVID-19 and other Planetary Health risks.

The theme of the CBD COP 15 meeting[6] is *Ecological Civilization: Building a Shared Future for All Life on Earth.* The CBD and the Government of China indicate that this theme "gives voice to the aspirations of people around the world to build a global society in which economic, social, cultural and environmental concerns are addressed in a truly holistic way, by recognizing that nature is the fundamental infrastructure supporting life on earth, and that the UN CBD Vision of Living in Harmony with Nature by 2050 can be achieved through a renewed relationship between humans and nature." We believe this theme is needed to guide us towards safety and health of both planet and people in these demanding times.

Our intent in the current working paper is to provide insights and recommendations to China and the international community in support of a fulsome recovery including perspectives of ecology and environment, and on integrated policies and approaches for post-2020 action. We are mindful that crisis can be an opportunity for innovation, especially in the face of multiple threats. How can we take innovative approaches in dealing with COVID-19 impacts? This is an important question to answer, and to do so in an adaptive fashion as we learn more. Finally, we must take full advantage of existing knowledge and approaches that have not been given as much attention as they should. Thus, we identify several important areas where synergies will give good returns and value.

Most of this working paper was prepared and submitted to CCICED in the period of March-April 2020—written in real time as the initial COVID-19 crisis within China was winding down, and while the pandemic situation worsened in other parts of the world. Since then, even as some countries gained control over outbreaks, the pandemic spread has worsened. Our intent is to look into a future that still contains many unknowns. We are seeing (1) the emergence of financial crisis piled on top of health crisis as governments struggle to control national and subnational outbreaks; (2) many attempts to sort out cause and effects; (3) and a variety of assertions that lack sufficient scientifically derived analysis. Very thoughtful integrated approaches are emerging as noted throughout this document and in its annexes.

The focus in the Working Paper is particularly on environment and sustainability in a broad sense. Understandably, many other analyses of impacts focus almost entirely

[6] The CBD COP 15 meeting is now postponed from October 2020 until Q2 2021. Various preparatory meetings also have been postponed. The theme was announced at a press conference in September 2019 in Beijing. https://www.cbd.int/doc/press/2019/pr-2019-09-05-cop15-en.pdf

on the economic and human health dimensions. However, increasingly the focus is on sustainable development and on 'building better' rather than reversion to past unsustainable patterns.[7]

We start with an examination of why it is so important to link ecological and environmental knowledge in the management of public health for the prevention and response to disease outbreaks and pandemics. Next is an introduction to frameworks of current 'rescue packages' put in place to deal with short-term health and economic needs and the early stimulus packages for returning to 'normal'. In some instances, these have included 'temporary' waiving of environmental regulations. At the present time major fiscal recovery packages are being designed. These are particularly important in terms of much attention they give to environmental impacts and green development. They provide great opportunities to blend with significant needs to address environmental and ecological protection. The pandemic response demonstrates that much larger flows of money and expertise can be mustered quickly when considered absolutely necessary. This is an important lesson for those in the environment and development community. The latter part of the Working Paper reviews efforts designed for green recovery and other ways for moving from emergencies to sustainable development and China's approach of Ecological Civilization. Several recommendations are provided specifically for China's consideration domestically and internationally.

ECOLOGICAL AND BIODIVERSITY LINKAGES WITH HUMAN HEALTH

Biosecurity

Biosecurity risks are complex and generally not comprehensively covered under any one international agreement, or by any single agency within a country. However, there is growing awareness internationally of the need for collaborative, evidence-based policies and actions at country, regional and global levels. Highly disruptive major human health pandemic and food safety challenges now occur every half-decade or even more frequently. There needs to be new or strengthened platforms to monitor ecological and health risks. Potential threats numbering in the hundreds from disease transfers between animals and people, and in the thousands when plant, bacterial and viral threats are included. It is clearly a time for building better

[7] See, for example, BBC. March 2020. *Will COVID-19 Have a Lasting Impact on the Environment?* https://www.bbc.com/future/article/20200326-covid-19-the-impact-of-coronavirus-on-the-environment Also, Bloomberg Green. 18 March 2020. *The Post-Virus Economic Recovery Could Be a Green One: Investing in Solar Farms, Electric Vehicle Infrastructure, and High Speed Internet Would Create a New Way Forward.* https://www.bloomberg.com/news/articles/2020-03-18/green-projects-could-pull-economies-out-of-the-coronavirus-slump ; and https://www.economist.com/science-and-technology/2020/03/26/the-epidemic-provides-a-chance-to-do-good-by-the-climate?utm_campaign=the-climate-issue&utm_medium=newsletter&utm_source=salesforce-marketing-cloud&utm_term=2020-04-06&utm_content=ed-picks-article-link-1

understanding. Integrated strategies are needed to avoid or reduce catastrophic damage from pathogens transferring between species, or via invasive species. Introducing green food production standards and consumption choices, improving trade, traceability and investment practices, and defining many more nature-based solutions to economic and social based problems are examples of steps that must be taken.

Especially since the early 2000s there has been expanded scientific and medical attention given to addressing or avoiding globally catastrophic biological risks. These include the 2003 SARS problem, ongoing avian flu outbreaks affecting wild birds and poultry, swine flu concerns, Ebola and other problems, such as Lyme disease, and Mad Cow Disease. Considerable effort has gone into defining new paradigms for biosecurity, including what some call 'conservation medicine' (see Aguirre, A. Alonso, et al., 2002).[8] About 60% of pandemics involve zoonotic disease (*zoonoses*) where bacteria, viruses or parasites move between animals to people. Other problems involve food chains, environmental disruptions or ecological shifts driven by factors such as climate change[9]. The concerns are by no means related only to animals. Food security issues arise as a consequence, for example, of relying on disease-prone plants (e.g., for cultivated bananas increasingly dependent on a single genetic variety), or on diseases affecting pollinators such as bees. Alien species introductions are a long-standing problem, made more difficult with globalization. There are many pathogens in marine and freshwater aquatic systems that hold considerable danger for people and for important aquaculture and wild catches.

There is considerable concern regarding the use of blunt policy instruments such as border closing, culling of wild animals, habitat destruction such as removal of wetlands for migratory waterfowl, hunting bans, excessive use of biocides or other control measures such as introduction of exotic species to control problem species. Ill-advised efforts have been suggested to control avian flu in domesticated chickens through massive killing of migratory birds. This was suggested in the first decade of this century. The unique nature of each major pandemic and the role played by causative situations and organisms makes uniform policy action difficult. Social factors, trade, travel and other economic considerations will influence strategies.

On the other hand, lack of comprehensive planning and management approaches, or weak policy development can lead to out of control situations—the case with COVID-19. Developing countries may not have the full organizational and financial capacity to adequately address catastrophic outbreaks. However, with the onset of environmental changes related to climate change, even the wealthiest countries may

[8] Aguirre, A. Alonso, et al. 2002. (eds.) *Conservation Medicine: Ecological Health in Practice.* Oxford University Press. 432 pp.
[9] Ogden, Lesley. 2018. *Climate Change, Pathogens, and People: The Challenges of Monitoring a Moving Target.* BioScience 68(10): 733-739.
https://academic.oup.com/bioscience/article/68/10/733/5136476

not perform adequately. An example is the failure to contain the spread of Lyme disease in North America and Europe as climate warms.

A persistent problem in preventing zoonotic pandemics is the need to break the transmission between wild animals such as bats, civets, birds, etc., and humans. Wildlife markets and 'bush meat' sources are prime examples of how pandemics can emerge seemingly from nowhere. There are calls for elimination of these markets in all parts of the world.[10,11] Another key problem is sprawling urban settings that bring people into close contact with disrupted ecosystems or polluted conditions that harbor disease vectors (e.g., for malaria and dengue fever). In the case of West Nile Virus[12], following its discovery in 1937 in Uganda, it has gradually spread into a global concern—the most important causative agent globally for viral encephalitis. Many animal species are involved, including mosquito vectors.

A new report (6 July 2020) from UNEP[13] discusses the role of zoonoses, with a number of key messages, especially in relation to food systems. Seven key drivers of transmitting situations are: "increasing human demand for animal protein; unsustainable agricultural intensification; increased use and exploitation of wildlife; unsustainable utilization of natural resources accelerated by urbanization, land use change and extractive industries; increased travel and transportation; changes in food supply; and climate change."

The UNEP report makes 10 policy options suggestions to reduce risk of future pandemics: "raise awareness of health and environment risks and prevention; improve health governance, including by engaging environmental stakeholders; expand scientific inquiry into the environmental dimensions of zoonotic diseases; ensure full-cost financial accounting of the societal impacts of disease; enhance monitoring and regulation of food systems using risk-based approaches; phase out unsustainable agricultural practices; develop and implement stronger biosecurity measures; strengthen animal health (including wildlife health services); build capacity among health stakeholders to incorporate environmental dimensions of health; and mainstream and implement One Health approaches." These suggestions are broadly in line with our Working Paper analysis and we therefore endorse them.

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[10] See Open Letter to WHO, UNEP and Office International Epizoologie. *Live Wild Animal Markets, Human and Animal Health, and Biodiversity Protection.* 10 February 2020. https://iwbond.org/wp-content/uploads/2020/02/Live-Wild-Animal-Markets_Final_10-February-2020.pdf

[11] Somewhat belatedly, on 8 April 2020, a number of US Congress leaders called for world closure of live wildlife markets globally and a ban on live wildlife international trade in an open letter to the Director Generals of WHO, OiE, and FAO. https://www.documentcloud.org/documents/6827817-04-08-20-Booker-Graham-Quigley-McCaul-Sblock.html

[12] Chancey, Caren, et al. 2015. *The Global Ecology and Epidemiology of West Nile Virus.* BioMed Research International. Volume 2015 Article 376230. 20pp. https://www.ncbi.nlm.nih.gov/pubmed/2586677

[13] https://wedocs.unep.org/bitstream/handle/20.500.11822/32060/zoonoses.pdf?sequence=1&isAllowed=y ; also, https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals

Breaking Animal-to-Human Disease Pathways

Globally most pandemics in recent years have started with contact, capture or consumption of wildlife. Bats and wild carnivores pose the greatest risk of sources or diseases with the potential to cross into humans; and therefore, in general should never be consumed. Pandemics originating in these groups, or using them as an intermediate vector include SARS, MERS, Ebola, Nipah and now COVID-19. Of these, only Ebola is likely through direct consumption of bats. In other circumstances, bats can also be carriers, Nipah originates in bat urine (normally through the consumption of toddy wine, which, if left in open containers, bats can drink and urinate into). The three Corona viruses, SARS, MERS and COVID-19 likely originated in bats and were transmitted into humans through another intermediate host animal.

Bats (especially Rhinolophids such as Horseshoe Bat species) and Civets, the small carnivorous mammal implicated in the 2003 SARS outbreak in Guangdong, show similar expression of the viral genes, and similar viral genomes, The chain is believed to be from bats, to intermediate hosts, then into humans. Minimizing contact between people and these groups, and ensuring high quality habitats to reduce the susceptibility, spread and any infection risk between wild animals and humans has multiple benefits in terms of enhanced service provision and decreased risks of diseases. In many cases including COVID-19 there are other theories about how and when the transfer from animals to humans might have taken place. This point highlights the complexity of addressing causality and also the limited understanding of factors involved in ecosystem disruption such as deforestation, global warming, pollution, mining in karst areas, and some intensive forestry and agricultural practices.

While the reasons to avoid contact between disease-bearing wildlife and people are clear, defining what is wildlife is not always easy. Some species not commonly considered as 'domesticated' are now farmed or ranched (including marine and freshwater organisms). This creates problems, especially for rare and endangered species when it comes to trade. Thus, as the city of Shenzhen has done, it is possible to draw up a short list of species for husbandry. Any species <u>not</u> on the list then can be considered unsuitable for sale or trading. Problems arise for game farms, zoos and other situations where native or exotic animals are kept as pets, or for research, commercial use of skins, etc. However, as Shenzhen has discovered, taking action at a local level can be difficult. The city has put in place a regulation banning dog and cat as food item, but turtles and frogs are on their list of acceptable foods.

The pandemics of introduced species ('alien invasive species'), whether animals or plants, is a well-known issue. Sometimes it is not the competition with native species that is the primary concern, but the transport of dangerous pathogens. Examples include migratory birds carrying Asian H5N1 virus that can spread to domestic chickens and then to people; or ticks infected with Lyme disease that can be spread by birds to small mammals then on to people and a range of wild and domesticated animals. Biosafety measures (see Annex 1 for difference between biosafety and

biosecurity) include destruction of flocks of domesticated creatures, vaccinations (if available) and limitations on access of people to animal husbandry locations are examples. There have been some misplaced suggestions, for example culling of migratory birds, and reducing wetland areas where they gather. More productive have been measures related to boundary inspections of products entering and leaving seaports, airports and via overland transport. Also, decisions to rely upon indigenous rather than imported varieties and species for ecological restorations and in agriculture.

The simplest solution to the issue of what may be safe, or not to farm, is to delimit a list of species that can be cultivated for commercial purposes and have a central registry of approved sellers. This is particularly important for designated wildlife husbandry. It enhances the ability to monitor and track almost any associated disease, and allows a rapid, targeted response if any disease does emerge. China has tried for decades to develop appropriate conservation mechanisms related to scarce or endangered wildlife, but the process has been fraught with difficulty including problems of determining whether there is a clear distinction between illegally traded stocks and farmed stocks.

Wildlife definition should be tied to credible origin of traded individuals and whether they were sourced from the wild, or were bred in captivity. The first consideration is which species need to be utilized, and how they can be screened to prevent a risk of infection. Human consumption of mammals should be restricted to hoofed ungulates (Perissodactyla and Artiodactyla). These groups are far enough away from people genetically to pose a lower risk of disease transmission, and herbivores in particular are less likely to be exposed to viruses. Thus, captive livestock should not be fed meat (e.g., to avoid mad cow disease). And species from other carnivores (especially mustelids such as weasels, badgers, otters, ferrets; and viverrids such as the masked palm civets) should not be consumed. They are likely to originate in the wild and have considerable risk of spreading disease. Even rabbits carry diseases dangerous to humans.

High value items consumed as a status symbol and/or used in traditional medicines (such as pangolins[14]) could be replaced by investment into intangible cultural heritage of regional traditional and historical dishes that do not require wildlife. In fact, careful reading of ancient texts suggests[15] that pangolins should not be consumed since they cause digestive and other problems. Other links to traditional Chinese culture deserve preservation, of course. However as in the case of pangolins, when commercial demands rise, they actually harm rather than stimulate the

[14] "On June 5th [2020], the National Forestry and Grassland Administration (NFGA) in China announced to uplist pangolins from Class II state protection to Class I under the Wildlife Protection Law. Following on June 9th, China also officially removed the pangolin scale from the 2020 edition of the Traditional Chinese Medicine Pharmacopoeia." https://www.ifaw.org/ca-en/news/china-pangolin-protections-2020

[15] Wufei Yu. 5 March 2020. *Coronavirus: Revenge of the Pangolins*. The New York Times. https://www.nytimes.com/2020/03/05/opinion/coronavirus-china-pangolins.html

protection of plants and animals. Alternative opportunities are emerging through technology innovation. For example, food and medicine based on cell culture shows promise for reproducing desirable characteristics, but without the risks to human health and to depleted wild stocks and dangerous chains of infection. There is great potential for new supply chains involving substitution of plant sourced foods rather than farmed animals. In the future tissue-cultured 'meat' products may find acceptance with consumers.

However, farming in some cases is for derivative products such as bear bile and tiger-bone wine rather than direct consumption of meat. These uses can be particularly contentious from an international perspective due to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Regulations regarding folkloric and other 'natural health remedies' need to satisfy both international and domestic animal protection regulations. Some products currently have little or no scientific rationale for their use. Though the cessation of such trade would be favorably looked upon internationally this may not be possible in some local or national settings. However, in all cases standards need to be developed and implemented to ensure that the trade in these species does not present a risk to people or to wild, endangered or threatened populations. These same regulations also need to be applied to wildlife sourced for traditional medicinal use, establishing a central database of approved sellers for certain items, so that what is being imported or traded can be closely monitored, any infectious agents quickly detected and controlled, and the trade of endangered, nationally protected or CITES listed species regulated. Illegal trade definitely must be stamped out as quickly as possible.

Examples of differing points of view are arising as a consequence of China's recently imposed permanent ban on commerce related to wildlife species and products.[16] Two recently expressed concerns highlight dilemmas. The ban exempts some uses related to research and for products in use for Traditional Chinese Medicine (TCM). In March 2020 the National Health Commission in China set out new guidelines for utilizing bear bile powder as one of the ingredients in a TCM injection treatment of very ill COVID-19 patients.[17] Presumably this is meant for medical use in China only. This matter is of considerable concern to various conservationists and animal rights organizations around the world. The second case involves medical research community testing for vaccines and efficacy of new medications potentially of value in COVID-19 treatment.[18] China is a major global supplier of farmed monkeys used as test animals. Under the new ban apparently the process of getting approval for such use within China or for export is complex, even though there is a specific exemption in the law designed for meeting research needs. Internationally, there are continuing efforts to stop airlines from participating in shipment, while the European Animal

[16] Wildlife ban (24 February 2020) notification from China to CITES Secretariat. https://cites.org/sites/default/files/notif/E-Notif-2020-018.pdf

[17] https://www.afp.com/en/news/15/activists-slam-chinas-use-bear-bile-virus-treatment-doc-1qc23y1

[18] https://www.theglobeandmail.com/world/article-chinese-wildlife-ban-freezes-export-of-test-monkeys-amid-worldwide/

Research Organization, for example, has called for considering the import of such research animals as a subject of 'national importance' during the current COVID-19 crisis.

Creating and Protecting 'Whole Ecosystems' and 'Nature-based Solutions'

Nature can provide for its own enrichment (soil quality, species diversity, and ecological community structure) if not disturbed, and if interconnections among natural systems are respected. Infrastructure development, resource exploitation, industrial structures, urban and suburban land development are inherently disruptive to land, water and marine ecological systems unless very carefully planned. Even parks and recreational areas can be harmful in this regard. Therefore 'Design with Nature' [19] is an essential element to avoid pandemics, since disease outbreaks often are abetted by ecological disturbance. It also is the basis for some of the best approaches to landscape-level regional planning and, at a larger scale still, in advanced approaches and programs for ecological restoration.

Endemic risk for disease can be known and present in specific areas. Such areas can be assessed for their epidemic or pandemic risk. However, if ecological conditions change (e.g., land use or water conditions change; species composition is altered; or climate change effects occur) environmental risks of disease will be altered. However, "Pandemic risk is driven by the combined effects of spark risk (*where* a pandemic is likely to arise) and spread risk (*how likely* it is to diffuse broadly through human populations)." [20] An endemic disease situation can get out of control if the environmental conditions favour its release, for example in poor drainage systems of slums, warm winters promoting exploding populations of ticks that become effected for lyme disease, or, as appears to be the case with coronavirus, with presence of habitats suitable for hosts such as bats.

Massive investment in reforestation, grasslands and wetlands has taken place in some countries such as China. These efforts take time to produce a 'whole ecosystem' with high diversity of life that can become self-sustaining. It may take decades to reach a full level of nature-based protection, for example in mangrove forests, or on mountainsides. However, even in relatively short time frames, the stream of ecological services provided can include protection against disease outbreaks by reducing ecological disturbance.

For ecologically or environmentally significant areas that require special protection or are under potential threat, ecological redlining (see Annex 1 for definition) will be

[19] A perspective made famous in a book by Ian McHarg. 1969. *Design with Nature.* http://www.ecotecture.com/reviews/mcharg2.html ; See also Bo Yang and Shujuan. 2016. *Design with Nature: Ian McHarg's ecological wisdom as actionable and practical knowledge*. Landscape Architecture and Urban Planning. Volume 155, pp. 21-32. https://www.sciencedirect.com/science/article/pii/S0169204616300482

[20] Nita Madhav, et al., Chapter 17 *Pandemics: Risks, Impacts, and Mitigation* in Jamison DT, Gelband H, Horton S, et al., editors. 2017. *Disease Control Priorities: Improving Health and Reducing Poverty.* 3rd edition**.** https://www.ncbi.nlm.nih.gov/books/NBK525302/

of value. Concern for protection against disease outbreaks has not been a pressing concern in China's ecological redlining system, but this should be reconsidered. For example, in karst areas where bat caves are found. It is essential to maintain healthy populations of these creatures, which can be important as plant pollinators and for controlling insects. Yet they also are important as hosts for many coronavirus varieties. Mechanisms are needed to fully control their entry into human contact or use as food. This is only one example. In general, much more attention and research is needed on how ecological redlining can become a key part of prevention of future disease outbreaks—whether in China or elsewhere.

Nature-based criteria for disease and pandemic prevention need to be developed for a wide array of diseases and their ecological origins and linkages. The warning, of course, is that while great progress has been made in some cases, such as guinea worm[21], schistosomiasis (bilharzia) and polio, clearly the difficulty of dealing with other zoonoses such as those related to coronaviruses has so far been problematic. This is where improved understanding of environment and of ecological associations can be helpful. Solutions involve spatial planning and management, for example, integrated river basin management, marine and coastal planning and management, and urban ecology improvement (e.g., to control diseases such as dengue fever[22]). An important starting point is to include ecological screening criteria for rural and urban planning and management in areas such as the Pearl River, the Yangtze River (YREB), and subtropical coastal areas such as Hainan Province.

Environmental Risk Reduction

Environmental risks are taking a prominent position in the overall picture of global risks[23], a point that is well known to the reinsurance industry[24], and, of course, in the arguments for treating climate change as a global emergency.[25] More recently with the expanding impacts of forest wildfires, disease outbreaks, water and pollution impacts, economic losses related to nature are on the rise, even becoming unmanageable. Organizations such as the World Economic Forum are seeking new

[21] Sadly, however, the eradication of this parasitic disease has been moved from 2020 to 2030 due to spread in both animals and people. https://www.nature.com/articles/d41586-019-02921-w?utm_source=Global+Health+NOW+Main+List&utm_campaign=e65ca73d93-EMAIL_CAMPAIGN_2019_09_30_12_53&utm_medium=email&utm_term=0_8d0d062dbd-e65ca73d93-890763

[22] Jin-Ya Wu et al. 2010. *Dengue Fever in Mainland China*. American Journal of Tropical Medicine and Hygiene. 83(3). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2929067/

[23] http://www3.weforum.org/docs/WEF_Global_Risk_Report_2020.pdf

[24] Geneva Association. 2018. *Climate Change and the Insurance Industry: Taking Action as Risk Managers and Investors Perspectives.* https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/climate_change_and_the_insurance_industry_-_taking_action_as_risk_managers_and_investors.pdf ; Also, a recent survey revealed climate change as the second most significant concern among reinsurers. https://static1.squarespace.com/static/54d620fce4b049bf4cd5be9b/t/5d024ff71ac35c0001a7147d/1560432655309/Insurance+Banana+Skins+2019+Final.pdf

[25] William Ripple. January 2020. *World Scientists' Warning of a Climate Emergency*. Bioscience. 20(1). https://academic.oup.com/bioscience/article/70/1/8/5610806

approaches such as the 'New Nature Economy' intended to address both risk and opportunity. [26]

The case for applying the Precautionary Principle [27] (PP) is extremely strong in dealing with biosafety and biosecurity—not only in preparing to save lives but also in considering environment. It is, for example, the basis for widespread vaccination in dealing with influenza outbreaks (e.g., caused by H1N1 virus in 2009). WHO describes this as "plan for the worst, hope for the best". It is an approach that should shift situations from reaction, even when there may be great uncertainty. Unfortunately, full application of PP is often perceived as expensive, and leading to option foreclosure (e.g., when ecological redlining excludes resource exploitation; when infrastructure construction may disrupt ecosystems or landscapes; and where bans are implemented before being fully supported by scientific evidence.

Dr. Shi Zhengli, the leading bat cave virologist from Wuhan has found dozens of types of Coronavirus that could be a risk in the future—along with hundreds that are not.[28] This sobering thought reinforces the need to invest in risk assessments that would normally apply the Precautionary Principle. However, whether in China or in other parts of the world, the protocols for doing so are still lacking, or lagging compared to simpler environmental risk issues.

Clearly, larger investment in fundamental research regarding animal hosts, ecological disruptions and dynamics, and the chain of exposure to risks is needed. Meanwhile steadfast application of the PP is necessary. Within China, this implies a more concerted effort to build a specialized eco-environmental risk assessment approach suitable for human and animal health; also, for potential plant-based disease outbreaks. Internationally, some of the most advanced PP efforts have come from the new paradigms associated with One Health. Yet these are not routinely applied in relation to either human or planetary health aspects. The chaotic approaches seen in various countries in making choices among alternative paths for controlling disease outbreaks suggests there is often failure to fully incorporate PP in a timely and effective fashion. At a global policy level, the assessment of progress on meeting the UN2030SDGs is important, since this is perhaps the most integrated approach to seek reduction in global threats.

[26] A series of publications is expected during 2020. The first is: World Economic Forum. 2020. *Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy.* http://www3.weforum.org/docs/WEF_New_Nature_Economy_Report_2020.pdf

[27] WHO Europe. 2004. *The Precautionary Principle: Protecting Public Health, the Environment and the Future of Our Children*. http://www.euro.who.int/__data/assets/pdf_file/0003/91173/E83079.pdf

[28] Jane Qiu, 11 March 2020. *How China's "Bat Woman" Hunted Down Viruses for SARS to the New Coronavirus.* Scientific American. https://www.scientificamerican.com/article/how-chinas-bat-woman-hunted-down-viruses-from-sars-to-the-new-coronavirus1/

Eco-environmental Planetary Boundaries [29] are the ultimate application for the Precautionary Principles. We need to learn how to live within these nine boundaries for human survival. Perhaps a tenth boundary is needed to deal with the many complex health hazards such as what we are facing with COVID-19. This is a worthy topic for consideration in the climate change and biodiversity negotiations. And for promoting the perspectives called for by One Health.

'One Health'

The OiE, is a global agency that addresses animal health[30] and has been very helpful in developing and promoting the concept of 'One Health'. OiE's vision is "A world that is safe and secure from the accidental or deliberate release of animal pathogens, including zoonoses." OIE issues an annual list of animal diseases, infections and infestations, totally 117 in 2020.

One Health is a platform just waiting to be given broader exposure for addressing problems arising from the relationships of nature, disease transmission and human health. Veterinarians and others concerned with animal disease are prominent contributors to this collaborative effort. They operate through the long-established World Organization for Animal Health (OiE). They place emphasis on capacity development for scientific expertise including a number of reference laboratories around the world. In addition to providing guidance related to animal husbandry and diseases, OiE maintains a platform about wild animal diseases.[31] They also maintain an information base regarding biological warfare. In fact, One Health provides one of the most coherent integrative approaches for pandemic preventive action.

Clearly there is a considerable need for investment at the level of billions of dollars into creating or strengthening platforms that bring together the diverse communities related to human and ecological health matters, to sustainable infrastructure, sustainable agriculture, veterinary sciences, and investment criteria. This is the message from both practitioners and policy-oriented specialists, such as those in Aguirre, A. Alonso, et al. 2002. (eds.) *Conservation Medicine: Ecological Health in Practice.* Other authors provide visionary advice, such as Gebreyes, Wondwossen. 2014. *The Global One Health Paradigm.*[32]*; and* Karesh, William. May 2009. *Where the*

[29] https://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html
[30] OIE is the World Organization for Animal Health.
https://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/EN_FINAL_Biothreat_Reduction_Strategy_OCT2015.pdf
[31] (WAHIS): https://www.oie.int/wahis_2/public/wahidwild.php#.
[32] Gebreyes, Wondwossen. 2014. *The Global One Health Paradigm: Challenges and Opportunities for Tackling Infectious Diseases at the Human, Animal, and Environment Interface in Low-Resource Settings.* PLOS Neglected Tropical Diseases. 8(11): e3257 (online) 6 pp.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4230840/

Wild Things Are: The Link between the Health of Humans, Animals, and the Environment.[33]

A 2004 international meeting organized on 'One World One Health' produced the useful 12 'Manhattan Principles'.[34] These Principles have been updated and reissued in October 2019 as 10 'Berlin Principles' (reproduced in Annex 2).[35] They provide an integrated package of guidelines linking ecology, animal health and human health. The Principles were followed up in two World Bank reports on *People, Pathogens and Our Planet* (2010 and 2012) [36] that focus attention regarding economic aspects. One Health is important since it takes an integrated ecological, animal (wild and domestic) disease, and human health perspective. This broad perspective could be further extended to provide new insights regarding matters such as ecological restoration, natural solutions to climate change, and the valuation of ecological services. The WHO, CBD and UNEP teamed up to produce a useful 2015 review report on *Connecting Global Priorities: Biodiversity and Human Health.*[37]

It is troubling that this collection of valuable knowledge and other valuable sources do not appear to have fully influenced existing public health and other policies to the necessary extent. This seems to be the case with SARS in 2003, for example. The ban on wet market sales of certain mammals suspected to be involved in the transmission of the SARS coronavirus to people in China apparently was lifted only months after the disease outbreak.[38] And there have been many other missed opportunities to put in place comprehensive policies that might have saved the massive expenditure just on this one current pandemic, to say nothing of the loss of life and livelihoods of so many people.

Other Collaborative Efforts

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[33] Karesh, William. May 2009. *Where the Wild Things Are: The Link between the Health of Humans, Animals, and the Environment.* Foreign Affairs. https://www.foreignaffairs.com/articles/2009-05-08/where-wild-things-are ; Karesh, William and Robert Cook. July/August 2005. *The Human-Animal Link.* Foreign Affairs. https://www.foreignaffairs.com/articles/2005-07-01/human-animal-link

[34] One World, One Health (website). *The 12 Manhattan Principles on "One World, One Health".* http://www.oneworldonehealth.org

[35] https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/13435/Global-Health-Leaders-Issue-Urgent-Call-for-United-Effort-to-Stop-Diseases-Threatening-All-Life-on-Earth.aspx

[36] World Bank. 2010. *People, Pathogens and Our Planet. Volume 1: Towards a One Health Approach for Controlling Zoonotic Diseases.* https://siteresources.worldbank.org/INTARD/Resources/PPP_Web.pdf ;
World Bank. 2012. *People, Pathogens and Our Planet. Volume 2: The Economics of One Health.* https://openknowledge.worldbank.org/bitstream/handle/10986/11892/691450ESW0whit0D0ESW120PPPvol120web.pdf?sequence=1&isAllowed=y

[37] UNEP, CBD, and World Health Organization. 2015. *Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review.* https://sustainabledevelopment.un.org/content/documents/1785Connecting%20Global%20Priorities.pdf

[38] Science. 22 Aug 2003:Vol. 301, Issue 5636, pp. 1031 https://science.sciencemag.org/content/301/5636/1031.1/tab-pdf

There have been some systematic efforts to build new paradigms involving multiple international agencies. For example, in 2010, WHO, OiE, and FAO[39] agreed upon a collaborative partnership with the objective of working more closely together to align activities related to the animal-human-ecosystems interfaces in order to support member countries. Their intention is to address complex issues involving "The emergence of new or the re-emergence of existing animal diseases, including zoonoses, the growing threat of transboundary animal diseases, the impact of environmental changes and globalization, as well as new societal demands related to food security, food safety, public health and animal welfare." They note that: "Prevention of the emergence and cross-border spread of human and animal infectious diseases is a global public good with benefits which extend to all countries, people and generations." The three organizations "envisage a coordination mechanism to better consolidate fragmented efforts at global, regional, national and sub-national levels."

The WHO believes there are about a billion cases of influenza globally each year, with up to 650,000 viral respiratory disease deaths annually. The agency suggests that globalization, mobility, and urbanization may result in pandemics that move "faster and further." It introduced an enhanced *Global Influenza Strategy 2019-2030,* which focuses on national level programs covering three goals: "reducing seasonal influenza, minimizing the risk of transmission from animals to humans, and limiting the impact of a pandemic." [40]

The wide range of biodiversity issues linked to food security has been well documented in a 2019 document prepared by the FAO.[41] The ongoing national and international debates about selective breeding and GMO matters are important, including the use of biocides that cause collateral damage to other species. Some issues bridge genetic, species and ecosystem-level concerns. For example, disease sources in marine and freshwater aquaculture systems. Livestock food supply that includes offal from diseased sources has been a significant causal agent for mad cow disease (BSE-Bovine spongiform encephalopathy and its link to Creutzfeld-Jakob disease in humans). Traceability and certification mechanisms are becoming very important for almost all internationally traded products, but must be incorporated into more local situations as well. With climate change impacts becoming pervasive

[39] https://www.who.int/zoonoses/MoU-Tripartite-May-2018.pdf?ua=1
https://sustainabledevelopment.un.org/content/documents/1785Connecting%20Global%20Priorities.pdf

[40] World Health Organization. (2019). Global influenza strategy 2019-2030. World Health Organization.
https://www.who.int/influenza/Global_Influenza_Strategy_2019_2030_Summary_English.pdf?ua=1

[41] FAO. 2019. *The State of the World's Biodiversity for Food and Agriculture*, J. Bélanger & D. Pilling (eds.). FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome. 572 pp. http://www.fao.org/3/CA3129EN/CA3129EN.pdf

in crop systems, it is likely that the risk of pandemic situations involving human health and food systems may worsen.

The UN SDG2030 Goals provide an opportunity to link biodiversity, ecological integrity and human health, for example through consideration of Goal 3 (Good Health and Wellbeing), Goal 6 (Clean Water and Sanitation), Goal 11 (Sustainable Cities and Communities), Goal 14 (Life Below Water), and Goal 15 (Life on Land). However, as they are currently written, they do not address pandemic risk reduction in a very explicit fashion (except Target 3.D., 'Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.')

What is impressive is the level of basic understanding about many aspects of pandemics and the environment, yet the apparent difficulty to fully put this knowledge to work. With few exceptions, each epidemic seems to get well underway before sufficient action is taken. And afterwards, while lessons are learned, they are not fully applied the next time. With globalization, and with disrupted ecosystems, plus climate change factors, the spread of new diseases, whether plant or animal diseases, or human health outbreaks, is bound to worsen unless there is better use of already acquired knowledge; and more effective, comprehensive partnerships—disease organisms are not good about respecting boundaries.

Nature and Green Space to Build Societal Resilience and Well-being

Appreciation of nature is important as an element for good mental health, and more broadly, for building societal resilience.[42] This point is well understood to be an important component for Ecological Civilization and for its role in creating a 'Beautiful China.' Certainly, it is appreciated as well in relation to the UN Sustainable Development Goals and among the reasons for promoting the agenda of the global Convention on Biological Diversity. In the current pandemic, opportunity to enjoy nature has been reduced through severe measures to reduce contact among people. In countries such as Canada pent-up demand for camping sites, nature hikes, and other outdoor adventures has been high. People have turned to gardening in their back yards. Birds and other wildlife have returned to quiet urban core areas.

The current pandemic situation affects the level of anxiety and strain of ordinary people. Undoubtedly there are differences according to cultures, urban and rural residents, level of income, and access to nature via social media, private green space and public locations. Yet all can benefit from access to the beauty of birdsong and so many other joys arising from contact with nature—indeed part of the vision for a 'Beautiful China'.

[42] Aerts, Raf, et al. 2018. *Biodiversity and Human Health: Mechanisms and Evidence of the Positive Health Effects of Diversity in Nature and Green Spaces*. British Medical Bulletin 127:5-22. https://academic.oup.com/bmb/article/127/1/5/5051732

A second point is the need to make best use of nature and green spaces in the recovery during months (and perhaps years) following the immediate crisis period. China, with its newly expanded effort to build a national park system needs to take such concerns into the design and speed of implementing the system. Also, a very important concern is to continue making more green spaces available in both existing cities and new communities. These are points to be considered for the 14th Five Year Plan.

The third point is directed at the need for full participation of people and communities in the protection of nature. There is a fulfillment need to be recognized in this process. Satisfaction can be gained in feeling that individual effort is helpful in protecting nature. It is essential as part of the long-term effort to build a new relationship between people and nature. Appreciation of values of nature is a touchstone for hope in the undoubtedly difficult times ahead as the globally troubled economy is rebuilt. Certainly, protecting nature will help towards building resilience in a world that will still face climate change and other environmental and socio-economic concerns. Fortunately, this point seems to be hitting home as countries engage in the transition from immediate COVID crisis to longer-term thinking and action.

STIMULUS AND RECOVERY: MOVING FROM SHORT TO LONGER TERM INTEGRATED ACTION

Some 300 initiatives from many different parts of the world, mainly of a rescue type rather than longer-term recovery, have been examined in a recent study from SSEE at Oxford University.[43] Their study is based on more than 200 interviews of financial and other experts. The authors assessed that only about 4% of the initiatives were 'green' in relation to greenhouse emission reduction, while about 4% had potential to increase emissions. They believe that, due to the likely scale of COVID-19 recovery packages and their multiplier effect, there is a considerable potential to do good or harm towards meeting climate goals and possibly other goals such as biodiversity conservation, although this latter topic was not specifically examined. One of the five policy items they suggest for economic and climate goals is "natural capital investment for ecosystem resilience and regeneration".

A recent UNESCAP report[44] has examined potential sustainable development impacts of the current pandemic in the ESCAP region. It provides a very useful starting point for considering recommendations on addressing environmental aspects and also the interactive and synergistic needs to keep our societies on track for a sustainable future. We have included some of the key suggestions from this document in Annex 3, and in brief form below. These set the stage for discussions of various actions we

[43] Cameron Hepburn, Brian O'Callaghan, Nicholas Stern, Joseph Stiglitz, and Dimitri Zhenghelis. 4 May 2020. *Will COVID-19 Fiscal Recovery Packaged Accelerate or Retard Progress on Climate Change? https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf*

[44] ESCAP. 26 March 2020. *The Impact and Policy Responses for COVID-19 in Asia-Pacific.* https://www.unescap.org/sites/default/files/COVID%20_Report_ESCAP.pdf and https://www.unescap.org/sites/default/files/COVID19%20_Report_ESCAP_Presentation.pdf

believe to be of critical importance in order to build a level of resilience currently lacking globally and nationally in most countries.

The ESCAP Report notes three key observations on environmental factors:

- *Slowdown of economic activities in Asia and the Pacific gives the environment breathing space.*
- *The outbreak has provided opportunities to promote more resilient and sustainable practices.*
- *Environmental changes are the primary drivers of past disease emergencies.*

The Report also notes a need to progress towards a 'new normal' that includes locking in environmental benefits seen during the pandemic while avoiding the boomerang of ramped up pollution, unsustainable production and consumption patterns, and other 'business as usual' approaches associated with the global environmental emergency.

Stimulus and Short-Term Recovery Packages

The unprecedented scale of the already committed social and economic support programs of some countries during the initial crisis stage of the COVID-19 pandemic is astonishing—committing to a war[45], as some leaders explicitly note. Another way of looking at it is provided by UNDP: "the defining global health crisis of our time and the greatest challenge we have faced since World War Two".[46] It is believed the expenditure will be on the scale of that for WWII, or greater.

Many organizations link the need for stimulating trade and investment, even while many globalization initiatives are under threat. In late March UNCTAD suggested the need for a 2.5 trillion dollars stimulus package for developing countries.[47] Likely this is likely an underestimate given the continuous spread and rising intensity of the pandemic. Given the rapid decision-making and anticipated rapid distribution of funds, it is hard to imagine that the trillions already committed mainly in richer nations will be spent in an optimal fashion.

The next round of stimulus packages may be of even greater magnitude. Of course, many countries cannot afford to commit at G7 or G20 scale. Thus, a new financial divide may emerge. Likely the return to an economic state of the past few years may take a half decade or longer, and various surprises will emerge during the process. In its latest (June 2020) Annual World Economic Report[48] OECD has created two scenarios of GDP 2020 decline (either of coronavirus control during the year or of a dismal second wave of the pandemic), using 2019 as the baseline. Both scenarios

[45] This view is controversial, especially as the effort to control this pandemic in general is not ideologically-driven. See https://newseu.cgtn.com/news/2020-05-08/Can-we-compare-the-COVID-19-pandemic-to-a-world-war--Qhw25Ig9Fe/index.html
[46] https://www.undp.org/content/undp/en/home/coronavirus.html
[47] https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=2315
[48] http://www.oecd.org/newsroom/global-economy-faces-a-tightrope-walk-to-recovery.htm

suggest a dramatic economic decline and serious unemployment during the year 2020. The OECD calculations suggest -11 to -14% GDP decline for some EU countries (e.g., Spain, Italy, UK); for OECD countries an average of – 7.5 to – 9.3%. For the USA a decline of – 7.3 to 8.5%, and for China -2.6 to – 3.7%.

The existing COVID emergency-funding spree by countries is far greater than the level of funds at both national and international levels committed in recent years to address the global environmental emergency; also, for the UN 2030 SDGs. So far national statements of funds committed to COVID-19 do not say enough about how these might affect future needs on climate change and on biodiversity. Postponement to 2021 of COP 26 and COP 15 provides additional time to work out such future financial commitments.

Fortunately, there appears to be growing demand for inclusion of environmental considerations. On 24 March, 2020, a letter signed by 100 conservation and other organizations sent a letter to congressional leaders suggesting that 1% of future stimulus packages being prepared by the USA be devoted to biodiversity conservation and related issues.[49] In this presidential election year, the US situation has become very polarized. However there are many green recovery initiatives under discussion.[50] The EU has built on its 2019 Green New Deal approach to produce a green recovery package. [51] There are numerous other emerging green recovery efforts, but there is no coordinated global effort despite the laudable exhortations of the UN Secretary General and leaders of other international organizations. Whether today's efforts amount to the headline "green recovery fever spreads around the globe", as suggested by a June 2020 Corporate White Knights article [52], is still debatable.

For example, recently the USA has relaxed some important environmental regulations of its Environmental Protection Agency to major industrial sectors affected by the economic turndown.[53] Also, it is not holding the automobile sector to certain goals for future fuel efficiency. These actions could set off action on the part of other countries concerned about competitive disadvantages during the recovery period. China will face some of the same difficulties as it works to increase jobs, stimulate the economy through greater emphasis on domestic consumption, and maintain its international trade. Certainly, China is receiving strong input for

[49] https://www.documentcloud.org/documents/6819003-CoronavirusWildlifeLetterStimulusPackage.html

[50] https://us.boell.org/en/2020/07/02/urgently-wanted-us-stimulus-package-which-more-dollar-bills-are-green

[51] https://www.euractiv.com/section/energy-environment/news/do-no-harm-eu-recovery-fund-has-green-strings-attached/

[52] https://www.corporateknights.com/channels/leadership/green-recovery-fever-spreads-around-globe-15916950/

[53] https://www.reuters.com/article/us-health-coronavirus-usa-epa/trump-administration-eases-environmental-enforcement-during-outbreak-idUSKBN21D3DI

strengthening green development in 2019-2020 leading up to the 14th Five Year Plan.[54]

There are several green points to consider for national level stimulus and recovery packages:

- Screening criteria should be considered for all recovery projects to avoid environmentally damaging investments.
- Focus greater attention on green infrastructure, decarbonization efforts, further stimulus for the transition to renewable energy, public transportation involving transition to electric buses, etc.
- Expand green employment in various sectors and improved eco-compensation packages benefitting rural dwellers.
- Maintain green development incentives to enhance ecological services.
- Focus on increasing natural capital in order to build resilience and prosperity.

As many commentators have noted, it would be unfortunate to seek a 'business as usual' recovery.[55] That would miss an opportunity to put in place a 'Nature and Climate Positive Recovery' suggested by others such as the World Economic Forum and WWF. Green Stimulus Packages can focus on green development innovation.

Indeed, China, which is already highly engaged with environmental and ecological improvements through the 13th Five Year Plan, appears to be focusing particular attention to innovation technologies. Many such initiatives, for example those related to electrical vehicles and battery technology, and those for circular economy will support greener economic outcomes. Furthermore, there is a strong effort underway to create natural capital infrastructure not only within China, but increasingly with some developing country partners in the Belt and Road Initiative (BRI). Like all other countries, China must determine what economic and sustainable development innovation will mean in a world where globalization may now play out quite differently over this new decade compared to the previous two.

While opportunities knock, it is important also to consider the well-identified but still prevalent challenges that can diminish progress on green stimulus and recovery. Key among these are perverse fossil fuel subsidies; the stimulus and socio-economic license to destroy natural forests and wetlands; overinvestment in heavy industry, transport networks, etc.; and failure to build at high standards. Perhaps more difficult, is the need to reconsider patterns of urban and suburban development, the over-promotion of some types of service sector activities, and overconsumption within both wealthy and emerging societies. Many facets of these concerns have both

[54] http://www.cciced.net/cciceden/POLICY/APR/201908/P020190830118167260634.pdf#:~:text=A%20broadbased%20consensus%20on%20green%20development%20as%20centered,a%20period%20of%20critical%20importance%20for%20China's%20high-quality

[55] https://theenergymix.com/2020/05/20/major-cities-urge-green-resilient-recovery-with-no-return-to-business-as-usual/ ; http://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/ ; https://www.weforum.org/agenda/2020/04/covid-19-three-horizons-framework/ ; https://wwf.panda.org/our_work/climate_and_energy/green_recovery_dialogues/

individual health and planetary health implications. They have been identified at the global level in the SDG2030 priorities, yet the progress on reaching the SDG goals is inadequate. This is ominous in relation to what may happen with COVID recovery package outcomes and their green components.

Reinforce the Innovation Role of Business for Green Economic Recovery

Synergies are essential among government, communities and enterprises in order to address problems in an integrated fashion. Business can excel and take leadership on certain innovation aspects as noted below and in other ways:

- Businesses can play a large role in generating knowledge and using scientific results for new ways to win old battles. Examples include new medicines, vaccines and sustainable biotechnology solutions for natural resource use in land and aquatic ecosystems, and in food production (including a trend away from meat to sustainable plant sources).
- Ecological conservation and ecological construction on a massive scale can provide enhanced ecological services to drastically reduce environmental risks and their impacts. Much of the work needs to take place in rural areas while supporting local businesses. Business needs to be much more proactive in improvement and innovation regarding eco-compensation programs.
- Business enterprises could help much more to achieve the UN 2030 Sustainable Goals, whether within China, or in BRI countries; and in providing consistent support for climate change mitigation and adaptation initiatives and for biodiversity conservation.
- Ensuring that stringent environmental and sustainable development screening takes place for all economic stimulus initiatives, especially for those involving heavy industry, infrastructure, and tourism. In particular formulation of green tourism requires major revision to unsustainable use of natural areas, today's models for cruise shipping, and the environmental impacts of air transportation.

A very major point is how to use China's massive efforts in AI and IT to have a green recovery related to improved production and consumption. This should include consideration of optimal ways to use online education and conferencing rather than moving people—whether across town or across countries and continents. The ability to use IT and social media and online sales platforms for stamping out illegal activities such as illegal trade of wildlife products is noteworthy.[56]

[56] The Coalition for Wildlife Trafficking Online. JD.com, Alibaba and Tencent are members of the Coalition. They seek "Wildlife Free Ecommerce." Their hope is to reduce online wildlife trafficking by 80 percent by end of 2020. https://www.aljazeera.com/news/2020/03/illegal-wildlife-trade-online-china-shuts-markets-200324040543868.html ;
https://www.traffic.org/site/assets/files/2108/briefing-online_wildlife_trade-2016.pdf ;
https://www.traffic.org/news/leading-tech-companies-unite-to-stop-wildlife-traffickers/

The medium-term (from now to 2030/35) is highly significant because it involves both old and new technologies, institutional change, and rethinking of supporting services. Businesses should find opportunities almost everywhere. Many innovation technology applications are at a stage where they could change the world as we know it—in agricultural, industrial, energy, construction and service sectors for countryside, ocean and cities.

International Trade and Investment

Certainly, some progress has been made on introducing environment and sustainable development concerns into global and sometimes regional agreements governing trade and investment, and also into multilateral financing through banks, development agencies, corporate bodies and other elements of the financial sector. However, much more work is still needed, for example on 'soft commodity' supply chains such as agricultural products like soy and palm oil, meat, fish and other marine products; fiber including forest products and cotton trade. The problems are well discussed but often not resolved. Health and sanitation standards, certification, and ecological issues in supplier settings are significant concerns. Mining and energy sourcing involve both biodiversity and climate change issues. All of these examples and more are major components of globalization as played out over the past several decades. In addition, there is the on-going concern about externalities associated with factories abroad and with export of wastes. The global circular economy is undergoing many changes at present. Finally, there is the dark side of trade and investment, notably the illegal trade in wildlife.

CITES, a treaty organization that might be expected to tackle some important trade and environment aspects related to the Coronavirus pandemic has taken a stand that is somewhat surprising. As noted in its official statement[57], "Matters regarding zoonotic diseases are outside of CITES's mandate, and therefore the CITES Secretariat does not have the competence to make comments regarding the recent news on the possible links between human consumption of wild animals and COVID-19." However, in the same statement, they state: "We are observing key Parties that are affected by illegal trade in wildlife; also scaling up efforts and implementing strong measures regarding wildlife trade regulation at domestic level. These activities and measures will inevitably impact on, and contribute to, addressing transnational wildlife crime more effectively. These measures will also contribute to the effective implementation and enforcement of the Convention and the conservation of CITES-listed species."

On the broader aspects of trade and investment, there might well be major shakeups related to globalization. Many would involve production and consumption pathways. These could be beneficial or detrimental from an environmental perspective during a long recovery period. Some possibilities include the following:

[57] https://www.cites.org/eng/CITES_Secretariat_statement_in_relation_to_COVID19

- Shorter supply chains – this could promote increased attention to pollution reduction and innovation to reduce waste, energy use, and introduce new production methods. The closing of borders for movement of people and flow of goods between countries undoubtedly will have some lasting impacts on environment as well as economies. Middle class populations in particular may reassess their levels of consumption based on actual 'needs' in comparison to 'wants'. Potential reduction in service sector growth – the temporary collapse of tourism including cruise ships and other packaged tours, etc., will perhaps take pressure off areas that experience ecological stress. It provides an opportunity to rebuild along sustainable lines.
- The switch to virtual reality during the COVID-19 pandemic may be enduring for at least some geographic locations. Service sectors such as food and beverages, and various recreational activities also are likely to take time to return. Combined with such slowdowns is likely to be a drop in transportation and fuel use. The net impact on biodiversity and nature's services is hard to predict.
- There are many links to travel on business and commerce, education and family matters that have been temporarily shelved. Or will they? The switch from environmentally costly elective travel to expanded online use may be one of the most enduring legacies of pandemic. It has been termed a 'flight diet' for long distance travel with implications for reducing carbon footprint of the richer half of humanity.

Some postulations about trade and investment may prove false if there is quick recovery and rebounds to old patterns. Such a situation could lead to even new record highs in terms of environmentally damaging activities. This was the case from 2010 or 2012 onwards after the financial crash of 2008.

This short discussion did not really cover the more profound shifts that might occur in terms of investment patterns. A significant amount of thought needs to be given to accelerating the pace of green investment no matter how short or long-term the impact of COVID-19.

Green Belt and Road Initiative

Many of the countries actively engaged with China in the massive BRI partnership for infrastructure development are likely to be seriously affected by COVID-19 sooner or later. Hopefully they may be spared the full impact since they can take advantage of experience gained by China and some other countries. Ideally the investments made for infrastructure [58] should be helpful in reducing both pandemic risks and positioning of the member countries in the global recovery phase of the COVID-19

[58] https://www.unescap.org/blog/covid-19-reveals-urgent-need-resilient-infrastructure?utm_source=Mailing+List+-+ESCAP+Newsletter&utm_campaign=0870e33cb8-CAMPAIGN_ESCAP_Newsletter_April_2020&utm_medium=email&utm_term=0_e318af22fc-0870e33cb8-112014133

calamity. In April 2019 a BRI International Green Development Coalition was launched with 10 thematic programs.[59] This Coalition (BRIGC) could be of considerable value since it intends to address environmental risk issues associated with the BRI. At present the Coalition does not include specific reference to pandemic health issues in its thematic work. However, there are some obvious ways this can be introduced as the themes are broad ranging.

OPINIONS ABOUT COVID-19 ECONOMIC RECOVERY AND ENVIRONMENTAL EMERGENCIES

Many views are being expressed about how characteristics of the current pandemic and the efforts to address its impacts might be put to use in addressing environmental emergencies. This short section covers several insightful observations. It is by no means comprehensive, and much of the information is anecdotal, although often based on well-established concepts. Certainly, some ideas are controversial. However, all of the ideas highlighted are worthy of follow-up research and consideration, for example, in national or international negotiations related to climate, biodiversity and other environmental agreements. They also will relate to broader frameworks such as international trade and investment and other globalization matters such as security, and, of course, for health and various sectoral concerns.

'Flattening the climate change and biodiversity loss curves'. Just as the control of COVID-19 can be shaped by actions such as social distancing, lock-downs and self-isolation, so that impacts are made more manageable, this behavioral shift concept could be helpfully applied to environment emergencies.[60] While pandemics are fast moving and therefore susceptible to immediate battles as happened with SARS, the environmental emergencies tend to be taking place in 'deep time' with the need for very long-term strategies and action.[61] However, given the dramatic blue skies and enforced ways of change in recent months, it may be possible to undertake actions previously believed to be impossible in the short term to preserve low levels of pollution, etc., associated with the pandemic's impact. In turn, this would achieve the accelerated action seen as necessary to achieve tougher goals for the long-term.[62]

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[59] https://www.chinadaily.com.cn/a/201904/25/WS5cc181c5a3104842260b8626.html ; BRIGC Themes include: Biodiversity and Ecosystem Management; Green Energy and Energy Efficiency; Green Finance and Investment; Improvement of Environmental Quality and Green Cities; South-South Environmental Cooperation and Capacity Building towards Realising the 2030 Agenda on Sustainable Development; Green Technology Innovation and Corporate Social Responsibility; Environmental Information Sharing and Big Data; Sustainable Transportation; Global Climate Change Governance and Green Transformation; Environmental Laws, Regulations and Standards.

[60] https://www.politico.com/news/magazine/2020/03/26/what-the-coronavirus-curve-teaches-us-about-climate-change-148318 ;

[61] Arno Kopecky. 7 April 2020. *A Fast Moving Virus, a Slow Changing Climate. https://thetyee.ca/Analysis/2020/04/07/Pandemic-Foreshadows-Climate-Change-Catastrophe/*

[62] Martha Henriques. 26 March 2020. *Will COVID-19 Have a Lasting Impact on the Environment.* BBC Future. https://www.bbc.com/future/article/20200326-covid-19-the-impact-of-coronavirus-on-the-environment

'Rethinking growth as a means to live within Planetary Boundaries and an appropriate global Ecological Footprint.' From this ecological systems point of view[63], the COVID-19 pandemic is a preview of more severe future crises. Several conclusions are suggested: the current pandemic is an inevitable consequence of human population expansion and with circumstances that includes among other effects: (1) the consumption of wildlife carrying potentially dangerous pathogens; (2) related to living under situations of densification and urbanization; (3) lack of adequate access to sanitation for billions of people; and (4) emergence of disease, resource catastrophes like wildfires, pollution, etc. These concerns point to collapse. In the wake of COVID-19 the political call seems to be for a return to previous conditions of growth as the normal state. But in this analysis "normal is the pathology" that "guarantees a repeat performance". Much of the economy will have to be rebuilt to size in ways that include "globally networked but self-reliant national economies" for a "smaller human family".

Trade-off analysis as a tool to identify explicit or implicit trade-offs linking the environment and health or economic recovery. UNEP's Chief Environmental Economist explained this approach in a recent interview [64], starting with the tragic case of several thousand deaths from COVID-19 in China but with indirect air quality benefits [65] due to the strict efforts taken, since many more thousands of people perhaps will be saved from premature deaths from air pollution—an example of implicit trade-off since it was not anticipated. "Lockdown of Hubei province contributed to a reduction in [air] pollution that, according to a Stanford University researcher, may prevent 50,000 to 75,000 people from dying prematurely. This demonstrates a trade-off between consumption-driven society (and its interference with nature) and the resiliency of nature and ecosystems…We must try to understand and appreciate the limits to which humans can push nature, before the impact is negative. Those limits must be embraced by our consumption and production aspiration…How can trade-off analysis be used to address COVID-19 and in anticipation of similar crises? A strong collaboration of science–including economics, natural sciences, zoology and ecology–should identify, assess and quantify the losses and gains across stakeholders over the present and future…Such robust research enables economists to identify both the benefits of reduced pressure on nature and the economic costs; while natural scientists elaborate the biological and health system factors affecting economic gain or loss...Decision makers must carefully evaluate the potential impacts of trade-offs–considering who will gain or lose, and

[63] William Rees. 6 April 2020. *The Earth is Telling Us We Must Rethink Our Growth Society*. The Tyee. https://thetyee.ca/Analysis/2020/04/06/The-Earth-Is-Telling-Us-We-Must-Rethink-Our-Growth-Society/

[64] Pushpam Kamar (UNEP published interview). March 2020. *COVID-19 and the Nature Trade-off Paradigm.* https://www.unenvironment.org/news-and-stories/story/covid-19-and-nature-trade-

[65] See *COVID-19 reduces economic activity, which reduces pollution, which saves lives.* However, the author, Marshall Burke of Stanford University, points out that none of his calculations support any idea that pandemics are good for health…these harms likely vastly exceed any health benefits from reduced air pollution. http://www.g-feed.com/2020/03/covid-19-reduces-economic-activity.html

how—and draw on collective wisdom to determine the next steps in the challenges we face today."

"What the Post-COVID-19 Economic Recovery Models Are Getting Wrong"

The 'return to normal' from COVID-19 is often cast in terms of the GDP yardstick. This may be accompanied by arguments that it is necessary to suspend environmental standards for a number of years as sectors and enterprises struggle to previous levels of economic activity. Nishan Degnarain[66] argues that this is a "false tradeoff". Instead of the indicator of GDP growth, he believes that "models of recovery need to clearly articulate how they will fundamentally redefine our economies' relationship with nature."

Degnarain suggests that "Rather than a drain on growth, a Sustainable Green Economy should be viewed as a multi-trillion exciting new growth and job-creating opportunity…It will create new economic winners in the green economy that could go on to displace slower-moving incumbents." To demonstrate this, he has constructed four possible scenarios for planetary health that incorporate COVID-19 Policy Responses that are strong (effective health and economy response) or weak (prolonged health crisis, widespread recession, high unemployment); similarly there can be strong (new green economy with effective strategy) or weak (loosening of environmental regulations) Planetary Health Responses. When these are plotted over time, they can result in four scenarios labeled as: A. Accelerated Planetary Decline (BAU economic recovery and lost years of environmental reform); B. Disorderly Planetary Recovery (patchwork of COVID, economic and planetary interventions); C. Slow Planetary Recovery (virus contained but weak economic and environmental recovery); and D. Planetary Renaissance (virus contained, strong economic and environmental rebound). Clearly Scenario D will be most desirable; anything else must be considered inadequate. This scenario would result in a "V"-shaped Planetary Health curve over time—important for climate change, biodiversity and SDG2030 goals, as well as for the battle to control the COVID-19 pandemic. However, at the moment, we are far from Scenario D. Indeed, we are in danger of falling into Scenario A or B.

Menu for Innovation and Green Stimulus Packages

The pathway for change has been laid out in a number of different ways. For industry it is the WEF Fourth Industrial Revolution "characterized by the fusion of the digital, biological, and physical worlds"[67] but led by innovations in a number of IT, AI, biotech and many other fields. For global society, the carefully negotiated UN 2030

[66] https://www.forbes.com/sites/nishandegnarain/2020/04/22/not-back-but-forward-what-the-post-covid-19-economic-recovery-models-are-getting-wrong/#66e10c227abb

[67] https://www.brookings.edu/research/the-fourth-industrial-revolution-and-digitization-will-transform-africa-into-a-global-powerhouse/ ; https://www.weforum.org/focus/fourth-industrial-revolution

Sustainable Development Goals provide a broad roadmap oriented towards many necessary social dimensions, led by inclusiveness, poverty elimination and environmental sustainability. For green economy and green development it might be considered in the context of a specialized green stimulus package in the aftermath of the COVID-19 pandemic. In Canada the framework for such a package was proposed by the Smart Prosperity Institute following the 2008 global financial meltdown, but not put in place. [68] It is still a helpful starting point for thinking post-COVID. Obviously there is overlap among these and other innovation initiatives. The push for synergies is important, and the need to incorporate both climate change and biodiversity is strategic.

While there might be any number of green stimulus packages proposed in coming months or years, the largest proposal so far is an eight-point package proposed by some "progressives" in the USA. This proposal draws upon people from various sectors and organizations, and has been circulated within congressional circles.[69] It amounts to a starter investment of at least $2 trillion followed by automatic renewal of 4% per year (estimated to be about $850 billion) until the economy is fully decarbonized and the unemployment rate is below 3.5 %. Even if these levels could not be started immediately due to the immediate focus of dealing with COVID-19 impacts and cost, the recovery should be linked. Planning should take place so that very quickly there would be major green economy/development projects.

A 'menu', comprised of eight practical policy interventions aligned with green principles and four strategies is proposed: (1) housing, buildings, civic infrastructure, and communities; (2) transportation workers, systems and infrastructure; (3) labour, manufacturing and 'just transition' for workers and communities; (4) energy system workers and infrastructure; (5) farmers, food systems, and rural communities; (6) green infrastructure, public lands, and the environment; regulations, innovation, and public investment; and (8) green foreign policy. The initiative is intended as "an inflection point for the USA—building a healthy, clean, and just future". In an election year for the US Presidency and Congress, this proposal will be seen in different lights according to perspectives both within and between political parties.

POST-COVID-19 LONGER-TERM GREEN STIMULUS/RECOVERY

Can there be a long-term framework for Green Stimulus Packages globally, regionally, or for individual countries, rich and poor? While there may be some common characteristics, one size is not likely to fit all. However, it is worth starting with identification of some common characteristics needed for comprehensive and

[68] This independently proposed green stimulus package for Canada was released in 2009. https://institute.smartprosperity.ca/sites/default/files/publications/files/Building%20A%20Green%20Economic%20Stimulus%20Package%20for%20Canada.pdf

[69] https://medium.com/@green_stimulus_now/a-green-stimulus-to-rebuild-our-economy-1e7030a1d9ee

sustainable stimulus packages, including the following (with italicized comments of individual leaders):

- Start by rapidly addressing key issues on economic, social and health concerns and impacts associated with the COVID-19 outbreaks and pandemic. This should include widespread effort and support for countries and people already facing humanitarian crises. *Get immediate help for people hurting*.[70]
- Plan for a permanent (enduring) approach with continuity, and with links to still extant global and national emergencies involving poverty, violence against women and girls, resilience and sustainability, emergencies of climate change, biodiversity, and oceans; and other serious matters such as the plight of refugees. *Tackling one crisis must not come at the expense of others*.[71]
- Ensure there is a gradual move from the immediate concerns associated with recession and disease control to a profound, systemic shift to a more sustainable economy that works for both people and planet. *As we inch from a "war-time" response to "building back better" we must take on board the environmental signals and what they mean for our future and wellbeing.*[72]
- Build stronger international cooperative arrangements, perhaps greater than ever seen in previous decades or even centuries. Such arrangements must focus attention on financing, science and technology advances and applications, institutional strengthening and new models of cooperation especially for investment and green trade rules, full involvement of business and social organizations. *The world faces its gravest test since the founding of the Organization* [the United Nations] *...This is not a time for political opportunism.*[73]

The way forward can be built on the strengths and experience of individual country plans to produce a sum of the parts approach. To some extent this is what happens now in the experience with climate change and biodiversity efforts since outcomes and progress are defined by the robustness of nationally defined contributions (NDCs) [74] to greenhouse gas emissions, for example under the Paris Agreement on Climate Change. The situation is more complex with the Biodiversity Convention, and with the UN 2030SDGs, since there are so many targets and no single globally agreed outcome (c.f., in the climate change case, measurement of the global level of a limited number of greenhouse gases mixing in the atmosphere).

[70] David Roberts. 25 March 2020. *A Just and Sustainable Economic Response to Coronavirus, Explained. In the Short-Term Recovery; in the Long-Term, Resilience and Renewal. https://www.vox.com/energy-and-environment/2020/3/25/21180248/just-sustainable-economic-response-coronavirus-explained*

[71] Achim Steiner and Angel Gurría. 9 April 20. *Opinion: COVID-19 –How to Avert the Worst Development Crisis of This Century.* https://www.devex.com/news/opinion-covid-19-how-to-avert-the-worst-development-crisis-of-this-century-96962

[72] Inge Andersen. 5 April 2020. *COVID-19 Is Not a Silver Lining for the Climate.* https://news.un.org/en/story/2020/04/1061082

[73] António Guterres . 9 April 2020. *Remarks to the Security Council on the COVID-19 Pandemic.*

[74] https://unfccc.int/nationally-determined-contributions-ndcs

For the Post-COVID-19 stimulus packages, a very complex situation is likely to emerge due to the various phases of the disease (which may not be synchronized among countries) leading to difficulties with the suggested idea of a staged effort to gradually place more emphasis on other global emergencies. This raises two points. First is that it may make for a prolonged transition period before the other emergencies are sufficiently addressed. Say, a minimum of five years. Second is that we are already seeing in some countries a desire to move away from existing green standards, using the virus pandemic recovery as an excuse. The combination could fully negate the opportunity to accelerate the pace of both protecting biodiversity and ecosystems, and decarbonization of the economy.

There are ways around these issues, for example: (1) find synergies between actions to reduce the pandemic damage and enhance recovery by taking advantage of nature-positive risk reduction to lessen impacts of new outbreaks; (2) similarly with climate change, for example, promote cleaner air leading to less intensive future health risks; (3) recognize that the virus outbreaks and economic recoveries are non-linear, with surprises to be expected, thus opening new windows on how to link with complex natural system needs. Another important point is that it will be difficult to maintain continuity, given the realities of governance systems. Take full advantage of the remarkably fast decision-making occurring in the early stimulus packages (most, however, have not been particularly green). One perspective is that it is better to make the stimulus packages big from the start[75] and keep the opportunity to bring in environmentally positive aspects as soon as possible. Ideally, do this in a way that does not require a great deal of time lost in further medium and longer-term decision-making and other delays.

The point about turning crisis recovery into long-term investment for a sustainable future economy and society means that the perspective on stimulus and recovery packages should be probably a minimum of 10 to 15 years (still medium-term). That could set up the proper pace for meeting very robust sustainability goals by 2030 to 2035, and then continue with even stronger visions such as total decarbonization in the global economy as proposed by numerous countries, and the CBD vision of 'Living in harmony with nature' by 2050.

How will green investment fare in light of the massive short-term expenditures (especially in richer countries) on fighting the dual battle of health care and catastrophic economic decline? Will, for example, green bonds recover quickly from a dramatic slowing in the first three months of 2020?[76] Will the investment in renewable energy suffer as a consequence of low oil prices, or will the fossil fuel sector be on an inexorable path towards becoming stranded assets? What should be

[75] See David Roberts (*A Just and Sustainable Economic Response to Coronavirus*) who makes the point that small stimulus packages run the risk of economic suffering and unemployment being prolonged so that other problems get inadequate attention and funding.
[76] https://www.environmental-finance.com/content/news/covid-19-slams-the-brakes-on-green-bond-issuance.html

the role of the cruise ship industry and some other elements of tourism in the post-COVID-19 economy?

CONCLUSIONS

By reducing risk of future environment and development crises we stand the best chance to achieve at least the basics of sustainable development and ecological civilization within a generation. This is a strong message from our examination of factors related to the already historically significant COVID-19 pandemic, and concerns about how it and potential future epidemic events might derail aspirations for a healthy relationship between people and nature. We believe the 'One Health' paradigm (see Berlin Principles in Annex 2) worked out in some detail over the past 15 years—but still not fully put into practice globally and nationally—provides important means to prevent future pandemics before they can take hold.

In hindsight, failure to follow up adequately after recent past epidemics with some obvious steps may now seem truly regretful. An example in many parts of the world is the unmet need to rapidly and permanently eliminate contacts between people and disease-carrying organisms in local wet markets. Another is the inadequate investment in research and management efforts across a spectrum of matters pertaining to ecological destruction and its role in human health. Much greater attention must be given to cooperation and collaboration between scientists and policy makers to build adaptive solutions, and, sometimes, new levels of integrative planning and management. For example, it is encouraging that we now see direct involvement of the financial sector working with leading scientists on response packages for addressing COVID-19, climate change and biodiversity emergencies. Yet, the science for understanding and acting on global emergencies is still lagging. Synergies are needed to build adequate nature-based solutions and nature-positive economic recoveries.

If the future is a return to the past, little will have been learned as a consequence of this major event. On the other hand, people around the world are recognizing some of the environmental benefits of a forceful pushback from the high consumption pressures: the quick return of blue skies and cleaner water; the virtues of a slower, more reflective basis of activities. Also, just how effective governance decisions can be when they are taken definitively—and ideally in a timely, coordinated and collaborative way. The perspective of integrated planning and management, pushed so hard in the UN SD2030 Goals, is demonstrably a path for reaching an Ecological Civilization in China and perhaps elsewhere.

The term Biosecurity as expressed in this paper is ensuring health of people and planet by living within boundaries set by Nature and not by the hubris of our species. Certainly, new knowledge and technologies are needed to address the realities of Planetary Boundaries. Yet we have been humbled by the smallest forms of life many

times before, and once again must recognize the extremely high costs. So many assumptions will be altered by this current situation and in the recovery.

CORVID-19 recovery is sometimes described as 'hitting the reset button', altering our priorities for the entire decade and perhaps well beyond. But it should not be the return to past, unsustainable practices. If future generations can live more securely as a consequence of the reset, the tremendous social and other human costs of our immediate emergency will not have been experienced in vain. That means placing much greater emphasis during this decade on solving those other global emergencies: poverty elimination, climate change and Nature's decline while addressing COVID-19 recovery.

RECOMMENDATIONS FOR CHINA

The rise of COVID-19 means that a disease described by one CCICED former Member as creating 'humanity's darkest hour' [77] now dominates what was to be the '2020 Super-year for the Environment' to address multiple ecological planetary emergencies of biodiversity, climate change, health of the ocean, and, a time to address progress on the UN 2030 Sustainable Development Goals. China was to host the global Convention on Biological Diversity (CBD) 15th Conference of Parties in Kunming in October 2020. The COP 15 meeting is to set new goals for this decade. All of these and many other meetings have been postponed, generally to 2021. What will be the priorities of countries by then, after the economic, social and other shocks created by this pandemic? We can expect tens of trillions will be committed to meet immediate needs and longer-term economic recovery from the COVID-19 Pandemic. Likely this will constitute an unprecedented level of investment—and possibly for an indefinite period.

Yet the environmental emergencies will still loom large, and indeed are likely to increase in severity. We have little choice nationally and globally but to ensure that existing investments for environment and development are protected and enhanced in the years ahead. Therefore, we must shift our thinking to a strategy consistent with a 'Super-Decade of the Environment'. We also must try to make the COVID-19 economic recovery time not to be a reversion to an unsustainable state of affairs. It should be a time for sparking innovation on many fronts.

Some talk of 'pressing the reset button'. Surely not for returning to globalization as it was, or for the continued erosion of biological wealth and rising levels of climate change, or for a return to unsustainable production and consumption systems. We need to consider how to live within Planetary Boundaries, and in a comprehensive

[77] Kristalina Georgieva, IMF Managing Director. 3 April 2020 in a joint press conference with the head of WHO. *This is, in my lifetime, humanity's darkest hour and a big threat to the whole world. What is required from us is to stand tall, be united and protect the most vulnerable of our fellow citizens on this planet.*

fashion reduce environmental risk, including the risks to both human health and ecosystem health. This is essential if we are to reach a new level of global biosecurity to involve all forms of life, and to meet the goals of sustainable development. Only then will we achieve the vision of 'Harmony between People and Nature' and as noted for the theme of CBD COP 15, *Ecological Civilization: Building a Shared Future for All Life on Earth.*

Recommendations on ecology and environment after the pandemic cover distinctive time frames: China's 14th Five Year Plan (2021-2025); Medium-term Plans (2020 to 2030/2035) covering target periods such as achieving the UN Sustainable Development Goals and China's efforts for having a basic Ecological Civilization in place; and longer-term to 2050 consistent with various targets related to decarbonization, full realization of biodiversity recovery, and China's ambitions for a prosperous society and a 'Beautiful China.'

China can carry out these recommendations not only domestically but also in partnership with other countries, especially through Green Belt and Road Initiatives and other international programs. Also, via China's participation in global governance efforts and funding, for example via UNDP, WHO, UNEP; domestic and international lending sources such as the Asian Development Bank, the AIIB and the New Development Bank (NDB); and with enterprises, research or other organizations.

The five recommendations below form a starting point for on-going discussion and action. Deliberately, they are broad to encourage in-fill with more detailed and action-oriented ideas as the current COVID-19 Pandemic continues to unfold, and as specific recovery initiatives take shape (see Annex 5 for some of the current thinking).

Recommendation 1. During the 14th Year Plan Period significantly reduce the level of environmental and ecological risks that can lead to human, plant or animal disease outbreaks, epidemics or pandemics.

The 'One Health' approach linking health of ecosystems, plant and animal health, and public health should be more strongly supported in China. This will require taking an integrated approach to preventing disease outbreaks. Better screening of health risks is needed as part of environmental assessments, green development initiatives, and for recovery packages with components that might seriously increase pollution and greenhouse gases, or disrupt intact ecosystems.

Scientific research and monitoring need to be greatly improved, especially of disease passed from animals to humans (zoonoses), involving either domesticated animals or wildlife. The recent Chinese law with a permanent ban on hunting, wet markets, and the revoking of many licenses for wildlife husbandry will help to reduce probability of future cross-species disease outbreaks if strictly enforced, but is still not complete enough to reduce risk sufficiently.

TCM exception from the new law intended to reduce wildlife commerce will weaken the effort to reduce threat of new disease outbreaks. Therefore, establish a 'Nature-friendly' 21st Century Traditional Chinese Medicine approach. Various TCM products require attention regarding ecological impacts related to their sourcing. Also, whether rising TCM demand might be met in different ways, for example by advanced biotechnology applications for animal tissue culture, and substitution strategies to stop exploitation of threatened and endangered species.

Recognize that humans can pass on disease to animals in the wild; or in domestic animal husbandry circumstances (reverse zoonoses). An example is H1N1 influenza virus. Another is antibiotic resistant bacterial infections. There is a need for building understanding of such situations, and to further strengthen biosafety protocols and other measures to address such epidemics.

Recommendation 2. Establish and lock-in new baseline or reference levels of pollution taking into account air, water and perhaps other forms of pollution reduction experienced during the current coronavirus pandemic.

Evidence is mounting that the economic downturn and health measures related to the COVID-19 pandemic have significantly improved air and water quality, reduced noise pollution, and reduced fossil fuel use, generally with favorable public reaction. Every effort should be made to protect these gains, in some cases making the reductions the new normal and seeking transformative objectives in stimulus packages where necessary. This is a one-time opportunity to accelerate environmental quality progress, starting now but with a cascading effect that can last into medium and long-term time frames. In order to get the full positive impact, it may be necessary to include tailored green incentives within COVID recovery packages.

The flip side of this recommendation is to tighten efforts to reduce types of waste or to avoid misplaced actions associated with health initiatives. An example of an emerging waste problem is improper disposal of the mountains of single use facemasks and other protective equipment Another, more complex concern is that well-meaning efforts to reduce epidemic concerns can lead to unnecessary reductions in numbers of particular wildlife species (e.g. civet, as occurred after the SARS outbreak), or misplaced ecological alterations such as draining of wetlands to reduce presence of migratory waterfowl in domestic chicken rearing areas).

Recommendation 3. Ensure economic stimulus and recovery packages support green development and protection of nature. Also, do not relax environmental and ecological standards either nationally or in areas hard hit by the disease outbreak. If necessary, provide subsidies or other incentives on a temporary basis. Green stimulus packages specifically aimed at climate change and many types of biodiversity conservation should be medium or longer-term (5 to 15+ years).

There are several points to consider for national level stimulus packages for economic recovery from COVID:

- Green screening criteria need to be considered for all recovery projects to avoid environmentally damaging investments.
- Focus greater attention on green infrastructure, decarbonization efforts, further stimulus for the transition to renewable energy, public transportation involving transition to electric buses, etc.
- Green employment in various sectors and improved eco-compensation packages.
- Maintain green development incentives that enhance ecological services.
- Expand support for sustainability-oriented projects with strong multiplier effects.

Recommendation 4. Strengthen China's commitment to building ecological resilience as a medium and long-term transformative approach towards national biosecurity.

China's significant investment in ecological construction of forests, grasslands and wetlands**,** improvement in management of parks and nature reserves, and integrated management of river basins and coastal areas should be strengthened by setting site-specific ecological resilience goals throughout the country. These can be related to specific needs related to human or plant and animal health, ecological services, or other needs such as strengthening ecological corridors as migration routes.

Use ecological redlining as a key mechanism to reduce ecosystem disruptions that are an important factor in disease outbreaks. It is a means to ensure full ecological restoration of damaged habitats and maintenance of high biodiversity. Develop criteria related to specific health-related needs for use in determining location, protection and management of redlined areas.

Recommendation 5. Assist China's Belt and Road Initiative partner countries to green their COVID-19 recovery packages especially through investments that enhance their natural capital and ecological infrastructure.

Expanded sharing of Chinese experience, building better green partnerships and providing additional financial support are some of the prime means for China to assist developing countries in meeting their sustainable development goals, and national development commitments made under climate change, biodiversity, desertification and other global agreements. These aspects can be directly linked into both infrastructure and COVID recovery packages.

ANNEX 1. Terminology

Biosecurity

Source: Institute of Medicine and Natural Research Council. 2006. *Globalization, Biosecurity, and the Future of Life Sciences*. National Academies Press. Washington, D.C. https://doi.org/10.17226/11567
Security against the inadvertent, inappropriate, or intentional malicious or malevolent use of potentially dangerous biological agents or biotechnology, including the development, production, stockpiling, or use of biological weapons as well as natural outbreaks of newly emergent and epidemic diseases. Although it is not used as often as it is in other settings, to refer to a situation where adequate food and basic health are assured.

Source: http://www.fao.org/fileadmin/templates/abdc/documents/frampton.pdf
The exclusion, eradication or effective management of risks posed by pests and diseases to the economy, environment and human health. [New Zealand]

Biosecurity shall contribute to achieving Gross National Happiness by ensuring Bhutanese people, the biological resources, plants and animals are protected from the harmful effects of pests and diseases, invasive alien species, genetically modified organisms, toxic chemicals and food additives. [Bhutan]

A strategic and integrated approach that encompasses the policy and regulatory frameworks for analysing and managing relevant risks to human, animal and plant life and health, and associated risks to the environment…As such, biosecurity covers the introduction of plant pests, animal pests and diseases, and zoonoses, the introduction and release of genetically modified organisms (GMOs) and their products, and the introduction and management of invasive species. [FAO]

Coronavirus
Source: https://en.wikipedia.org/wiki/Coronavirus
A group of related viruses that cause diseases in mammals and birds. In humans, coronaviruses cause respiratory tract infections that can be mild, such as some cases of the common cold (among other possible causes, predominantly rhinoviruses), and others that can be lethal, such as SARS, MERS, and COVID-19.

Coronavirus SARS-CoV-2 (originally virus and disease called '2019 novel coronavirus')
Source: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it
Severe Acute Respiratory Syndrome Coronavirus 2

COVID-19
Source: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it
The infectious disease caused by this newly discovered coronavirus

Ecological Redline (China Ecological Conservation Red Line - ECR)
Source: https://www.nature.com/articles/d41586-019-01563-2

Permanently designated ecologically sensitive and vulnerable areas in land, freshwater and ocean that must be protected to ensure their ecological function and nature remain unchanged.

Precautionary Principle

Source: http://www.ejolt.org/2015/02/precautionary-principle/

The precautionary principle applies where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the high level of protection chosen by the EU. [EU, 2000]

Zoonosis

Source: https://medical-dictionary.thefreedictionary.com/zoonosis

Diseases that can be passed from animals, whether wild or domesticated, to humans.

ANNEX 2. Berlin Principles for 'One Health'

The Berlin Principles for a United Effort to Prevent the Emergence or Resurgence of Diseases that Threaten Human, Wildlife, and Livestock
Wildlife Conservation Society, October 2019

We urge world leaders, governments, civil society, the global health and conservation communities, academia and scientific institutions, business, finance leaders, and investment holders to:

1. Recognize and take action to retain the essential links between human, domestic animal, wildlife, plant and environmental health for human existence and well-being, food and nutrition security, and sustainable development; therefore take action to ensure the conservation and protection of biodiversity, which interwoven with intact and functional ecosystems provides the critical foundational infrastructure of life on our planet;
2. Take action to develop strong public health institutions that firmly engage and collaborate with policy-makers and invest in robust science-based knowledge translation into policy and practice;
3. Take action to combat the current climate crisis, which is creating new severe threats to human, animal and environmental health, and exacerbating existing challenges;
4. Recognize that decisions regarding land, sea, and freshwater use directly impact health and that alterations in ecosystems paired with decreased resiliency generate shifts in communicable and non-communicable disease emergence, exacerbation and spread, and take action accordingly to eliminate or mitigate these impacts;
5. Devise adaptive, holistic and forward-looking approaches to the detection, prevention, monitoring, control and mitigation of emerging/resurging and exacerbating communicable and non-communicable diseases that incorporate the complex interconnections among species, environment, and human society, while accounting fully for harmful economic drivers, environmentally harmful subsidies and climate impacts;
6. Take action to meaningfully integrate biodiversity conservation perspectives and human health and well-being when developing solutions to communicable and non-communicable disease threats;
7. Increase cross-sectoral investment in the global human-, animal-, and plant health infrastructure and international funding mechanisms for the protection of ecosystems, commensurate with the serious nature of emerging/resurging and exacerbating communicable and non-communicable disease threats for life on our planet;
8. Enhance capacity for cross-sectoral and trans-disciplinary health surveillance and clear, timely information sharing to improve coordination of responses among governments and NGOs, health institutions, vaccine/pharmaceutical manufacturers, and other stakeholders;
9. Form participatory, collaborative relationships among governments, NGOs and local inhabitants, and indigenous people while strengthening the public sector to meet the challenges of global health and biodiversity conservation; and
10. Invest in educating and raising awareness for global citizenship and holistic planetary health approaches among children and adults in schools, communities, and universities while also influencing policy processes to increase recognition that human health ultimately depends on ecosystem integrity and a healthy planet.

https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/13435/Global-Health-Leaders-Issue-Urgent-Call-for-United-Effort-to-Stop-Diseases-Threatening-All-Life-on-Earth.aspx

ANNEX 3. Environmental Action Suggestions from UNESCAP Report on Post-COVID Policy.

(ESCAP. March 2020. *The Impact and Policy Responses for COVID-19 in Asia-Pacific.* https://www.unescap.org/sites/default/files/COVID%20_Report_ESCAP.pdf)

Government stimulus packages should aim to accelerate decarbonization and greening of the economy, including sustainable mobility, not simply support "business as usual" decision-making and practices…In a landscape where corporate bailouts might be needed in order to save jobs and maintain social wellbeing, it is crucial that such bailouts should not support businesses and sectors that are main drivers of environmental degradation.

Governments should invest their efforts in "returning to the new normal", promoting the best practices and innovative solutions piloted during the outbreak as the recommended best practices. Transport and other regulations, resulting in unintended externalities during the disruptions must be revised and contingency scenarios adjusted, learning from the COVID-19 experience.

While many supply chains originating in China for renewable energy components are slowly being re-established, ***the renewable energy sector should diversify and localize supply chains to increase resilience to future disruptions.*** On the demand side, it is important the COVID-19 does not distract the focus on policy support to renewable energy deployment. This needs to continue to ensure the urgent long-term goal of decarbonizing the region's energy systems is addressed. Failure to do so could result in a rebound that continues the previous carbon intensive pathway.

Regional cooperation remains vital as it enables collaborative efforts, exchange of best practices and lessons learned and careful examination of the short- and long-term impact of implemented or anticipated travel and freight transport restrictions. It is also indispensable to continue bridging the infrastructure divide, ensuring that no country or territory is left in the fight and recovery alone.

The current COVID-19 pandemic is also a reminder of the intimate relationship among humans, animals and the environment, particularly in dense urban environments. Robust and comprehensive environmental policies may prevent and mitigate future pandemics; cities should better monitor and design the use of public spaces and access to WASH services; countries should collaborate to simultaneously ban trade of wildlife, harmonize sanitary standards across the region and address the interacting threats due to illegal trade, habitat loss, climate change, and different sources of pollution.

The outbreak underscored once again that ***consistent, coordinated and evidence-based policy measures, grounded in a strong political will and commitment to sustainability, will lessen the environmental impact of economic and social activities in the long run.*** These policies will need to act on multiple fronts, setting clear goals and targets. These include investing in human and institutional capacity, leveraging technology and innovation, improving urban basic services, as well as supply chain and other logistics management mechanisms.

ANNEX 4. Minimizing Infection Risk from Animal Consumption

By Alice C. Hughes Associate Professor, Centre for Integrative Conservation, Xishuangbanna Tropical Botanical Garden , Chinese Academy of Sciences

Preface

Biodiversity has inherent value, and intact ecosystems deliver numerous services to people, from reducing flooding and erosion, pollination services (88.7% of angiosperms require pollinators and pollination improves quality and quantity of 70-85% of crops globally), and natural pest-control services, in addition to cultural and aesthetic value. Maintaining healthy ecosystems and native species has many benefits, including social, cultural and economic service provision, and, in addition to direct benefits and natural products and services, can provide additional revenue through tourism. Unsustainable use of these systems not only decreases biodiversity, but also has potential risks from the destabilization of slopes leading to increased risk of landslide, to the risk of disease, or the failure or decreased productivity of crop plants.

Wildlife trade is a multibillion dollar industry, yet international attention frequently focuses on only international illegal wildlife trade of "high value" species and tends to neglect trade in lower value animals as pets, for consumption or for medicine, though this can impact on a far greater volume of species and is frequently less regulated. These high value species are also often the only species safeguarded by wildlife protection laws, leaving other species frequently little regulated. This poses both a risk to wildlife and a risk to humans. Wildlife, especially if eaten and poorly cooked, can pose a risk of disease to handlers and consumers. Unsustainable and under-regulated trade in wildlife poses a threat to humans and biodiversity, by undermining components of the economy through the removal of services dependent on biodiversity and by the risk of disease. To minimize these risks, ten core concepts (the Berlin Principles[i]) have been created to support 'One Health', a strategy to protect human and animal health while ensuring the protection and maintenance of biodiversity.

Risks Associated with Wildlife Consumption

Whereas domesticated animals may be kept in good conditions, well fed, sometimes dosed with antibiotics and screened for infection, the same is not true for animals captured from the wild. Poor quality habitat and poor nutrition can lead to immunosuppression in wildlife, which may be found in habitat patches surrounding human habitations.[ii]. In addition, while most livestock should be vaccinated, and screened and therefore have reduced exposure to pathogens, the same is not true for wild-caught animals, which especially when living in degraded habitats may also have larger ranges and higher levels of exposure to pathogens.

The ability of wild animals to carry diseases also varies dramatically by group. In recent years a number of pandemic diseases have emerged either from the direct consumption of wild animals or by close contact between wild caught and domestic animals for

consumption, especially when hygiene standards are poor. Threat is at its highest if animal products are eaten raw. Thus, the consumption of fresh blood or tissue carries a very high chance of passing on diseases, including not only viruses such as corona but even prions and viriods which would be destroyed through the cooking of tissue.

Globally most pandemics in recent years started with the capture and consumption of wildlife. Bats and carnivores pose the greatest risk of sources or diseases with the potential to cross into humans, and should not be consumed under any circumstances. Pandemics originating in these groups, or using them as an intermediate vector, include SARs, MERs, Ebola, Nipah and now Covid-19 (among others). Of these Ebola is likely through direct consumption of bats, though some other mammals can also be carriers, Nipah originates in bat urine (normally through the consumption of toddy wine, which if left in open vessels, bats can drink and urinate into), and the three Corona viruses (SARs, MERs and Covid-19), which likely originated in bats or civets and were transmitted into humans through civets or another intermediate host. Bats (especially Rhinolophids) and Civets show similar expression of the viral genes, and similar viral genomes, thus both have the potential to be a source for the viruses though the transmission route into humans is little known. Thus, minimizing contact between people and these groups, and ensuring high quality habitats to reduce the susceptibility, spread and any infection risk between wild animals and humans has multiple benefits in terms of enhanced service provision and decreased risks of diseases.

What is wildlife?

A simple definition of non-wildlife, especially when considering animals bred for consumption, may only consider domesticated animals (such as cattle, sheep and pigs) that have undergone considerable selection to enhance their body size or other factors. However, this definition ignores many commonly farmed animals from deer, to some poultry to camels, llamas and reindeer. Thus, defining what is wildlife is surprisingly challenging, as animals may be actively bred for many purposes in addition to direct consumption. Legislation for captive breeding and how it can be better regulated needs careful consideration. Thus, the simplest solution to this issue is to delimit a list of species which can be bred in captivity for commercial purposes and maintain a central registry of approved sellers. This would enhance the ability to monitor and track any possible disease, and allow rapid targeted responses if any disease does emerge.

A more sensible definition of wildlife should tie to the origin of an individual and whether it is sourced from the wild, or was bred in captivity. Thus, regulating the trade in non-domesticated animals that are largely for domestic use requires careful considerations. The first consideration is which species need to be utilized; and how can they be screened to prevent a risk of infection. For general consumption of mammals only ungulates (Perissodactyla and Artiodactyla) should be eaten. These groups are far enough away from people genetically to pose a lower risk of disease transmission, and herbivores in particular are less likely to be exposed to viruses. Thus, captive livestock should not be fed meat and species from order Carnivora (especially mustelids) should not be consumed. The consumption of non-ungulate mammals is unnecessary for non-medicinal purposes, and

should be entirely stopped, as such animals are likely to originate in the wild and have considerable risk of spreading disease.

Furthermore high value items which are consumed as a status symbol (such as Pangolins) could be replaced by the investment into intangible cultural heritage of regional traditional and historical dishes which do not require wildlife, and which may stimulate the growth of traditional Chinese food varieties that otherwise might be lost—and have links to traditional Chinese culture. Additional alternative opportunities include investing in the farming of native insects, which provide a high nutrition and low-fat alternative to meat products, have health benefits, economic opportunities and the potential to reduce waste through feeding them waste vegetable products.

However, farming in some cases is from derivative products rather than direct consumption. Examples include bear bile and tiger-bone wine. These species are particularly contentious from an international perspective due to the CITES agreements, thus regulations for such species need to satisfy both international and domestic animal protection regulations; and ensure that all necessary steps are taken to minimize risk to wild populations and to minimize disease risk. Though the cessation of such trade would be favorably looked upon internationally this may not be possible, and in this case standards need to be developed and implemented to ensure that the trade in these species does not present a risk to people or wild populations. These same regulations also need to be applied to wildlife sourced for medicinal use, establishing a central database of approved sellers for certain items, so that what is being imported or traded can be closely monitored, any infectious agents quickly detected and controlled, and the trade of endangered, nationally protected or CITES listed species regulated.

Regulations for sustainable captive breeding

As carnivores are more likely to pass on diseases additional regulations are needed to regulate trade, and to prevent wild captured individuals being added to domestic stock. Central registries of all large mammals are needed, including a recorded genetic barcode and a tattooed or branded individual number on the ear of each individual. This enables screening of breeding centers at any time, but also the screening of any products (such as medicinal wine) to ensure that no traces of non-data based individuals are present in the wine, This is a check for the inclusion of non-registered and thus possibly wild stock. Such a system would prevent illegal laundering, as databases would include the birth and birthdates of any new individuals, and given that the barcode allows easy verification of parentage. The technique effectively prevents the import of wild individuals and thus minimizes the possibility of new diseases entering the system. The same approach can be applied to bears.

For the farming of native species such as the giant salamander, contact with wild individuals also increases the probable risk of infection, thus captive breeding facilities must be kept separate from natural waterways, and waste water should be filtered to remove the possible spread of diseases, or chemical products into waterways. Tagging programs, which operate in a similar way to those outlined above for large carnivores could also be

utilized to ensure that stock is captive bred, though tattooing of individuals would need to wait until individuals metamorphose into their final form. Preferably a single species of giant salamander could be farmed to facilitate monitoring.

Welfare standards are critical in such conditions, as increased stress makes for greater susceptibility of wildlife to disease, and raises the likelihood the disease will be passed onto other animals. Guidelines for sensible animal husbandry are outlined in the EAZA standards and policies for the Accommodation and Care of Animals in Zoos and Aquaria[iii], and provide a sensible basis for ensuring that disease risks are at their lowest.

Technologies for monitoring wildlife trade

An issue that has become apparent during the outbreak of COVID-19 is the lack of basic data on what is being traded—where it came from and its health status. In addition, it is the lack of hygiene provisions in the trade of wildlife that provides ideal conditions for disease transmission. Regulation of what is traded—where and how—will provide the ability to minimize the risk of disease transmission and rapidly identify and control any outbreaks.

Basic molecular barcoding of individuals combined with the development of a digital registry of captive-bred individuals of large non-ungulate mammals is valuable for tracking sources. Training staff involved in running such facilities in the use of these systems also allows for full transparency and monitoring of traded individual animals.

International trade also requires better regulation, including detecting what is passing over internal borders and what is being carried across international borders; especially given that many animals transported over land borders are likely to have been wild caught. Wildlife detection dogs have proved effective at detecting concealed wildlife, and could be used at land and air borders. Genetic screening (using Minion or other nanopore technologies[iv]) could also enable verification of species being traded and imported to prevent laundering, and ensure species being traded are being accurately reported (often the reporting is done by non-experts).

Recommendations to protect humans and wildlife

Ultimately, reducing the risk of transmission of diseases from animals to humans has three major facets that act to: reduce risk of infection and spread of diseases in wild animals; reduce the risk of any diseases moving from wildlife into humans; and decrease risk of captive populations harboring or passing on diseases.

1. ***Maintaining healthy native populations and minimizing risk of contagion***

a). Protect healthy habitats to ensure wildlife is healthy and less likely to carry diseases, or move into areas they could come into contact with humans or livestock.

b). In limestone mine sites and karsts prevent the destruction of caves, and decrease mining of karsts with known caves as this will cause the movement of Rhinolophid and other bat species, causing increased risk of passing pathogens between bats, or coming into contact with humans.

c). Where hunting is permitted it should be licensed so hunters are listed and have a specific quota of any listed species (e.g., pigs, deer), and are checked by local law enforcement agencies to ensure that only quotas are hunted. Non-ungulates should not be harvested from the wild, even though the majority of species are not listed in wildlife protection laws.
d). Wild meat, if for sale at all, should only be from licensed sellers and of species known to be unlikely to transmit diseases based on a quota and must be refrigerated and kept separate from other meat.
e). Prevent wild animals entering supply chains, wild caught animals should at no time be openly for sale, and if sold as meat a regulated system must be used.
f). Wildlife markets should be closed to prevent contact between wildlife and humans. As this is challenging in border markets (particularly Mongla and to a lesser extent Botan on Myanmar and Lao borders) borders should be entirely closed to human entry. Closure of borders would vastly reduce contact between humans and wildlife at such markets, and force higher value trade online where it can be dealt with through ecommerce strategies.
g). Imported wildlife intercepted at international crossings should be repatriated or sent to centralized holding facilities where they can be screened for diseases and rehomed to appropriate long-term facilities. Non-native species being domestically sold should also be seized and sent to screening centers unless sellers have licenses to permit the sale.
h). Where possible plant-based alternatives to the use of animals in traditional medicine should be further developed as the risk of contagion and source from animals used in this process is little known. Where unavoidable animal ingredients should be through licensed sellers subject to regular screenings.

2. *Preventing infection in captive animals*
a). Animal welfare links directly to disease susceptibility and spread, thus minimum welfare standards should be applied to the keeping of captive animals.
b). To ensure any diseases can be rapidly traced and stopped, central databases captive mammals for all mammals larger than a rabbit should be kept, with all individuals listed with unique identification numbers. Individuals should be listed in the database, and health checks and vaccination status noted.
c). For non-domesticated animals bred in captive conditions, especially carnivores (tigers, bears), online registry should include an individual genetic barcode which can be used to verify identity and prevent wild caught individuals being bought into the system.
d). Develop certification and quarantine facilities for imported animals to ensure they do not bring diseases into the country and the system is appropriately regulated.

3. *Preventing transmission into humans*
a). Meat should not be sold in open conditions but only by licensed sellers in shops where it can be kept refrigerated and separately wrapped. Blades used for cutting meat should be sterilized between uses, and disposal of waste meat conducted with care, or incinerated. No meat should be for sale in open conditions, and a registry of sources (livestock sellers) should be kept so any infections can be quickly traced to source.
b). No restaurant should be able to sell uncooked or uncured meat or blood, even specialist restaurants should not sell any raw meat for direct consumption.
c). Live animals sold in markets (e.g., poultry, ducks, rabbits) should be kept in standard conditions, with bedding changed several times weekly and the waste burned. Areas

around where these animals should be kept washed and disinfected at least three times weekly.
d). Find alternatives to food items currently used to symbolize high status or education such as investing in the resurgence of traditional regional Chinese dishes and food varieties

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https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/13435/Global-Health-Leaders-Issue-Urgent-Call-for-United-Effort-to-Stop-Diseases-Threatening-All-Life-on-Earth.aspx

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https://www.eaza.net/assets/Uploads/Standards-and-policies/Standards-for-the-Accommodation-and-Care-of-Animals-2014.pdf

https://nanoporetech.com/products/minion

ANNEX 5. POST-COVID-19 LONGER TERM GREEN STIMULUS PACKAGES

Some Recent Published and On-line Comments Related to Green Recovery Topics

These are arranged according to some of the key recommendations in the *Biosecurity to Ecological Civilization Draft Working Paper*. In some cases, excerpts are quoted. In others only the on-line reference is provided.

Recommendation 1. During the 14th Year Plan Period significantly reduce the level of environmental and ecological risks that can lead to human, plant or animal disease outbreaks, epidemics or pandemics.

OECD: [2020]

In developing immediate, short-term, sector-specific and macroeconomic policy responses to the COVID-19 emergency, governments may wish to:

- *Systematically evaluate possible unintended negative environmental impacts of new short-term fiscal and tax provisions.* While the priority is rightly on providing urgent relief to impacted businesses and individuals, a careful screening of the environmental impacts of stimulus measures would significantly add coherence to policies and avoid creating perverse and unintended environmental consequences that might damage the future resilience and environmental health of societies.
- *Do not roll-back existing environmental standards as part of recovery plans.* As countries implement urgent measures to tackle the health and immediate economic impact of the crisis, it will be important not to retreat from the gains made in recent decades in addressing climate change, air and water pollution, biodiversity loss, and other environmental challenges.
- Make sector-specific financial support measures conditional on environmental improvements where possible. The use of financial support measures such as preferential loans, loan guarantees and tax abatements could be directed towards supporting stronger environmental commitments and performance in pollution-intensive sectors that may be particularly affected by the crisis.
- Ensure that the measures will enhance levels of environmental health in order to strengthen the resilience of societies. A cleaner environment will have a positive impact on human health; for example, reductions in air pollution will improve the health of vulnerable segments of urban populations and can make them more resilient to health risks.
- Communicate clearly on the benefits of improving the overall environmental health of societies. Underscoring the benefits to well-being and prosperity from more resilient societies can strengthen public support for measures aimed at enhancing environmental health.

As the COVID-19 emergency evolves, the effects of governments' stimulus packages will need to be assessed with respect to the long-term environmental impacts. A focus on the transition to low emissions and resource-efficient economies will be a central component of such a process. For example, the investment plans associated with recovery will be critical in setting the environmental pathway for the next few decades, crucial for global efforts to avoid dangerous climate change.

https://www.oecd.org/coronavirus/policy-responses/from-containment-to-recovery-environmental-responses-to-the-covid-19-pandemic/

Recommendation 2. Establish and lock-in new baseline or reference levels of pollution taking into account air, water and perhaps other forms of pollution reduction experienced during the current coronavirus pandemic.

OECD [21 April 2020]

https://read.oecd-ilibrary.org/view/?ref=129_129937-jm4ul2jun9&title=Environmental-health-and-strengthening-resilience-to-pandemics

"Most important of all for the green economy, it is possible the economic stimulus that is already taking shape could put rocket boosters under the net zero transition, integrating government's top priorities to resolve the coronavirus crisis and the climate crisis at the same time. But it is also possible the stimulus will fixate on propping up 20th century carbon intensive infrastructure for another decade or so. The desire to return to a pre-coronavirus state, in every sense, will be all consuming. The silver linings may never come."
https://www.businessgreen.com/blog-post/4012857/myth-silver-linings

In a recent report by the International Energy Agency (IEA), it was found there has been a 3.8% decrease in energy demand in 2020's first quarter compared to 2019.With this in mind, the IEA therefore predict there will be a whopping 8% decrease in energy-related CO2 emissions in Europe and China, and a 9% decrease in the United States. However, it must be noted the decrease is not entirely due to the pandemic, in the US, for example, a proportion of it was caused by a warmer-than-average winter, *NPR* reports. The annual energy demand is predicted to drop by 6% – something which hasn't been seen since World War II.
https://www.unilad.co.uk/news/greenhouse-gas-emissions-predicted-to-have-largest-ever-decrease/

Recommendation 3. Ensure economic stimulus packages support green development and protection of nature. Also, do not relax environmental and ecological standards either nationally or in areas hard hit by the disease outbreak. If necessary, provide subsidies or other incentives on a temporary basis. Green stimulus packages specifically aimed at climate change should be long-term (5 to 15 years).

General:

Angel Gurria [OECD Secretary General 22 April 2020] "Governments have a unique chance for a green and inclusive recovery that they must seize – a recovery that not only provides income and jobs, but also has broader goals, integrates strong climate and biodiversity action, and builds resilience."
https://www.oecd.org/coronavirus/en/

Roadmap for Governments to address climate and post-COVID economic crises:

https://climateactiontracker.org/documents/706/CAT_2020-04-27_Briefing_COVID19_Apr2020.pdf

Resilience.com – 'Will civilization's response to COVID-19 lead to a more sustainable, equitable world?'
https://www.resilience.org/stories/2020-05-01/will-civilizations-response-to-covid-19-lead-to-a-more-sustainable-equitable-world/

Paul Ehrlich – 'A pandemic, planetary reckoning, and a path forward'
https://www.ehn.org/pandemic-population-covid-19-2645518249.html?rebelltitem=1#rebelltitem1

Petersberg Climate Dialogue 2020 [held in April] Co-chairs' Conclusions excerpts:

UN Secretary General Guterres: "…the same brave, visionary and collaborative leadership that was needed to fight COVID-19 was also needed to address the looming existential threat of climate disruption." He called on countries to take 6 climate-related actions to shape the recovery, with a need to deliver new jobs through a clean, green and just transition: decarbonize, invest in sustainably, end fossil fuel subsidies, invest sustainably, and work together as an international community.

Comments from various ministers and high-level speakers:

"Several Ministers made the link between protecting biodiversity, climate and human health. They stressed that protecting and restoring nature can contribute solutions to these crises."

Summary of demands: (1) Economic recovery plans need to be aligned with the Paris Agreement and the Sustainable Development Goals; (2) For the recovery to be successful it needs to happen worldwide; (3) Development of enhanced Nationally Determined Contributions (NDCs) and Long-Term Strategies (LTSs) under the Paris Agreement should not be postponed.

https://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/pcd_xi_cochairs_conclusions_bf.pdf

Article from Guardian Newspaper discussing observations from Petersberg Dialogue

Dominic Raab, the UK's foreign secretary, said: "It will be the duty of every responsible government to see that our economies are revived and rebuilt in a way that will stand the test of time. That means investing in industries and infrastructure that can turn the tide on climate change and doing all we can to boost resilience by shaping economies that can withstand everything nature throws at us."

Richard Black, the director of the Energy and Climate Intelligence Unit, said it was time for such measures. "Backing for a clean recovery is now widespread, led by governments and major businesses," he said. "For actions to match rhetoric, concrete policies are going to be

needed very soon – for example, the UK government delivering new policies that get the nation on track to its legally binding net-zero target, and making sure the world doesn't bounce back into high-polluting ways as soon as the lockdown eases."

Helen Clarkson, the chief executive of The Climate Group, a set of businesses accelerating action on the climate, said companies were still committed to climate action. "With the right green stimulus policies that ramp up investment in long-term sustainable solutions from electric transport to clean efficient energy, we can deliver on the goals of the Paris agreement without compromising on economic growth," she said.

Quote from Guterres in Guardian article "Public funds should invest in the future by flowing to sustainable sectors and projects that help the environment and climate. Fossil fuel subsidies must end, and carbon must have a price so polluters will pay for their pollution," https://www.theguardian.com/environment/2020/apr/28/un-chief-dont-use-taxpayer-money-to-save-polluting-industries

Kristalina Georgieva, IMF Managing Director [Speech at the Petersberg Dialogue]: 3 priorities from IMF staff: (1) Use public support wisely. For example, when providing financial lifelines to C-intensive companies should mandate commitments to reduce C emissions… and phase out harmful subsidies at this time of low oil prices; prioritize investment in green technologies. IMF suggests $2.3 trillion needed every year for a decade for low C transition. (2) Promote green finance. Emphasize use of green bonds, etc. Government guarantees to mobilize private investment. Mandate financial firms to better disclose climate risks in lending and investment portfolios. (3) Put the right price on C. Governments can use a higher C price as a source of income and a means to encourage climate smart investment for infrastructure, health and education. "Coming out of one crisis need not be a prelude into getting into another—a 'green recovery is our bridge to a more resilient future' https://www.imf.org/en/News/Articles/2020/04/29/sp042920-md-opening-remarks-at-petersberg-event

Financial Times [23 April 2020]

"The lesson from 2008 is that measures responding to an economic crisis can be combined with efforts to meet long-term sustainability goals. There are however three key differences between then and now. First, the cost of renewable energy has dropped dramatically, in many cases below that of conventional energy (though the slump in oil prices complicates the picture). Today we don't have to talk mainly about investing in speculative technologies but more about the pressing need to extend the deployment of widely available and commercially proven solutions. Second, the world's development institutions are now much more focused on climate change than in 2008. The World Bank and the IMF have taken stronger positions on climate action, while the European Investment Bank has started referring to itself as Europe's "climate bank" and has undertaken to devote 50 per cent of its financing to climate action and environmental sustainability by 2025. The EU aims to be climate-neutral by 2050 — that is, to have net-zero greenhouse gas emissions by then. Much of the financial and technical support it offers externally will be informed by that goal. Third, a global carbon price is on the horizon. It will take time for it to be established but there are already some 50 carbon markets around the world. The EU is now discussing a "carbon border adjustment mechanism" that will reflect the carbon footprint of the goods it imports, and the IMF has suggested that a $75 per ton global carbon tax by 2030 would be the right goal. Factoring the future carbon price into new projects will be essential. This new

environment suggests that climate-mitigation measures would not only be compatible with post-coronavirus stimulus in emerging economies, but make for a stronger recovery and long-term sustainable growth…"

"The recovery after 2008 showed that "green growth" is not an oxymoron. Since then, anxieties over climate-change — and awareness of the need for action — have only become more pressing. Coronavirus is a severe blow, certainly; but it need not be a blow to a more sustainable future."
https://www.ft.com/content/16d84fbc-74fe-11ea-90ce-5fb6c07a27f2

EU:

27 May 2020 EU 'Do No Harm' Recovery Fund with25% of funding to be dedicated to climate change, and with green development a focus in the overall management.

"…the EU's updated seven-year €1 trillion budget proposal and €750 billion recovery plan will both be geared towards the green and digital transitions…Commission President Ursula von der Leyen made the announcement on Wednesday (27 May) in a speech before the European Parliament…"The recovery plan turns the immense challenge we face into an opportunity, not only by supporting the recovery but also by investing in our future: the European Green Deal and digitalisation," von der Leyen.

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"…Spending will also be guided by a sustainable finance taxonomy, which aims to channel private investments into technologies that contribute to at least one of six pre-defined environmental objectives, such as climate change mitigation…And a "do no harm" test embedded in the taxonomy will in principle exclude fossil fuels and nuclear power, which are seen to be undermining other environmental objectives such as pollution prevention and control."

"…By adding green conditions to its recovery fund, the European Commission is also trying to restore a level playing field between rich and poor EU member states…During the corona crisis, national governments have spent nearly €2 trillion in state aid for ailing companies and small businesses, without any green conditions attached. And 52% of that aid was spent by Germany alone, raising fears that the crisis will deepen economic disparities within the 27-member EU bloc."

https://www.euractiv.com/section/energy-environment/news/do-no-harm-eu-recovery-fund-has-green-strings-attached/

26 March 2020 Heads of States and Governments invited the Commission to start work on a comprehensive EU recovery plan integrating the green transition and digital transformation

Open letter from 17 EU Ministers of Environment [9 April 2020, with additional Ministers signing later]
https://www.climatechangenews.com/2020/04/09/european-green-deal-must-central-resilient-recovery-covid-19/

https://climateactiontracker.org/documents/706/CAT_2020-04-27_Briefing_COVID19_Apr2020.pdf

GREEN RECOVERY REBOOT & REBOOST our economies for a sustainable future - Call for mobilization [14–16 April 2020] Initiated by EU Parliament Pascal Canfin Chair of Environment Committee, European Parliament
https://drive.google.com/file/d/1j54QxE-QjhrEHjGb5LrKsHuDAKvv8LUq/view

https://www.wbcsd.org/Overview/News-Insights/General/News/Green-Recovery-Alliance-reboot-and-reboost-our-economies-for-a-sustainable-future

https://energyindustryreview.com/environment/launch-of-the-european-alliance-for-a-green-recovery/

EU Green New Deal [December 2019]

Roadmap:

https://ec.europa.eu/info/sites/info/files/european-green-deal-communication-annex-roadmap_en.pdf

Ten Pillars Needed [Critique by GNDE]:

https://static1.squarespace.com/static/5cb636ea93a63267f424e168/t/5d3087a5138f6f0001c0a177/1563461542410/GNDE+-+10+Pillars+of+the+GNDE+v2.pdf

Green New Deal for Europe and COVID:

Need for "holistic and ambitious policy programme" to lift ourselves out of an economic depression https://www.gndforeurope.com/covid

'Just Transition' and green jobs [British Labor Party, Eleanor Salter] https://tribunemag.co.uk/2020/04/coronavirus-recovery-needs-a-green-stimulus

Netherlands and EU Green Recovery

"The economic response to COVID-19 can contribute to the transition to a future-oriented, climate neutral economy. Importantly, the EU should withstand the temptation of short-term solutions in response to the present crisis that risk locking the EU into a fossil fuel economy for decades to come. Integration of the Green Deal ambitions in the economic recovery plans that will be shaped in response to COVID-19 is imperative to achieve a climate neutral and resource efficient economy and increase sustainable employment opportunities. Any recovery and reconstruction package should kick-start the economy, improve its resilience and create jobs while at the same time provide long-term clarity to investors that the EU will transition to a climate neutral society." https://www.euractiv.com/wp-content/uploads/sites/2/2020/04/Netherlands-non-paper-on-Green-Recovery-21-April-2020.pdf

USA:

Green New Deal: [Comprehensive proposal from Democrats [Proposed by Rep. Alexandria Ocasio-Cortez and Sen. Ed Markey March 2019; Bernie Sander follow-up]

https://en.wikipedia.org/wiki/Green_New_Deal#Proposition_to_include_the_green_new_deal_into_recovery_program_from_coronavirus

Green New Deal and COVID

Scientific American – Green New Deal in context of four converging crises: pandemic, economic recession, extreme inequality, and climate emergency

https://blogs.scientificamerican.com/observations/the-green-new-deal-is-more-relevant-than-ever/

'Green Marshall Plan [USA focused but with implications for future global economic recovery]
https://www.forbes.com/sites/davidcarlin/2020/04/08/america-needs-a-green-marshall-plan-to-fight-covid-19-and-climate-change/#690fa61e7943

Canada:

Post-2008, Keynes, Climate Change, Infrastructure Bank

https://policyoptions.irpp.org/magazines/april-2020/economy-and-climate-need-more-than-stimulus-after-covid-19/

South Africa:

https://www.newframe.com/how-coronavirus-is-infecting-south-africas-economy/

International:

Global South Green New Deal and COVID:

'The Solution to the Coronavirus Recession Is a Global Green New Deal'
https://jacobinmag.com/2020/04/coronavirus-global-green-new-deal-south-postcolonial

Recommendation 4. Strengthen China's commitment to building ecological resilience as a medium and long-term transformative approach towards national biosecurity.

World Bank [April 2020] Proposed Sustainability Checklist for Assessing Economic Recovery Interventions (6 to 16 months and long term)
http://pubdocs.worldbank.org/en/223671586803837686/Sustainability-Checklist-for-Assessing-Economic-Recovery-Investments-April-2020.pdf

"Resilient" means being prepared for shocks and adapting effectively to climate change. In a resilient world, countries are better prepared for more frequent natural disasters, more volatile weather patterns, and the long-term consequences of climate change. Healthy and well-managed ecosystems are more resilient and so play a key role in reducing vulnerability to climate change impacts. Climate resilience is integrated into urban planning and infrastructure development. Through effective social inclusion policies, countries and communities are better prepared to protect vulnerable groups and fully involve women in decision-making."
https://www.worldbank.org/en/topic/environment/publication/environment-strategy-toward-clean-green-resilient-world

'Thinking Beyond COVID-19' [World Bank Latin America and Caribbean Blog]

"What matters today is how we flatten the curve. What will matter tomorrow is how we stimulate economic recovery, bringing back better jobs and more of them to ensure that today's investment in recovering economies sets the stage for longer-term green, clean, and resilient growth … one that builds a path out of poverty into the middle class. In Latin America and the Caribbean (LAC), we can't do this without thinking about how to put natural capital to work for its people.

"The region is rich in natural capital and it already plays a major role in the livelihoods of many, with 49% of the total area of LAC covered by forests. That's 935 million hectares, representing approximately 22% of the forest area existing in the world, and almost half the land area of Latin America…

"LAC's rich natural capital stands ready to underpin a recovery across the region. Unlocking nature as an engine of recovery will take a robust regulatory environment that encourages only the sustainable use of public assets for private gain and long-term public health and economic strength , a credible set of institutions who can regulate this use and ensure that the stock of natural capital keeps growing, access to thoughtful capital that incentives sustainable natural resource management, and an infrastructure roadmap that doesn't open up pristine areas. It also includes the important role that Indigenous Peoples can play in the post-COVID recovery as protectors of the environment, particularly of the Amazon."

"Countries need to invest today in:

- Policies that strengthen their environmental regulation and bring credibility to their regulatory agencies.
- Establish sustainable offtake quotas for timber, non-timber and fish products in different sectors.
- Develop domestic markets that price natural capital transparently.
- Help the financial sector price risk and think about natural capital differently to seed entrepreneurialism in the sector.
- Make real investment in labor intensive jobs that will inventory natural capital.
- Replant degraded areas and clean-up degraded environments – both on land and at the coast.

"Countries can also immediately make stimulus investment in the climate-smart and resilient infrastructure needed to get natural capital to market , including the processing infrastructure that can make sure natural capital is not just hunted and gathered in the region but transformed domestically to move jobs up the value chain and connect the region's rich resources to the world's richest markets.

"With abundant natural capital available to help accelerate a recovery in LAC, and growing global demand for all nature has to offer, now is the time to put nature back to work for the people across the region. With sustainability as the watchword, nature can power a long-term, resilient economy full of good jobs stretching across sectors and across nations, bringing prosperity to rural and coastal communities and city retailers alike, for decades to come."

https://blogs.worldbank.org/latinamerica/nature-engine-recovery-post-coronavirus-world

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