How does COVID-19 impact the environment?

Point-of-View

January 2021

Contents

Executive summary

COVID-19 snapshot[1]

~80 million
confirmed cases
worldwide

~55 million
patients
recovered

>1,5 million
deaths
worldwide

220
affected countries
and territories

~20 million
the largest number
of cases was
registered in
the USA

1
the smallest
number of cases
was registered in
Vanuatu

Environmental effects of COVID-19 outbreak

Positive impact

- Reduced GHG[2] emissions
- Improved water quality
- Reduced noise pollution and improved air quality
- Restored wildlife

COVID-19 pandemic

Negative impact

- Increased medical waste
- Intensified municipal waste
- Increased haphazard disposal of PPE[3]
- Reduced recycling activities

Although the pandemic resulted in improved environmental conditions, namely less polluted air and water, these consequences could be maintained in the long term perspective only in the event of implementing reasonable protective policies by governmental authorities and international environmental institutions, as well as proactive behaviour of companies, industries, and the public.

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# Environmental prerequisites of COVID-19 appearance

" Human activities such as **deforestation, wildlife trade, and urbanisation** led to the **wide spread of different zoonoses**, which reached the peak with the spread of COVID-19 that became a global pandemic

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Deforestation and urbanisation appeared to be among the factors that impacted the initial spread of COVID-19

Over the past centuries, the human population has been affecting the environment by performing such activities as **deforestation, urbanisation, and trade of wild animals**. The interconnections between these actions and their consequences **led to the creation and global spread of COVID-19**. In particular, the virus is proved to be transferred to humans by bats primarily in Wuhan, China.

Deforestation

Urbanisation

Wildlife trade

Air pollution

Animal markets

Zoonosis

Correlation between deforestation and the increasing number of global epidemics
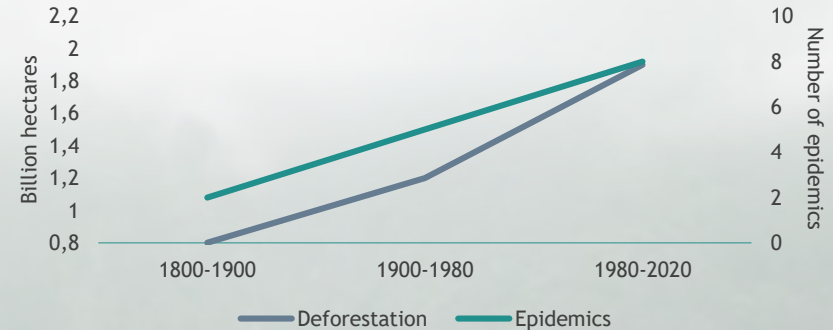
Although the intensity of epidemics has decreased as a result of healthcare and medical treatment progress, their quantity has **risen drastically** over the previous centuries. The **trend** is mainly **affected by urbanisation**, which forces animals to locate more densely within the limited areas and provokes their interactions. In addition, the correlation between the rise of deforested land and the **number of epidemics** becomes **higher**, which might demonstrate the **harmful effects of human** activities.

Source: The Nature website; Guardian website

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COVID-19 became one of the most widespread zoonoses, which led to 1,5 million deaths in less than one year

COVID-19 is the most recent zoonotic disease[1] in humans and demonstrates how human health and nature are closely intertwined. Interaction with nature could expose humans to a range of animal diseases. In fact, **about three to four new infectious diseases occur every year**, most of which originate from wild animals. Over the past 30 years, approximately **60-70% of new human diseases** have been of zoonotic origin. The growth of zoonotic disease outbreaks is a sign of a breakdown in the relationship between humans and nature and is likely to worsen.

Top-3 zoonotic diseases in terms of number of death (1998-2020)

COVID-19
>1.500.000

Swine flu H1N1
18.449

Ebola[2]
13.593

Zoonotic diseases known to infect people

Cumulative number of virus species

MERS
Hendra
SARS
HIV
Zika
Avian flu H5N1
Nipah
Swine flu H1N1
Ebola
COVID-19

1920 1940 1960 1980 2000 2020 Year

Negative impact of COVID-19 on the environment

" The pandemic made humanity face such challenges as overwhelming medical and municipal waste production, increased risks of natural disasters as well as various effects on both home and wild animals

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The drastically increasing amount of domestic and medical waste is one of the key negative outcomes of COVID-19

Coronavirus waste has become **a new form of global pollution**. The adopted quarantine, isolation, and social distancing led to a corresponding **increase in the amount of solid household waste (15-25%)** and a significant increase in the generation of **medical waste** in healthcare institutions (from **10 to 20** times). To protect themselves from the viral infection, people are using face masks, hand gloves, and other safety equipment, which increases the amount of healthcare waste. Face masks are **non-recyclable**, they are contaminated with body fluids and could potentially lead to indirect infection and transmission of the virus if released into the recycling system.

COVID-19 waste

Masks	Gloves	Other PPE
129 billion	**65 billion**	**84-1.233 Euro**
are disposed globally each month		as a PPE littering fine

PPE littering fine for the first offence, Euro
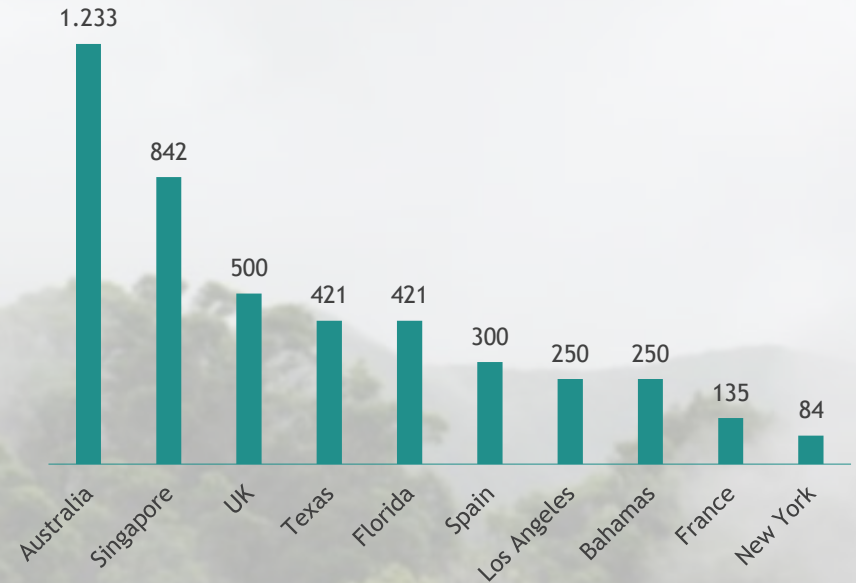
Australia	Singapore	UK	Texas	Florida	Spain	Los Angeles	Bahamas	France	New York
1.233	842	500	421	421	300	250	250	135	84

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Usage of Triclosan, a constituent substance of antiseptics, significantly harms nature as it gets into the water
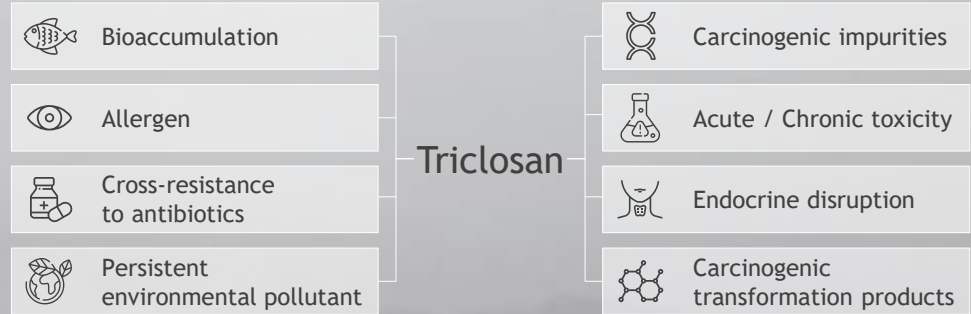
From the beginning of 2020, a **huge amount of disinfectants** has been applied to **roads, commercial, and residential areas** to exterminate the COVID-19 virus. However, at the same time, these disinfectants **might kill non-targeted** beneficial **species** and create **ecological imbalance**.

The vast majority of disinfectants and antiseptics, such as hand soap, contain a high percentage of the **hormone-disrupting pesticide Triclosan** (TSC). Triclosan converts to **dioxin, a highly toxic compound** when exposed to sunlight, which is often found on the surfaces of the aquatic environment.

Comparison of measures taken in 2018 vs 2020 among population[1]

Washing hands with antiseptic soap	
Using hand sanitiser	
Sterilising surfaces	

0%   50%   100%

■ 2018 ■ 2020

Impact of TSC on nature

| Bioaccumulation |
| Allergen |
| Cross-resistance to antibiotics |
| Persistent environmental pollutant |

Triclosan

| Carcinogenic impurities |
| Acute / Chronic toxicity |
| Endocrine disruption |
| Carcinogenic transformation products |
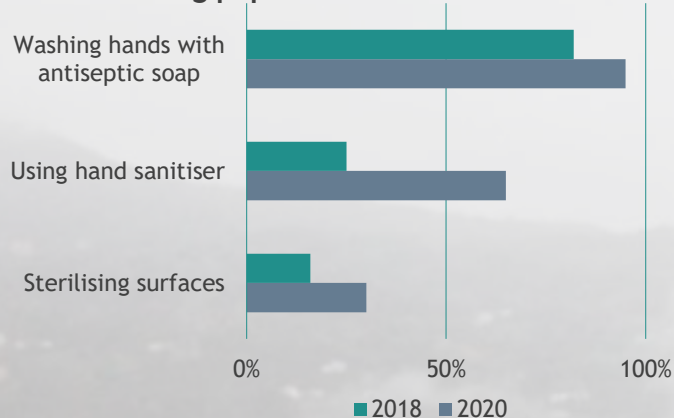
970 tonnes
end up in global aquatic system

95%
is washed down the drain

63%
detection frequency of TSC in tap water

0,21 nM[2]
concentration of TSC in tap water

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The volume of municipal waste generation increased due to less intensified recycling and security control measures

The COVID-19 disease **has affected** the existing **systems of waste management** (WM) and led to an **increase** in the volume of **municipal waste**. This tendency resulted from **reduced recycling** as well as further compounded challenges in the **collection and disposal** of general waste.

Municipal budgets are **weakened** as a result of increased healthcare costs and implemented social security regulations. Several governments introduced **limitations to the volume of recycling activities** in order to reduce the risk of virus infection.

Changes in the treatment of waste

Recycling **slowed down** due to the perceived threat of virus transmission

Waste disposal on landfills **increased** due to **more recyclable** waste being sent to general channels

The spread of single-use plastics **rose** due to implemented security measures

Governments' response to waste management

46%
of recycling programmes were restricted by US regulations

Regular health check for WM workers
is provided to ensure no disruptions in WM operations

Increased frequency of collection
is practiced in order to avoid exceeding waste

Positive effects of COVID-19 regarding waste

Slowdown in manufacturing activity

Industrial waste production fell

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The effects of COVID-19 such as lockdowns and increase in unemployment influenced both domestic and wild animals

The dramatic increase in **dog abandonment** in spring 2020 was mainly due to the health, economic, and social problems associated with COVID-19, as well as inconclusive reports of pets that are potential carriers of COVID-19.

A sharp **drop in tourist numbers** due to lockdowns could be **devastating** to wildlife. As millions of jobs have been lost due to the COVID-19 crisis, huge swaths of wildlife and habitat are vulnerable to poaching in some areas.

60%
increase in the call for rescue of homeless dogs since March 2020

73%
adoption rate for pets during the period March-June 2020

125%
increase in poaching cases in Africa during February–June 2020[1]

53%
decrease in rhino poaching in the first six months of 2020 in South Africa

Contrariwise, the **number of adopted animals also increased** greatly due to lockdowns as many people, who either were forced to work from home or lived alone, decided to take the animal home and spend time with it.

The loss of tourism revenue in the long term could lead to an extremely negative trend. Loss of income also means **loss of tolerance for dangerous and destructive animals**, leading to the hunt for wild animals out of necessity in order to get meat, ivory, and horn.

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Consumption of toilet paper in 2020 increased by 141% compared to 2019, accelerating the deforestation issue

Toilet paper vicious circle

3. COVID-19 digestive system side-effects

4. Higher quality of home toiler paper vs. office, public place toilet paper

5. Reliance on virgin forest

Global pandemic with high death rate

2. Home office

6. Deforestation

1. Lockdown

Carbon emissions

Urbanisation

Air pollution

Wildlife getting close to population

Respiratory diseases

Risk of zoonosis
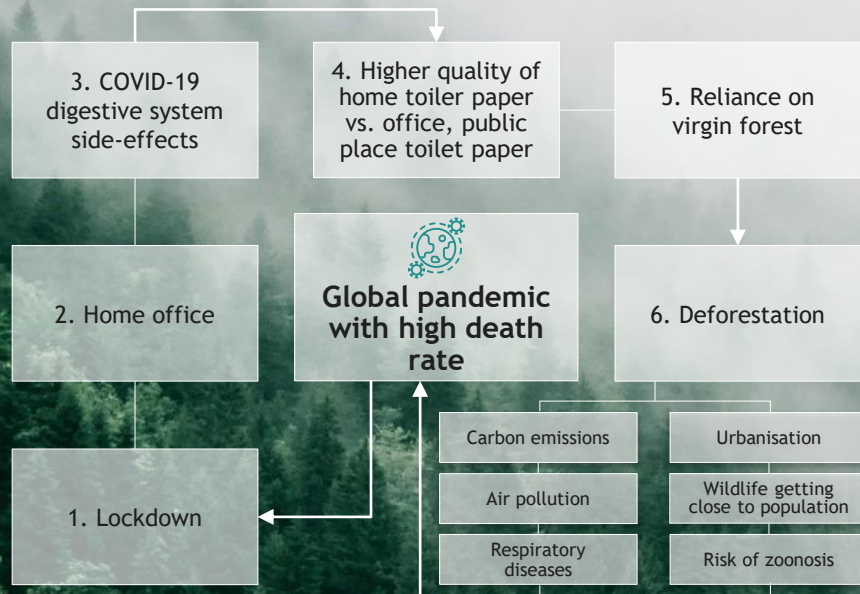
As a result of COVID-19 lockdowns, **working from home has not benefited the forests**. Unlike office toilet paper, which is usually made from recycled fibres, most household toilet paper is made from virgin material from clear felling. While a number of companies have seen an increase in the production of recycled toilet paper, the **leading manufacturers still depend on 100% natural forest fibre.**

Global toilet roll market, Bn Euro[1]
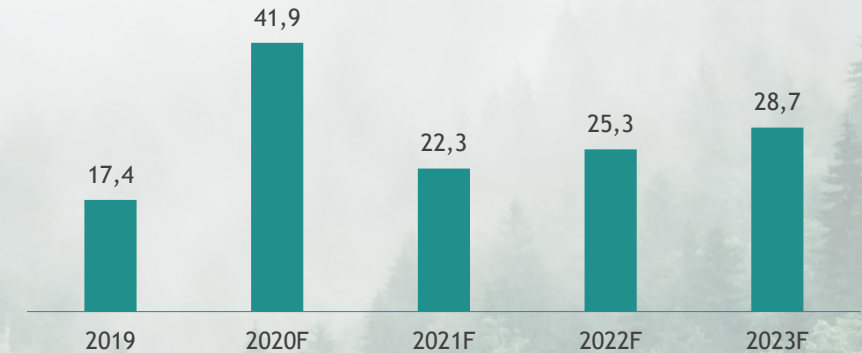
2019	2020F	2021F	2022F	2023F
17,4	41,9	22,3	25,3	28,7

12

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The world is facing challenges in dealing with natural disasters as it strives to slow down the spread of COVID-19

Disaster management organisations **are required to take steps** to control the spread of COVID-19. These measures become **inefficient and costly for mitigating damage** and lead to delays.

Examples of COVID-19 impact on the quickness of disaster response

Shelter

More shelter space for disaster victims is needed to keep a safe distance

Additional costs arise for sanitisers, protective barriers, etc.

Some procedures, such as feeding, **need to be modified** to avoid big crowds

Evacuation

Long travel hours due to movement restrictions

Large queues on registration points due to safe distance measures

Workforce

Long travel hours and **limited access** to some damaged areas

Most of the EOC[1] **training shifted online,** which can negatively impact the studying process

Cyclone Harold
Airports and ports of the damaged islands were not fully operational due to COVID-19 restrictions, which challenged access to the hit area.

Typhoon Hagibis
The shortage of volunteers affected the early recovery process as the Japanese government suspended receiving volunteers to prevent COVID-19 from spreading.

Flooding in Canada in April 2020
Manitoba Province established special sandbagging procedures and emergency barriers to ensure the workers' safety but at the same time slowing the recovery process.
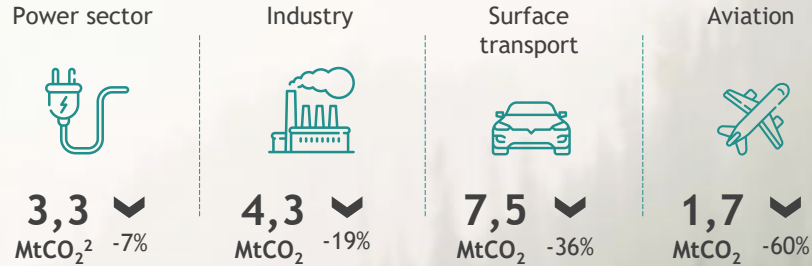
13 Notes: (1) Emergency operations centre

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Positive impact of COVID-19 on the environment

> Although there are multiple negative impacts on the environment, the countries *also experience a range of positive outcomes*, such as *improved air* and *water quality*, *better living conditions* for wildlife species, and *reduced noise pollution*
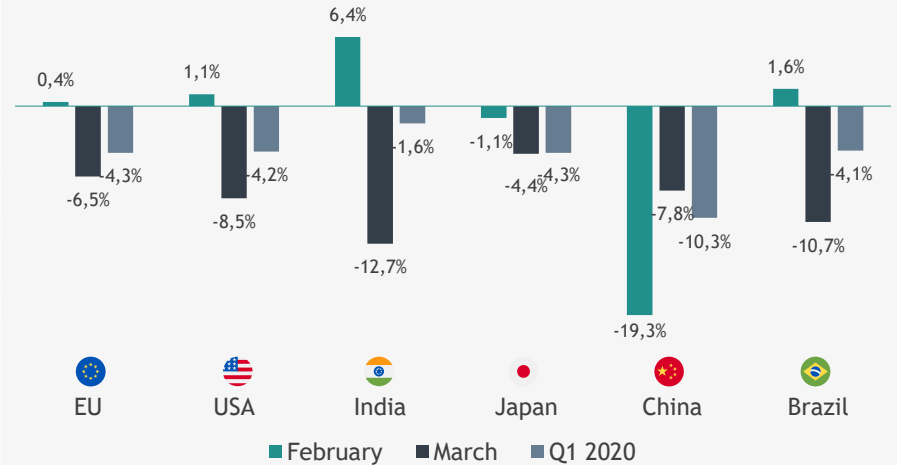
Air quality improved rapidly at the beginning of 2020 due to lower CO_2 emissions associated with COVID-19 measures

Estimated CO_2 emission reduction due to COVID-19 in selected sectors in 2020 in comparison with 2019[1]

Power sector	Industry	Surface transport	Aviation
3,3 $MtCO_2$[2] ⌄ -7%	**4,3** $MtCO_2$ ⌄ -19%	**7,5** $MtCO_2$ ⌄ -36%	**1,7** $MtCO_2$ ⌄ -60%

CO_2 emissions **decreased significantly** during the lockdown period due to less domestic and industrial activities as well as restricted vehicle movements. **Power and industry sectors were the most affected** in absolute terms, accounting for **86%** of the total reduction of global emissions.

CO_2 emissions in 2020 in comparison with 2019

Bar chart legend: February, March, Q1 2020

EU: 0,4% / -6,5% / -4,3%
USA: 1,1% / -8,5% / -4,2%
India: 6,4% / -12,7% / -1,6%
Japan: -1,1% / -4,4% / -4,3%
China: -19,3% / -7,8% / -10,3%
Brazil: 1,6% / -10,7% / -4,1%

Despite a significant decrease in March 2020, overall CO_2 emissions **started to rebound** to the 2019 levels in most countries by the end of Q1. That is why the positive impact of lockdowns **will not last long if no** other climate protection **policies are developed.**

Alongside CO_2, reduced NO_2 and PM2.5 emission levels led to a lower number of pollution-related health cases

PM2.5[1] levels reduction during the 2020 lockdown period[2], YOY[3]

London, UK
-9%

Delhi, India
-60%

New York, USA
-25%

Rome, Italy
+30%

Wuhan, China
-44%

Los Angeles, USA
-31%

Madrid, Spain
-11%

Seoul, South Korea
54%

Sao Paulo, Brazil
-32%

Mumbai, India
-34%

NO_2 emissions reduction in April 2020, YOY

Spain	France	Italy	UK	Germany	Europe
51%	44%	43%	36%	27%	37%
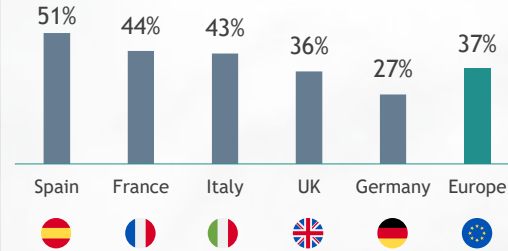
An approximately **40%** decrease in average NO_2 pollution worldwide in January–April 2020 was achieved through COVID-19 measures, which caused a **37%** reduction in coal production and an estimated **1/3** reduction in oil consumption, the most polluting sources of NO_2.

Projected avoided health issues due to lower air pollution in Europe in April 2020

11.313	Deaths
5.980	New cases of asthma in children
1.865	Asthma emergency visits
575	Preterm births
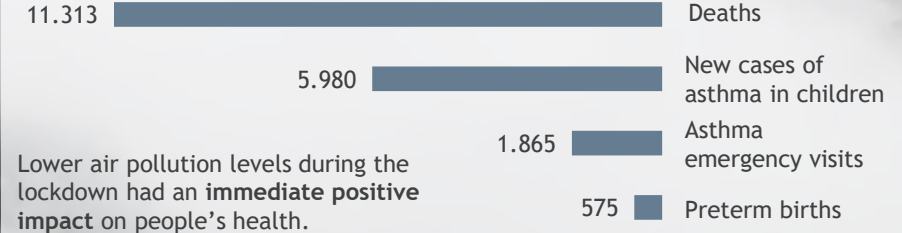
Lower air pollution levels during the lockdown had an **immediate positive impact** on people's health.

PM2.5 is one of the most dangerous air pollutants for human health, which comes mostly from fuels burning

9 out of 10 global cities experienced a **9%-60%** reduction in PM2.5 during the lockdown period

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Both travel restrictions and lower economic activity have improved the quality and transparency of water globally

The impact of COVID-19 on the quality of water depends on the urbanisation level of the region and the quality of soil, where emissions could be stored before the release in water systems. However, several researches evidence **the improvements in water quality** during COVID-19 crisis.

Water quality improvements **might be short-term** as a result of **lower sea traffic** during the lockdown. Therefore, provided that the population implements measures towards a better quality of water, **the positive effects could be achieved in the long run.**

Practical case examples

Vembanad Lake, India

16%
less suspended particulate matter (SPM) concentration on average

90%
zones of the lake experienced the reduction of SPM

55%
zones recorded the lowest level of SPM since 2013

Venice, Italy

Traffic reductions resulted in increased water transparency

Less boat traffic allows sediments to stay at the bottom of canals

Wild fish returned to Venice canals as a result of lower activities

Risk of virus transmission by water

Drinking water supply is **essential for the population's existence**. Therefore, water waste is regulated by strict legislation. With the spread of COVID-19, the threat of the virus being transmitted through waterways is analysed. However, recent researches state the risk is limited.

World Health Organization
WHO claims that there is no evidence that coronavirus could be transmitted through water systems

CDC CENTERS FOR DISEASE CONTROL AND PREVENTION
CDC considers the risk of the virus being transported via sewerage systems tends to be low

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With the reduced volume of traffic, the level of noise pollution, which affects human health, decreased

Noise pollution is
3rd

most dangerous environmental threat in the world

40%

of Europeans are exposed to long-term noise pollution

Cars

are the greatest noise pollutants

World Health Organization

The pandemic resulted in **decreased levels of noise pollution** due to restricted land, marine, and air traffic as well as reduced economic activity. Although the reduction of noise pollution during the lockdown would bring positive environmental effects only in case of long-term shortening of human traffic, recent researches demonstrate decreased levels of noise pollution.

Benefits of reduced noise pollution level

Enables to conduct seismological researches

Creates less impact on human health, in particular high blood pressure, annoyance, and sleep disturbance

Allows better communication of particular animal species

USA According to the research by the University of Michigan for four American states — Florida, New York, California, and Texas[1]:

2,6 dB[2]

average decrease in the four states that were analysed

New York

experienced the greatest decline in noise pollution (3,1 dB)

~50%

less noise was generated on average during lockdown

Ireland According to the research on the reduction of noise pollution in 12 areas of Dublin during lockdown compared to pre-lockdown period[3]:

100%

of monitoring stations recorded the reduction in noise pollution during lockdown

~74%

less times on average when the recorded sound exceeded the threshold of 55 dB

Locations with low pre-lockdown levels of noise pollution

experienced the highest reduction

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COVID-19 allowed to conduct quantitative and qualitive assessments of wildlife ecosystems based on wide datasets

Due to reduced human mobility both on land and at sea, the environmental conditions **enabled scientists to conduct various researches on human impact on wildlife**. The efficiency of such researches **could be enhanced by a large number of datasets**. There are several initiatives towards pooling the data:

Limited mobility allowed wildlife ecosystems to **experience existence with little or no human assistance**. This resulted in the **natural optimisation** of the animal lifecycle and led to **improved conditions for wildlife conservation.**

COVID-19 Bio-Logging Initiative

▶ Focused on the use of bio-loggers to collect data

▶ Developed to assess changes in animals' behaviour

▶ Aimed at investigating to what extent current movements of animals are affected by humans

PAN-Environment working group research

▶ Planned to evaluate the impact of human mobility on particular ecosystems

▶ Integrates broad sets of data gathered by sensor networks

▶ Works in collaboration with citizen science initiatives

Reduced disturbance of animals due to restricted recreational tourism

> Higher rates of reproduction

Research in Florida showed that the rate of loggerhead turtle reproduction increased by **61%** due to the beach closures.

Still there are some drawbacks of COVID-19 regarding wildlife

Less workforce to look after endangered species

Higher risk of poaching

Reduced capability to conduct field research

Source: People's Trust for Endangered Species website; The Nature website; Media overview
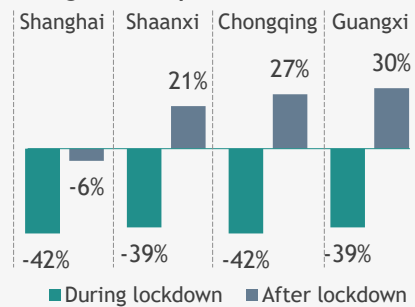
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Future perspectives and challenges

" Maintaining COVID-19 positive environmental outcomes **in the long-term run** and minimising the corresponding negative impact will become **the key challenge** for governments in terms of sustainable environmental growth

Although we can see environmental benefits from COVID-19, they are proved to be short-term if no action is taken
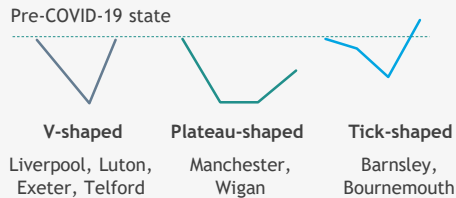
Change in NO_2 pollutant levels in China before vs after lockdown[1]

Shanghai | Shaanxi | Chongqing | Guangxi

21% 27% 30%

-6%

-42% -39% -42% -39%

■ During lockdown ■ After lockdown

In just **30** days after the lockdown, China's national average NO_2 levels **dropped by 40%**, compared to the same post-holiday period in 2019. However, already in May the pollution **overshoot pre-crisis levels**, even when many economic sectors were still reeling.

A study by the Centre for Cities shows that in the UK air quality improved dramatically during the lockdown, as NO_2 levels were **reduced by 38%** on average across the 49 cities analysed. However, during the recovery, **39 out of 49 cities** have seen levels **return to or even exceed** pre-pandemic levels.

Types of changes in NO_2 emissions during and after lockdown[2]

Pre-COVID-19 state

V-shaped
Liverpool, Luton, Exeter, Telford

Plateau-shaped
Manchester, Wigan

Tick-shaped
Barnsley, Bournemouth

Experience of multiple countries show that, during the recovery, environmental pollution will be back on track reaching its future development curve. It has been proved that the pandemic **does not lessen the need for action** on air quality, as well as water, forests, noise, and **only with proper actions** of the governments and institutions the **sustainable recovery could be achieved**.

Total CO_2 emission trajectories[3]
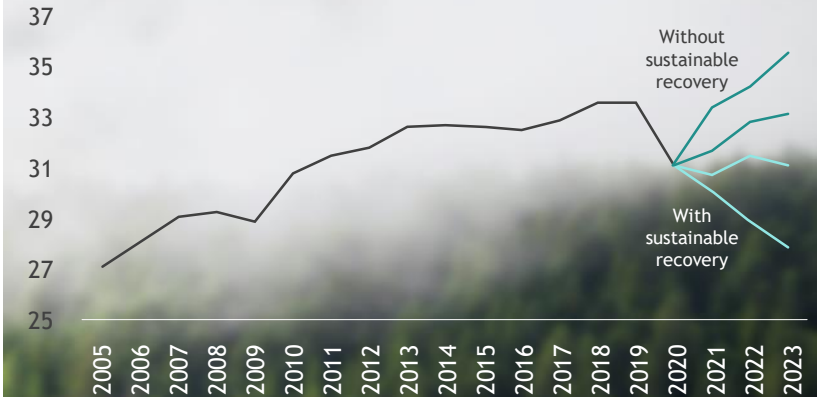
37
35
33
31
29
27
25

Without sustainable recovery

With sustainable recovery

2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

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Proper long-term environmental strategy becomes crucial for countries to retain short-term positive lockdown effects

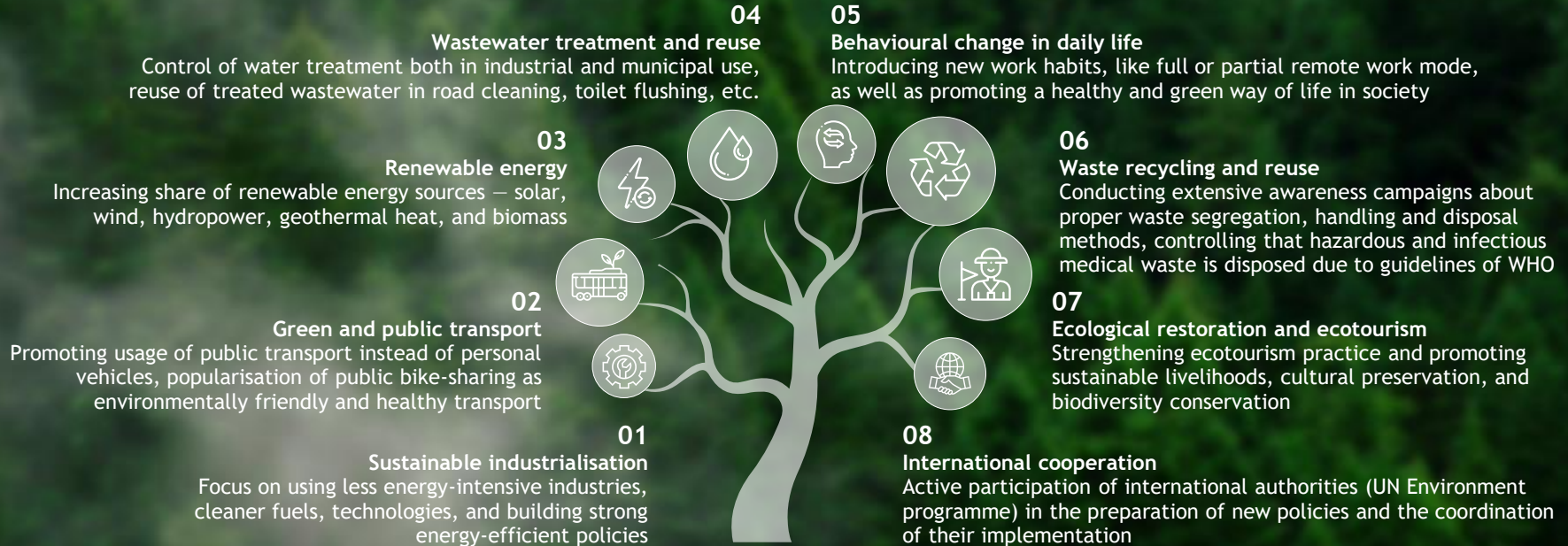## Possible strategies of sustainable environmental management

04
Wastewater treatment and reuse
Control of water treatment both in industrial and municipal use, reuse of treated wastewater in road cleaning, toilet flushing, etc.

05
Behavioural change in daily life
Introducing new work habits, like full or partial remote work mode, as well as promoting a healthy and green way of life in society

03
Renewable energy
Increasing share of renewable energy sources — solar, wind, hydropower, geothermal heat, and biomass

06
Waste recycling and reuse
Conducting extensive awareness campaigns about proper waste segregation, handling and disposal methods, controlling that hazardous and infectious medical waste is disposed due to guidelines of WHO

02
Green and public transport
Promoting usage of public transport instead of personal vehicles, popularisation of public bike-sharing as environmentally friendly and healthy transport

07
Ecological restoration and ecotourism
Strengthening ecotourism practice and promoting sustainable livelihoods, cultural preservation, and biodiversity conservation

01
Sustainable industrialisation
Focus on using less energy-intensive industries, cleaner fuels, technologies, and building strong energy-efficient policies

08
International cooperation
Active participation of international authorities (UN Environment programme) in the preparation of new policies and the coordination of their implementation

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A green recovery nowadays is an essential part of returning to sustainable development after the COVID-19 crisis

Regional and national stimulus packages

European Union
750,0 Bn Euro
The 'Next Generation EU' recovery fund will provide **500,0** Bn Euro in grants and **250,0** Bn Euro in loans for member states in 2020-2022. **25%** of the fund targets climate action, including **30,0** Bn Euro to boost the 'Just Transition Fund' for coal-dependent states.

Germany
80,0 Bn Euro
A recovery programme that targets clean energy infrastructure digitalisation and support for green recovery in municipalities such as public transport and cycle paths.

Luxembourg
**30.000,0 Euro / household
8.000,0 Euro / electric car**
The government helps households make homes more energy-efficient and subsidises the purchase of electric vehicles.

Airlines packages

AIRFRANCE **7,0** Bn Euro
Air France will receive **4,0** Bn Euro as a bank loan guaranteed from the state and **3,0** Bn Euro directly from the state to develop a plan for decreasing CO_2 emissions.

Austrian **600,0** Mn Euro
A package is offered on reducing the company's domestic and global CO_2 emissions by **50%** and **30%** respectively by 2030.

United Kingdom
44,5 Bn Euro
The Clean Growth Fund aims to support green start-up companies across the UK to supercharge the development of next-generation clean, low-carbon technologies and achieve net-zero emissions by 2050.
315,0 Bn Euro
A stimulus package for the transport sector to increase safety and provide restoration post-COVID support for trams and buses.

Norway
339,0 Mn Euro
In May 2020, a crisis package was introduced to support green technology projects, including hydrogen, battery technology, offshore wind and low-emission shipping.

Indonesia
2,8 Bn Euro
An investment for SDG Indonesia One platform to drive green growth, one of the first SDG platforms globally.
Also, the national Action Plan to reduce plastic pollution was introduced.

Working from home even one day per week could raise the prospects of long-term emission reduction in the future

Improved air quality not just in large city areas but high-commuting areas such as suburbs as well

Less paper usage, which leads to lower demand and a respective decrease in greenhouse gas emissions

Extra time to make a positive impact on the environment, either via social programmes, which are getting more popular in the post-COVID society, or even in the household
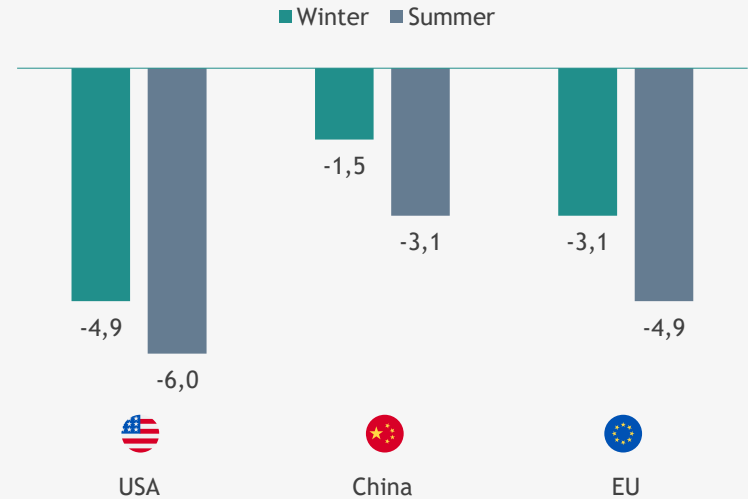
How can remote work improve

the environment in the post-COVID future?

Global emissions could fall by 24 million $MtCO_2$[1] a year if everybody able to work from home worldwide did so for just one day a week

Less plastic usage by cooking and brewing coffee at home, drinking water from the tap, etc.

Reduced power consumption as offices consume almost twice as much energy as households

Change in CO_2 emissions for households working from home once a week in 2020[2]

■ Winter ■ Summer

USA: -4,9 (Winter), -6,0 (Summer)
China: -1,5 (Winter), -3,1 (Summer)
EU: -3,1 (Winter), -4,9 (Summer)

USA   China   EU

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Actions should be taken by everyone — governments, companies, civil society organisations, and the public

Governments

▶ Design COVID-19 economic recovery packages with a **green transition element**, invest in **sustainable** business models

▶ Increase enforcement to **fight illegal wildlife trade**

▶ Introduce and enforce legislation and policies to **decrease deforestation**

▶ Apply a **One Health approach** — link the health of humans, animals, and the environment **within decision-making** on wildlife and land-use change

Companies and industries

▶ Implement and enhance all **voluntary environmental measures** during and after the COVID-19 crisis

▶ **Promote sustainable** production, ensure supplier traceability to points of origin

▶ **Encourage** consumers to make **sustainable dietary choices**

▶ **Support policies** in which production and consumption are **free from deforestation and conversion** of natural ecosystems

Civil society organisations

▶ **Support vulnerable communities** affected by the COVID-19 crisis

▶ **Work together** with governments and industries to **design sustainable solutions** to decrease illegal wildlife exploitation and transform food systems

▶ **Increase accountability** of institutions, governments, and industries **that fail to take environmental action** in the wake of the COVID-19 crisis

The public

▶ **Shift personal dietary** and consumption habits to make more sustainable choices

▶ **Call on industries** to show leadership by decreasing their negative impacts on society and nature

▶ **Interact with government representatives** to ensure that they take action to protect natural ecosystems and strengthen their climate commitments

Actions from

Source: WWF International — COVID-19: Urgent call to protect people and nature — [2020]

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A Kyiv based consulting practice with a focus on professional services, BDO Centers develops and scales innovations in support of the largest and most diversified group of strategy, consulting, digital, audit, tax, and operations professionals in the world. Drawing on a combination of industry and functional expertise, the company supports service processes for Marketing, Sales Enablement, Corporate Communications, Social Media, Events, Strategy and Business Consulting. Engineered to facilitate an increase in client centricity, the agile and cross-functional BDO Centers team provides strategic and operational value creation to accompany the full client journey.

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