Valuing nature conservation

A methodology for quantifying the benefits of protecting the planet’s natural capital

November 2020
Conservation decisions are typically made in the absence of robust data.

**BENEFITS**

- Crop pollination
- Water purification and filtration
- Carbon sequestration
- Pharmaceutical discovery
- Nutrient cycling
- Natural pest control
- Weather stability
- Outdoor recreation
- Wild-food sources
- Nonfood products
- Storm and flood protection
- Clean air
- Disease control
- Soil formation and stability
- Cultural inspiration

**COSTS**

- Opportunity costs
- Operating costs
- Investment costs
In the most optimistic scenario for industry decarbonization, deforestation would need to be reduced by 2030 by 75% to achieve a 1.5 degree pathway.
Ecosystem fragmentation can increase the likelihood of zoonotic diseases – such as COVID-19 – passing from animals to humans. Half of the global risk of zoonotic disease transmission exists in currently unprotected nature.
Climate change resilience

200 million people are protected by coral reefs. Coral reefs reduce wave energy, helping to protect from extreme storm damage, a risk that will continue to become more frequent as the climate changes.
Crop pollination

Pollination is estimated to support $240 to $580 billion of the world’s annual crop output.
Reliable rainfall generation

40–70% of rainfall on which agriculture depends originates from forest and vegetation evapotranspiration.
Ecotourism

1 in 10 people globally were employed in travel and tourism last year, while tourism linked to Protected Areas—a subset of the overall ecotourism market—was worth $300 billion in revenues.
Wild-food sources

Annual fish catch is worth approximately

$150 billion
Example ecosystem services

- Carbon capture and sequestration
- Weather stability
- Storm and flood protection
- Nutrient cycling
- Nonfood products
- Disease control
- Soil formation and stability
- Natural pest control

- Crop pollination
- Water purification and filtration
- Wild-food sources
- Outdoor recreation
- Genetic resources for pharmaceutical discovery
- Cultural inspiration
- Clean air
And yet, none of these services are routinely considered

**BENEFITS**
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- Clean air
- Disease control
- Soil formation and stability
- Cultural inspiration

**COSTS**
- Opportunity costs
- Operating costs
- Investment costs
Natural capital is declining at unprecedented rates

<table>
<thead>
<tr>
<th>1 million</th>
<th>68%</th>
<th>5 million km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>species currently at risk of extinction</td>
<td>decline in wildlife populations in the past 50 years</td>
<td>of tropical deforestation by 2050 under a BAU scenario, equivalent to 1.5x India’s total land area</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>of mangroves lost since 1950</td>
<td>of great barrier reef coral died in two years between 2016 and 2017</td>
<td>of the world’s fish stocks are in a state of collapse, rebuilding, or overexploited</td>
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When the value of intact nature can be quantified a more robust business case can be considered.
To conduct this work, we focused on **three principles**

- Highly granular analytics
- Stakeholder relevance
- Pragmatic suggestions
We have assessed the impact of doubling nature protection, in sufficient detail to support decision making

We analyzed every 5x5km pixel on the planet to understand the potential of nature conservation to impact climate, economics, human health and biodiversity...

- **CO₂** reduction from avoided deforestation and natural regrowth
- **Direct jobs** created by conservation activities
- **GDP and jobs** created and safeguarded in nature dependent markets
- **Zoonotic disease risk** in areas conserved: an indicator of mitigation potential

...and are able to compare that to the **cost of protection**

- Expanded conserved **habitat range** of at risk species
We established a baseline of existing Protected Areas...
...And then prioritized additional potential areas to conserve, together covering 30% of land and national waters

ONE OF SIX SCENARIOS DEVELOPED

Existing Protected Areas

Potential additional conservation priorities
Climate, economic, health, and cultural benefits could be compelling

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Value</th>
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<tbody>
<tr>
<td>Annually reduce atmospheric CO₂ by up to</td>
<td>2.6 gigatons</td>
</tr>
<tr>
<td>Support around 30 million jobs and up to $500 billion of GDP in</td>
<td></td>
</tr>
<tr>
<td>Create up to 650K jobs in nature conservation</td>
<td></td>
</tr>
<tr>
<td>Expand the conserved habitat of threatened species by up to 2.8x</td>
<td></td>
</tr>
<tr>
<td>Help reduce the risk of zoonotic diseases such as COVID-19</td>
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</table>
Six scenarios were developed to identify the range of potential benefits and costs of conserving 30% of the planet

<table>
<thead>
<tr>
<th>Spatial constraints</th>
<th>Optimization criteria</th>
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<tr>
<td>#1</td>
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<td>#5</td>
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<td>#6</td>
<td></td>
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</tbody>
</table>
Some of these trade-offs are predictable...

The lower the impact on existing human activity, the lower the impact on species protection, CO₂ reduction and zoonotic disease risk mitigation.

<table>
<thead>
<tr>
<th>Conservation Level</th>
<th>Increase in conserved habitat of species threatened with extinction</th>
<th>CO₂ abatement, gigatons (Gt) per year</th>
<th>Zoonotic disease risk vs. remaining unprotected nature, average¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% of each country</td>
<td>2.2x 2.4x</td>
<td>0.9Gt 1.8Gt</td>
<td>1.3x 1.7x</td>
</tr>
<tr>
<td>30% of each ecoregion</td>
<td>2.2x 2.3x</td>
<td>1.1Gt 1.8Gt</td>
<td>1.5x 1.8x</td>
</tr>
<tr>
<td>30% of each ecozone</td>
<td>2.2x 2.8x</td>
<td>1.0Gt 2.6Gt</td>
<td>1.1x 1.5x</td>
</tr>
</tbody>
</table>

¹Average zoonotic disease transmission risk in potential new conservation areas, relative to the risk in remaining areas of unprotected nature. A higher risk increases the potential positive impact of conservation.
...others less so

Decision makes can face trade-offs between minimizing short-term opportunity costs and ongoing operating costs.

**Annual operating costs of two scenarios for conserving 30 percent of each country**

*Degree of area fragmentation vs operating cost, $ billion annually*

Maximized protection of species and carbon stocks

- Less fragmentation
  - $28 billion

Maximized protection of species and minimized opportunity costs\(^1\)

- More fragmentation
  - $35 billion

\(^1\)Opportunity costs from existing human activities.
Across the board, we see that urgency, cost and benefit distribution of conservation is uneven

Biomes most at risk account for the majority of CO2 abatement potential and deliver this impact at a significantly lower cost…

**CO₂ abatement**

**CO₂ abatement, megatons vs. cost of CO₂ abatement, $ per tCO₂**

<table>
<thead>
<tr>
<th>Biome</th>
<th>Abatement (Mt)</th>
<th>Cost ($Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical and subtropical moist broadleaf</td>
<td>989</td>
<td>$3</td>
</tr>
<tr>
<td>Tropical and subtropical dry broadleaf</td>
<td>217</td>
<td>$3</td>
</tr>
<tr>
<td>Tropical and subtropical grasslands, savannas, and shrublands</td>
<td>413</td>
<td>$3</td>
</tr>
<tr>
<td>Temperate broadleaf and mixed forests</td>
<td>46</td>
<td>$236</td>
</tr>
<tr>
<td>Deserts and xeric shrublands</td>
<td>22</td>
<td>$177</td>
</tr>
</tbody>
</table>

SHOWS DATA FOR ONE OF SIX SCENARIOS DEVELOPED

HIGHER AVERAGE RISK TO NATURE

LOWER AVERAGE RISK TO NATURE

¹Land biomes shown that account for the top 97 percent of impact in each of CO₂ abatement, jobs, zoonotic disease risk, and species protection.
... and a similar theme can be seen across employment, zoonotic disease risk and species protection\(^1\)

**Employment**

*Jobs created or safeguarded, million*\(^2\) *vs. cost, $ per job*

- **8.1M** $332
- **0.8M** $851
- **9.4M** $118
- **3.4M** $3,175
- **1.7M** $2,382

**Tropical and subtropical moist broadleaf forests**

**Tropical and subtropical dry broadleaf forests**

**Tropical and subtropical grasslands, savannas, and shrublands**

**Temperate broadleaf and mixed forests**

**Deserts and xeric shrublands**

\(^1\)Land biomes shown that account for the top 97 percent of impact in each of CO\(_2\) abatement, jobs, zoonotic disease risk, and species protection.

\(^2\)Covers ecotourism, sustainable fishing, and conservation management.
Zoonotic disease risk mitigation

Transmission risk, % global total vs. cost, $ billion per percentage point of transmission risk

- Tropical and subtropical moist broadleaf forests: 7.0% cost 0.4
- Tropical and subtropical dry broadleaf forests: 1.8% cost 0.4
- Tropical and subtropical grasslands, savannas, and shrublands: 2.0% cost 0.6
- Temperate broadleaf and mixed forests: 3.5% cost 3.1
- Deserts and xeric shrublands: 2.5% cost 1.6

Higher average risk to nature → Lower average risk to nature

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3Total zoonotic disease transmission risk in potential new conservation areas as a percentage of total global risk. A higher risk increases the potential positive impact of conservation.
Species protection

Increase in conserved habitat of threatened species, percentage points (pp) vs. cost, $ billion per pp increase

- Tropical and subtropical moist broadleaf forests: 14.7pp (0.2) Habitat increase, 0.3 Cost
- Tropical and subtropical dry broadleaf forests: 2.4pp
- Tropical and subtropical grasslands, savannas, and shrublands: 1.2pp (0.9) Habitat increase, 1.4pp Cost
- Temperate broadleaf and mixed forests: 7.6
- Deserts and xeric shrublands: 2.1pp (1.9) Habitat increase, Cost

Higher average risk to nature → Lower average risk to nature
Geo-spatial analyses can inform local decision-making

Illustrative country snap-shot

New and enhanced conservation areas

<table>
<thead>
<tr>
<th>Climate impact</th>
<th>2MtCO2 sequestered</th>
<th>9MtCO2 emissions prevented</th>
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<tr>
<th>Economic impact</th>
<th>7,000 direct jobs</th>
<th>190,000 adjacent jobs</th>
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<tr>
<td>$3.2B GDP</td>
<td>3/4 PAs – GDP exceeds run rate cost</td>
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<th>Health and cultural impact</th>
<th>80% land containing missing zoonotic diseases conserved</th>
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<td>260,000 km² Indigenous land conserved</td>
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<tr>
<th>Cost of protection</th>
<th>$1.4B set up costs</th>
<th>$300M run rate costs</th>
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FICTITIOUS EXAMPLE; INPUT FOR DETAILED FEASIBILITY STUDIES ONLY
What is the interplay between our environmental and social commitments?

Which nature-based solutions should we employ and where?

How should we track and communicate progress?
Thank you