



World Health
Organization



Convention on
Biological Diversity



Biodiversity and Human Health

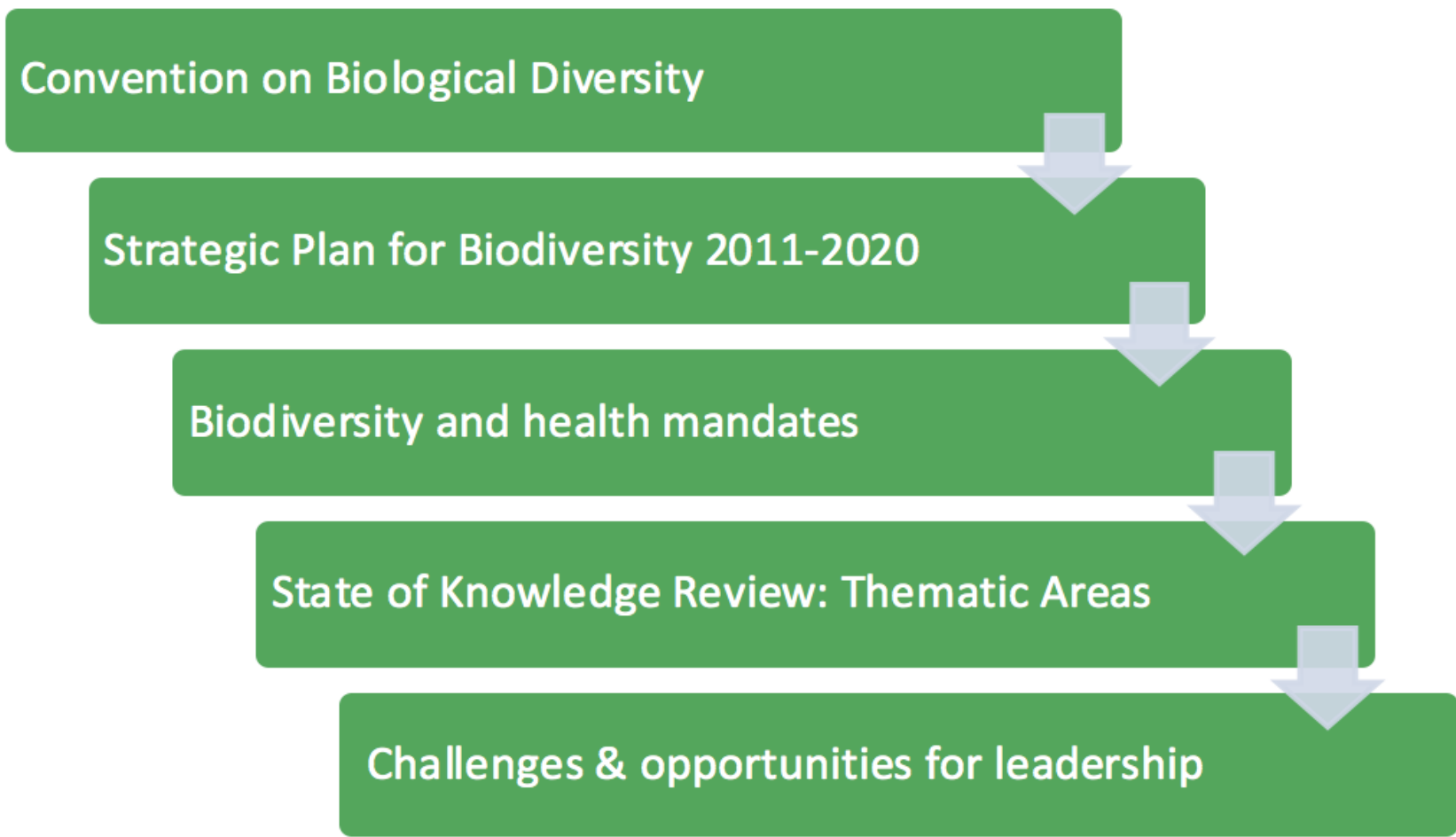
Opportunities for cross-sectoral collaboration

First meeting of the interagency Liaison Group on Biodiversity and health
WHO headquarters, Geneva
4 May 2017

Cristina Romanelli
Biodiversity and Health, Biodiversity Convention



Overview





Convention On Biological Diversity

Three primary objectives:

1. **Conservation** of biological diversity
2. **Sustainable use** of its components
3. **Fair and equitable sharing** of benefits arising from the sustainable use of genetic resources

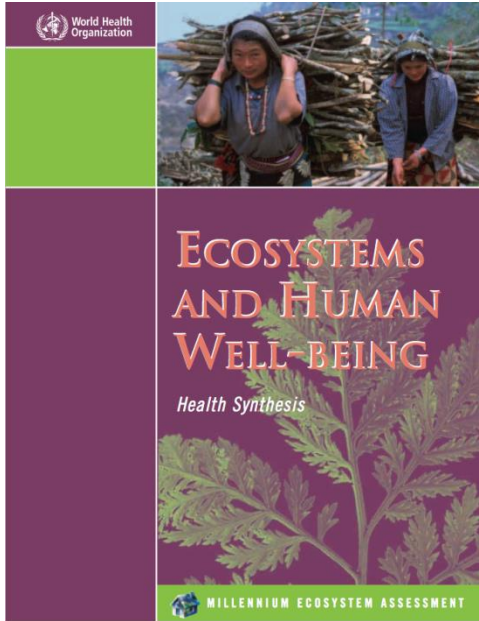
Biological Diversity (Art. 2) “...includes all **plants, animals, microorganisms**, the **ecosystems** of which they are part, and the **diversity** within species, between species, and of ecosystems.”

Decision V/4 para. 11

Impacts of anthropogenic pressures

- Up to 95 % of wetlands have been lost in some areas;
- 80 % of grasslands are suffering from soil degradation;
- 20 % of drylands are in the danger of becoming deserts;
- 90 % of all large fish species have disappeared from the oceans in the past half century;
- Tropical forest shrinking at about 5% per decade, adding 3 billion tons of CO₂ to the atmosphere yearly;
- Current atmospheric emissions of CO₂ are nearly 400 % emissions in 1950.

Importance of biodiversity and ecosystems to human health



“Nature’s goods and services are the ultimate **foundations of life and health**, even though in modern societies this fundamental dependency may be indirect, displaced in space and time, and therefore poorly recognized. These more distant and complex links mean that **we now need to look at environmental health through a broader lens...**”

(Lee Jong Wook, former DG of WHO, in MEA)

We all depend on biodiversity for human health, but some more than others

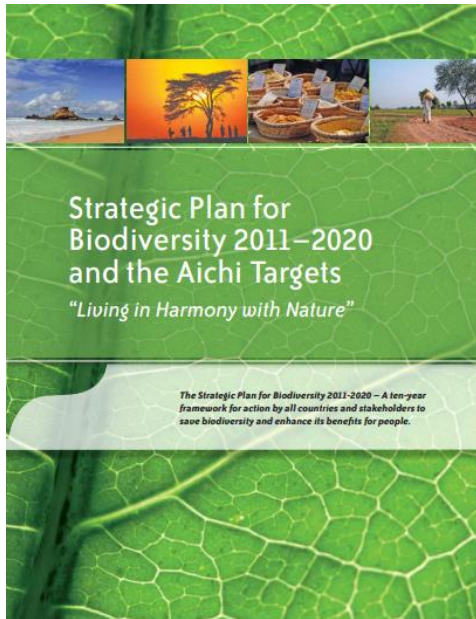
- Est. **33% globally** living under moderate to severe water stress.
 - **20-120 million** people live in areas affected by desertification;
- More than **3 billion people** depend on marine and coastal biodiversity for their livelihoods and subsistence;
- **1.3 billion** live from agro-forestry resources;
 - **60 million** indigenous peoples almost wholly dependent on forests;
 - An estimated **70% of world** population relies on medicinal plants;
 - **350 million people** depend on forests for subsistence and income;

Strategic Plan for Biodiversity 2011-2020: Vision

By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a **healthy planet** and delivering **benefits** essential for **all people**.



Mandates: Strategic Plan for Biodiversity 2011-2020



www.cbd.int/sp

Mission

Take effective and urgent action **to halt the loss of biodiversity** in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, **and contributing to human well-being, and poverty eradication.**

5 strategic goals and 20 Targets

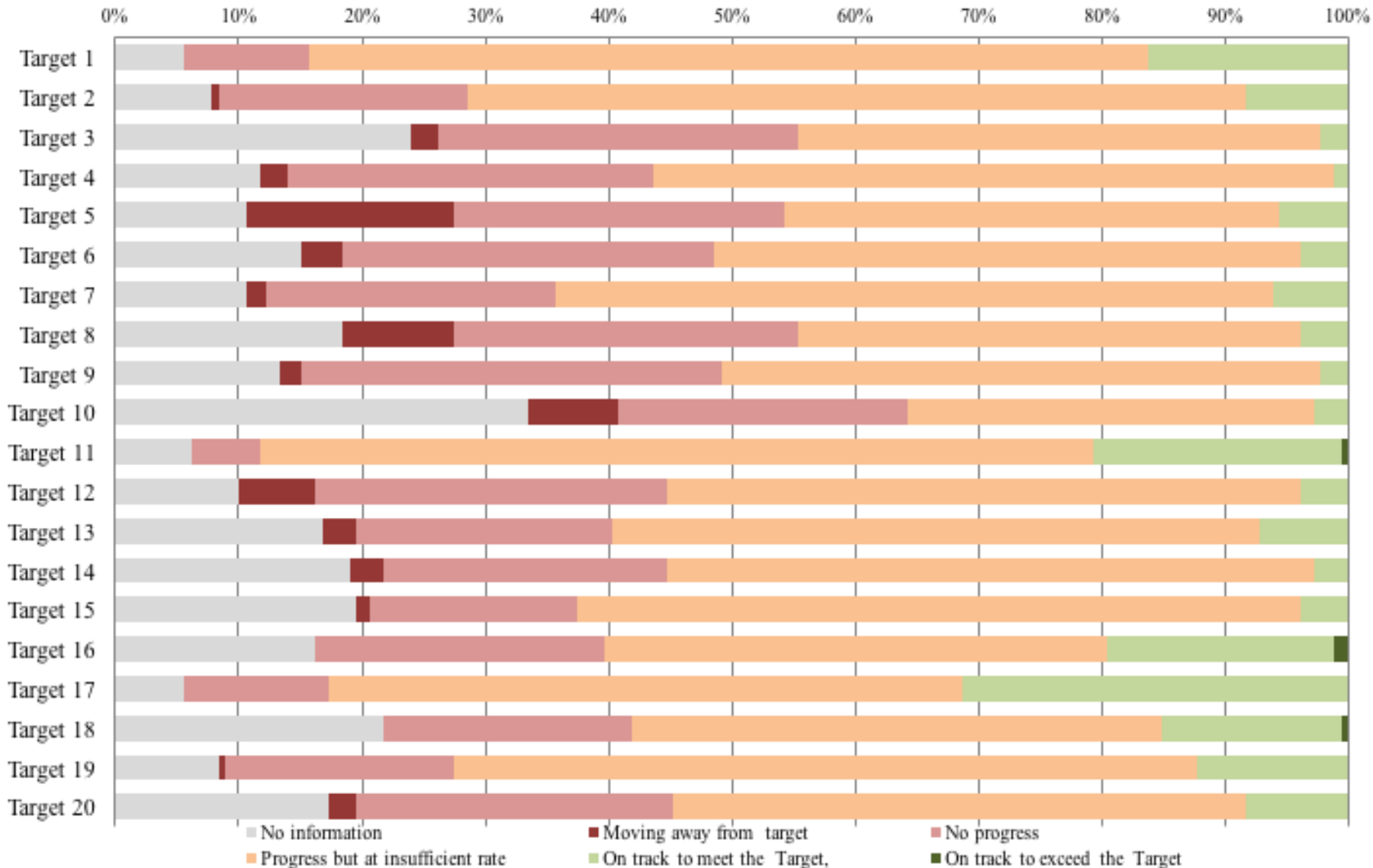
Aichi Target 14: ...Ecosystems that **provide essential services**, including services related to water, **and contribute to health, livelihoods and well-being**, are restored and safeguarded taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Strategic Plan : Opportunities for the health sector

*** Note: T1, T2 & T14 are relevant to all themes identified**

Biodiversity and Health Topic	Health Sector	Biodiversity Sector (Aichi Biodiversity Target)
<p>1. Food Species, varieties and breeds incl. domesticated and wild components Diversity of diet Ecology of production systems Total demand on resources</p>	<p><i>Direct responsibility</i> •Recognize and promote dietary diversity, food cultures and their contribution to good nutrition •Recognize synergies between human health and sustainable use of biodiversity (e.g. moderate consumption of meat) <i>Indirect responsibility:</i> •Promote sustainable production harvesting and conservation of agricultural biodiversity</p>	<p>T1; T14 T2 (poverty reduction) T4 (sust. production/consumption) T5 (reduce habitat loss) T6 (sustainable harvesting) T7 (sustainable management) T13 (genetic diversity)</p>
<p>2. Water Water quantity, quality and supply</p>	<p><i>Direct responsibility:</i> •Integrate ecosystem management considerations into health policy <i>Indirect responsibility:</i> •Promote protection of ecosystems that supply water and promote sustainable water use</p>	<p>T1; T14 T5 (reduce habitat loss) T8 (reduce pollution) T9 (invasive alien species) T11 (protected areas)</p>
<p>3. Disease regulation Ecosystem integrity and diversity</p>	<p><i>Direct responsibility:</i> •Integrate ecosystem management considerations into health policy <i>Indirect responsibility:</i> •Promote ecosystem integrity</p>	<p>T1; T14 T2 (poverty reduction) T5 (reduce habitat loss) T8 (reduce pollution) T9 (invasive alien species)</p>
<p>4. Medicine Traditional medicines Drug development (genetic resources and traditional knowledge)</p>	<p><i>Direct responsibility:</i> •Recognize contribution of genetic resources and traditional knowledge to medicine <i>Indirect responsibility:</i> •Protect genetic resources and traditional knowledge •Ensure benefit sharing</p>	<p>T1; T14 T2 (poverty reduction) T5 (reduce habitat loss) T13 (genetic diversity) T16 (Nagoya Protocol) T18 (local/traditional knowledge)</p>
<p>5. Physical, mental and cultural well-being Physical health benefits Benefits for mental health Cultural/spiritual enrichment</p>	<p><i>Direct responsibility:</i> •Integrate 'value of nature' into health policy <i>Indirect responsibility:</i> •Promote protection of values, species and ecosystems</p>	<p>T1; T14 T2 (poverty reduction) T11 (protected areas) T12 (preventing extinctions) T13 (genetic diversity) T18 (local/traditional knowledge)</p>
<p>6. Adaptation to climate change Ecosystem resilience and Genetic resources (value of 'options' for adaptation)</p>	<p><i>Indirect responsibility:</i> •Promote ecosystem resilience and conservation of genetic resources</p>	<p>T1; T14; T15 (ecosystem resilience) T3 (reduce negative subsidies) T5 (reduce habitat loss) T8 (reduce pollution) T10 (vulnerable ecosystems)</p>

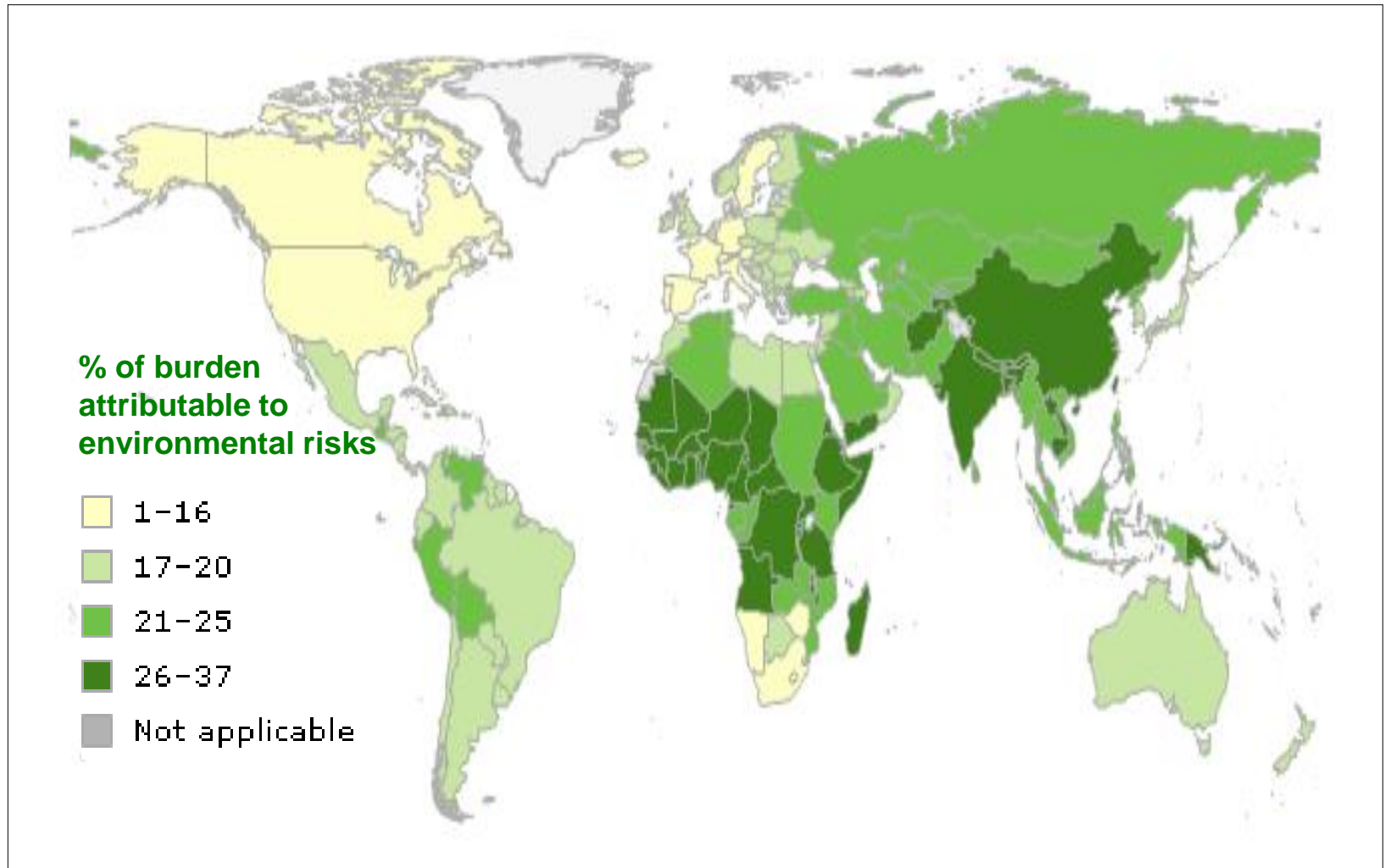
Mid-term Progress toward Aichi Targets based on 175 5th National Reports



SHARED DRIVERS of Biodiversity loss and ill health

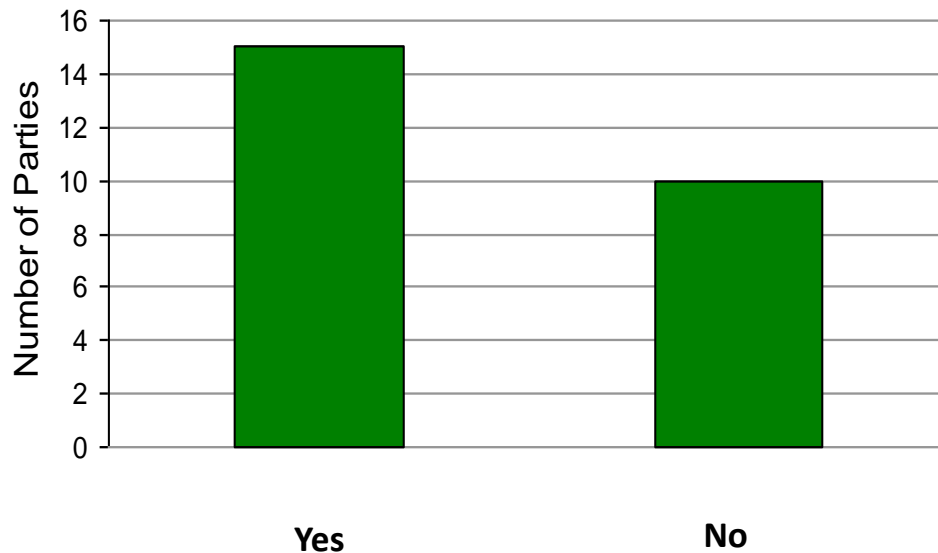
- **Land-use change:** Leading driver of disease emergence in humans; reduction in resiliency, elevated climate change impacts
- **Overexploitation and Destructive Harvest:** Loss of subsistence food sources; livelihoods
- **Pollution:** Bioaccumulation of toxins in food chain; respiratory diseases; chemical exposures; changes to microbial communities and development of antimicrobial-resistant infections
- **Invasive alien species:** Changes in species competition and displacement, leading to impaired ecosystem functions, e.g. food and water sources; disease introduction to humans, native wildlife and agricultural species
- **Climate Change and Ocean Acidification:** Shifts in species and pathogen range; extreme weather disasters; threats to agriculture, food and nutrition security

Environmental factors cause a quarter of global burden of disease - more in poorer countries

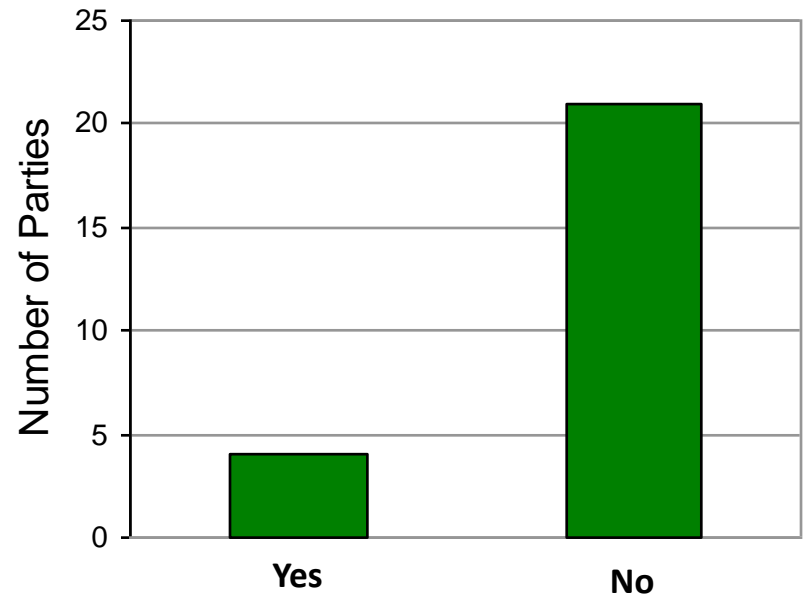


Integration of biodiversity-Health linkages in NBSAPs in the Americas

Mention of health in NBSAP



Presence of updated NBSAP



Health frequently referenced but generally not integrated in NBSAPs

Opportunities to integrate health-biodiversity links including in health plans, National Adaptation Plans, Nationally Determined Contributions...

PART II

**New era of collaboration and partnerships
on biodiversity and health**

Early mandates (COP 10)

1. **Strengthen collaboration with WHO and other partners** to support mainstreaming of biodiversity into health policies, programmes & plans.
2. Investigate how implementation of the **Strategic Plan** can best **support efforts to address global health issues**...and the MDGs
3. **Bridge gaps** between work on impacts of climate change on public health and its impacts on biodiversity.
4. Continue collaborating with relevant organizations in these fields to support the **mainstreaming of biodiversity** issues into **health policy** and **action** plans.

(Decision X/20, para 17)



Biodiversity and Health Mandates (cont.)

COP 11 (Decision XI/6)

Called for the establishment of a **joint work programme with the WHO**, and others, to support the contribution of the SP to achieving human health objectives;

COP 12 (XII/21): First full decision on biodiversity and Human health welcomes KM of the State of Knowledge Review, new emphasis on building capacity

COP 13 (XIII/6): Second full decision on biodiversity and Human health considers findings of the State of Knowledge review for Parties, new emphasis on supporting integration, coherence and implementation

Evidence-based decision making

Connecting Global Priorities: Biodiversity and Human Health

A State of Knowledge Review



Convention on
Biological Diversity



World Health
Organization

Consider implications of the findings... (Dec. XII/21)

Concepts, themes & directions

Water and air quality

Agricultural biodiversity and nutrition

Infectious diseases

Microbial diversity and noncommunicable diseases

Biomedical discovery and impact of pharmaceuticals

Traditional medicine

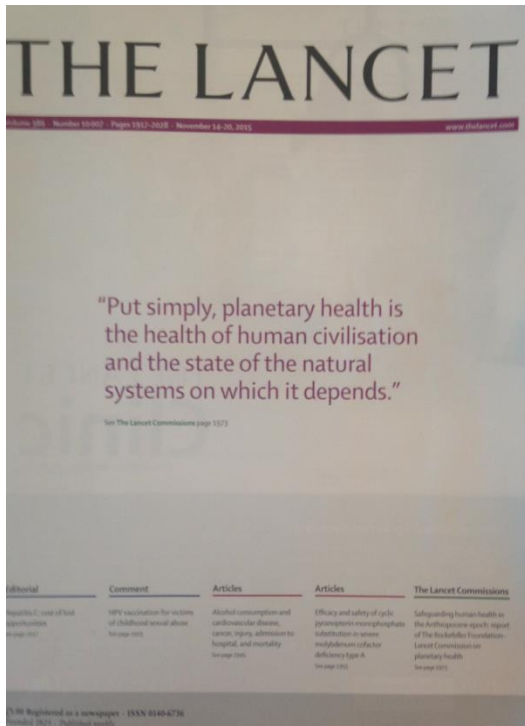
Physical and mental health and cultural well-being

Climate change and disaster risk reduction

Population, consumption and production patterns

Strategies, tools and ways forward

Evidence-Based Decision Making



1. Conceptual and empathy failures (imagination challenges), e.g. over-reliance on GDP as a measure of human progress; failure to account for future health and environmental harms over present day gains, and the disproportionate effect of those harms on the poor and those in developing nations.

2. Knowledge failures (research and information challenges), E.g. failure to address social and environmental drivers of ill health, a historical scarcity of transdisciplinary research and funding.

3. Implementation failures (governance challenges), e.g. how governments and institutions delay recognition and responses to threats, especially when faced with uncertainties, pooled common resources, and time lags between action and effect.

Biodiversity loss is exacerbating these challenges and the impacts of global environmental change on human health

Biodiversity and human health

Health "is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

Biological diversity (biodiversity) is "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."

Biodiversity underpins ecosystem functioning and the provision of goods and services that are essential to human health and well being.

The links between **biodiversity and health** are manifested at various spatial and temporal scales. Biodiversity and human health, and the respective policies and activities, are interlinked in various ways.



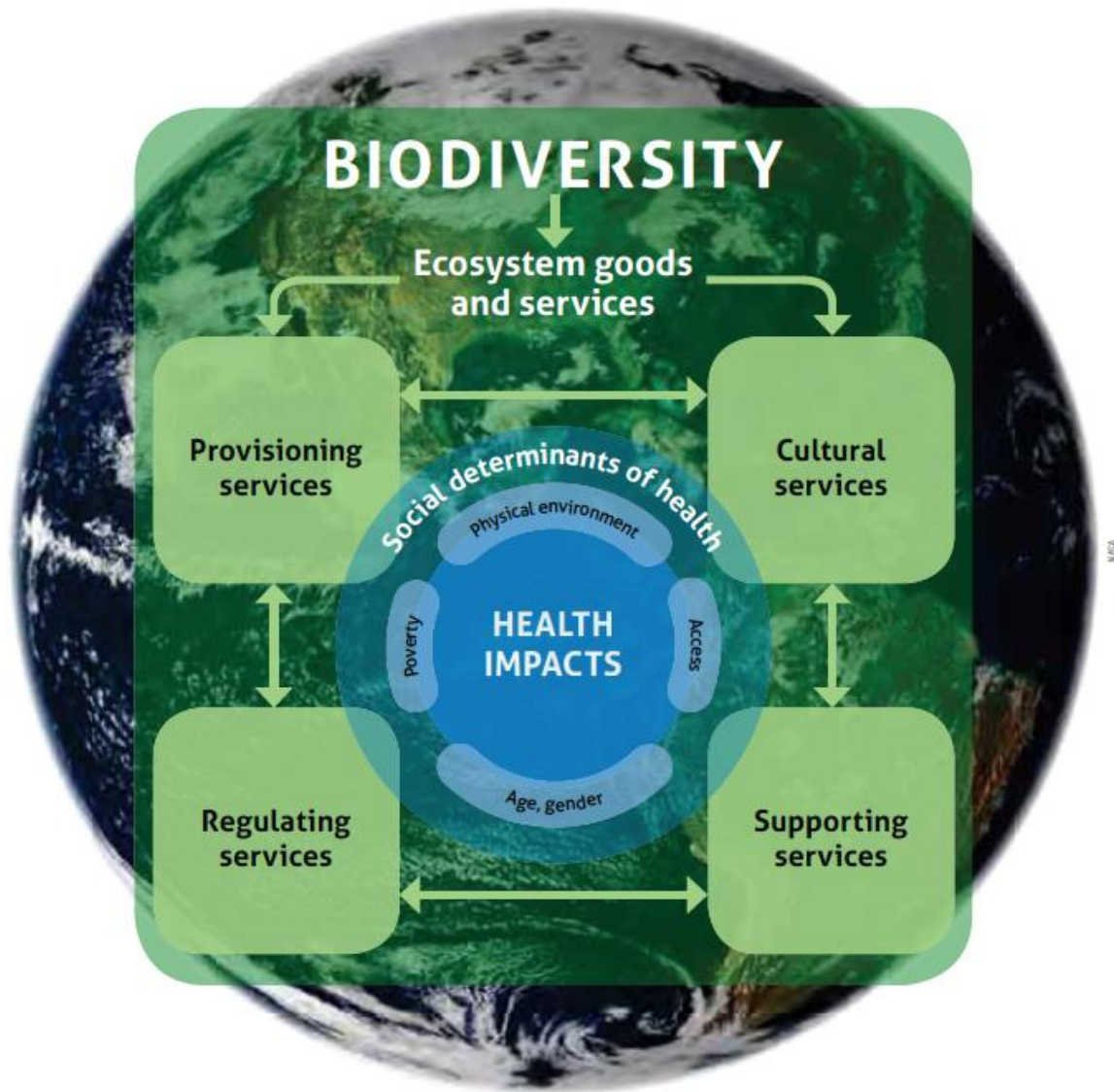
Direct drivers of biodiversity loss include land-use change, habitat loss, over-exploitation, pollution, invasive species and climate change. Many of these drivers affect human health directly and through their impacts on biodiversity.

Women and men have different roles in the conservation and use of biodiversity and varying health impacts.

Human population health is determined, to a large extent, by social, economic and environmental factors.

The social and natural sciences are important contributors to biodiversity and health research and policy. Integrative approaches such as the Ecosystem Approach, Eco-health and One Health unite different fields and require the development of mutual understanding and cooperation across disciplines.

Linkages and co-dependencies at the intersection of biodiversity and human health



Imperative to adopt integrative approaches

Challenges & opportunities for leadership

Unfinished agenda of the MDGs



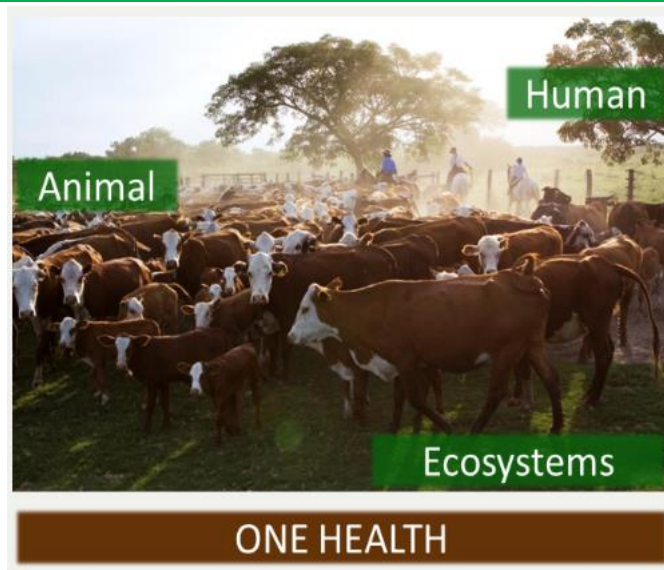
Political will, capacity, resources, competing interests...

Ongoing Social Challenges

- ❖ Vulnerable groups are also those most reliant on biodiversity & ES and least covered by social protection mechanisms (e.g. health insurance).
- ❖ Few resources for combating global environmental change & little voice in decision making
- ❖ Facing environmental changes driven by economic processes in other parts of the world
- ❖ Especially vulnerable to disease risk as a result of multiple stresses.



One Health/EcoHealth/Planetary Health



“...summarised an idea that had been known for more than a century; that **human health and animal health are interdependent and bound to the health of the ecosystems** in which they exist.”

www.oie.int

Health threats at the human-animal-ecosystem interface pose risks to public health, animal health and global health security

Planetary Health: “...the achievement of the **highest attainable standard of health, wellbeing, and equity** worldwide through judicious attention to the **human systems** -political, economic, and social- **that shape the future of humanity** and the Earth’s natural systems that **define the safe environmental limits within which humanity can flourish.**”

Unique opportunities for leadership

Major motivator for policy change & opportunity for:

- More integrated, inclusive, cross-sectoral approaches
- Address the common drivers of biodiversity loss and ill health
- Link policies to conservation as a delivery mechanism for health
- Evaluate and consider implications of ecosystem degradation for noncommunicable & infectious diseases & address the psycho-social dimensions of health
- Integrate health- biodiversity nexus in strategies, plans and actions

Additional opportunities to...

- Adopt preventive strategies and address upstream drivers of ill health
- Strengthen national and local capacity
- Conserve traditional knowledge and practices
- Contribute to Health in All Policies
- Maximize co-benefits & assess trade-offs
- Strengthen the science-policy interface
- Transformative change & intergenerational equity
- Enhance policy coherence & avoid duplication of efforts & structures
- ...Many more!

Opportunity to Link Health, Biodiversity and Climate Change



Important for the climate change community to explicitly recognize that human health and well-being are influenced by the health of local plant and animal communities, and the integrity of the local ecosystems

Opportunity & an imperative for the implementation of the SDGs



Annex: Examples of Biodiversity-Health Linkages & opportunities for health sector

Biodiversity-health linkages: Water

- ❖ almost 1 billion people lack access to safe drinking water and 2 million annual deaths are attributable to unsafe drinking water.

Role of biodiversity:

- ❑ Regulates quantity, quality and supply of freshwater
- ❑ Impaired water quality contributes to disease in humans, livestock and wildlife, negatively impacts on livelihoods of pastoral communities, tourism and trade, can lead to endocrine disruption, reproductive dysfunction, etc.

Direct opportunities for the health sector:

- ✓ Integrate ecosystem management considerations into health policy

Indirect interest of the health sector:

- ✓ Promote protection of ecosystems that supply water and promote sustainable water use



Biodiversity-Health Linkages: Air quality

- ❖ Over half of the world population relies on solid fuels for cooking and heating, often in unventilated space.
- ❖ Air pollution kills some 2 million/year, and can affect biodiversity and other ecosystem services

Effects on Acute Respiratory Infections

Proper use of biofuels reduce this health damage, but extensive biofuel production can also reduce biodiversity.

Direct opportunities for the health sector:

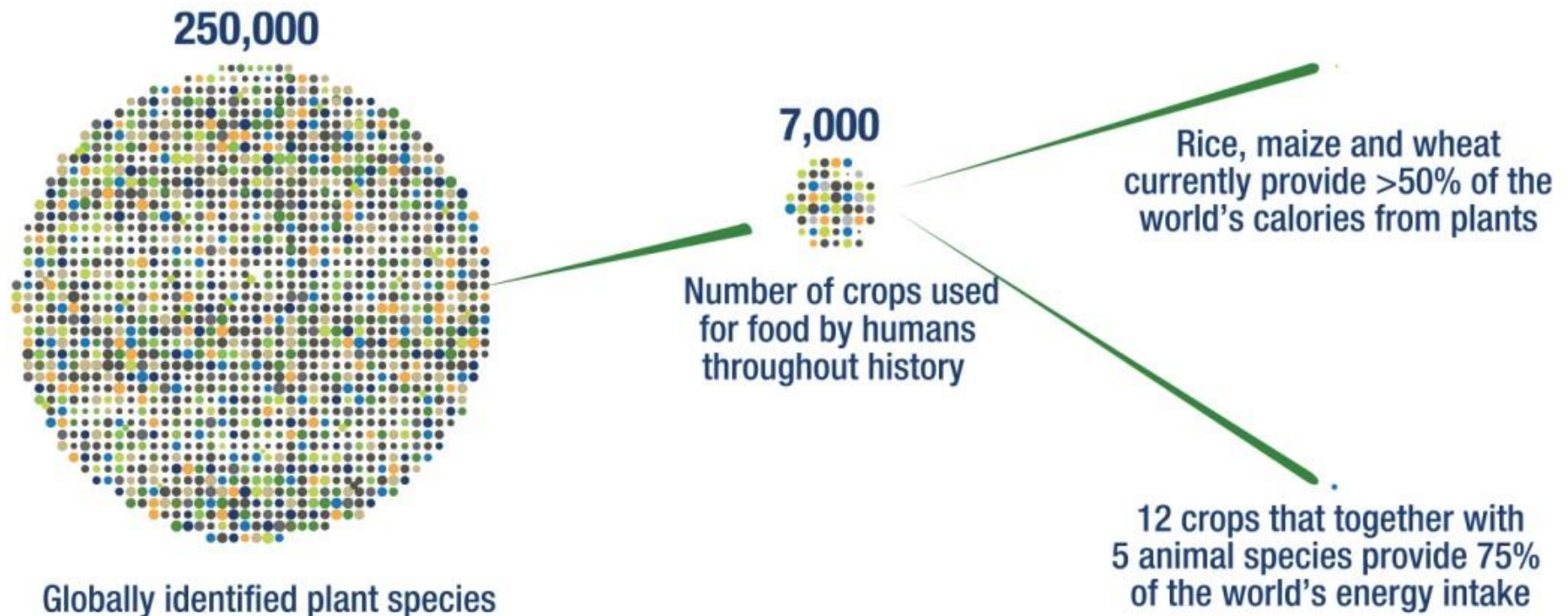
- ✓ Use components of biodiversity (e.g. lichens) as bioindicators of human health stressors and in air and water quality mapping, monitoring & regulation



Biodiversity & health linkages: Agricultural biodiversity

Agrobiodiversity underpins resilience yet...

Shrinking diversity



Food security & nutrition



1. Ng et al. 2014 2. FAO State of Food and agriculture, 2014 3. Global hunger index 2014

Dietary energy supply *can* be satisfied without diversity
Micronutrient supply *cannot* be satisfied without diversity

Opportunities for health sector: pest and disease regulation

- Pesticides have severe consequences for wildlife, human health and agrobiodiversity
 - 25 million/year suffer acute pesticide poisoning;
 - increased risks of some cancers
- Biodiversity supports the effective regulation of pests and disease in agricultural production and its loss can affect their occurrence
- Biological control methods provide more sustainable alternatives and minimize unintended impacts of chemical pesticides

Opportunities for the health sector: reduction of NCDs & nutritional security

- Pollinators affect approx. 1/3 food supply and increase crop productivity
- Widespread decline of pollinators (up to 70%!) associated with pesticide use, which impacts human nutrition (e.g. through loss of micronutrients)
- Wildlife (terrestrial, marine & freshwater) is essential to human nutrition. Even a single portion of local traditional food sources can result in significant increases in Vitamins A, B6, B12, D, E, Riboflavin, iron, zinc, magnesium, protein and fatty acids
 - ❖ **Food based approaches are critical to combatting malnutrition and promoting health!**
 - ❖ **Some dietary patterns have dual benefit of reducing climate change and promoting good health**

Microbial Diversity & Noncommunicable diseases

- Reduced contact with the natural environment and microbial diversity lead to poor control of background inflammation, especially in urban & high income settings
- Rise in Chronic inflammatory disorders →
 - Type 1 Diabetes
 - Colitis
 - Allergies
 - Asthma & many more!
- Antibiotic/antimicrobial use can also alter composition of the human microbiome
- Microbial exposure also linked to improved mental health

Direct opportunities for the health sector:

- ✓ strong medical rationale for increased provision of biodiversity and green spaces in modern cities



Credit: Nature news, 2012

J. Phipps/Shutterstock

Biodiversity & infectious diseases: a complex relationship

- > 60% of known human pathogens are zoonotic
 - Rabies, SARS, Ebola, Anthrax, Type A Influenzas, Toxoplasmosis, and 800+ others
- Approx. 73% of *emerging* human pathogens are zoonotic; most originate in wildlife.
- Rate of disease emergence is increasing

COMPLEX DYNAMICS

Ecological factors

Eg: Species composition, climate, landscape/habitat

Evolutionary factors

Pathogen reservoirs and hosts, pathogen persistence

Transmission factors

Route of transmission
Spillover via intermediate host
Human practices
Public health and clinical infrastructure

...Need many disciplines to see the full picture!

Biodiversity & disease regulation: A complex relationship

Ecosystem change	Potential effects on Disease transmission	Examples of diseases affected
Deforestation	Destabilized transmission cycles (Often) Increased vector densities (Often) Increased human contact	Malaria, Yellow fever, Leishmaniasis
Dam building/irrigation	More open/stagnant water Increased vector density	Schistosomiasis, Japanese Encephalitis
Unplanned Urbanization	Increase of vector breeding sites High densities of susceptible hosts	Dengue, Filariasis
Increased production density and human contact	Increased transmission and transfer to humans	SARS, Avian influenza

Opportunities for disease prevention

- ❖ Mortality in Lowland Gorillas and Chimpanzees due to Ebola were detected before human outbreaks in Gabon and Rep. Congo
- ❖ Transmission to humans may occur when handling infected wildlife
- ❖ Stakeholders and participants: hunters, foresters, conservation managers, public health

Direct opportunities for the health sector:

- ✓ Sentinel value: Early detection and warning system for conservation and health efforts
- ✓ Coordinated surveillance and lab. systems
- ✓ Employ prevention and control strategies, refine as more risk analysis inputs available

Biodiversity & health linkages: Traditional & modern medicine

❖ **Approximately 50% of synthetic medicines originate from natural sources**

Role of biodiversity:

- ❑ **Traditional knowledge**
- ❑ **Biomedical discovery and pharmaceutical development**

Direct opportunities for the health sector:

✓ Recognize contribution of genetic resources and traditional knowledge to medicine; better integration of traditional medicine; Opportunity to support broader dimensions of health

Indirect interest of the health sector:

- ✓ **Protect genetic resources and traditional knowledge**
- ✓ **Access to pathogens for responses**
- ✓ **Ensure equitable sharing of benefits**



Biodiversity and Health Linkages: Physical, mental and cultural well-being

Role of biodiversity:

- ❑ Physical and mental health
- ❑ Cultural/spiritual enrichment

Direct opportunities for the health sector:

- ✓ Integrate 'value of nature' into health policy including mental health and non-communicable diseases
- ✓ Increase opportunities for exposure to green spaces and microbial diversity as a preventive health strategy

Indirect interest of the health sector:

- ✓ Promote protection of values, species and ecosystems

