

# The role of Biologists in implementing appropriate mitigation strategies against climate change for the benefit of human health and the environment

Presented by

**KOLOKO Brice Landry**

*TWAS-CEMB Ph.D. Fellow*

# Overview



- ❖ **What is climate change ?**
- ❖ **Climate change processes & consequences**
- ❖ **Climate change & Human health**
- ❖ **Current solutions implemented towards the impacts of climate change**
- ❖ **Adverse effects of Mitigation and Adaptation strategies on Human health (cancer)**
- ❖ **What must be done to avoid adverse effects of Mitigation and Adaptation strategies on Human health ?**
- ❖ **Conclusion**



# What is climate change ?

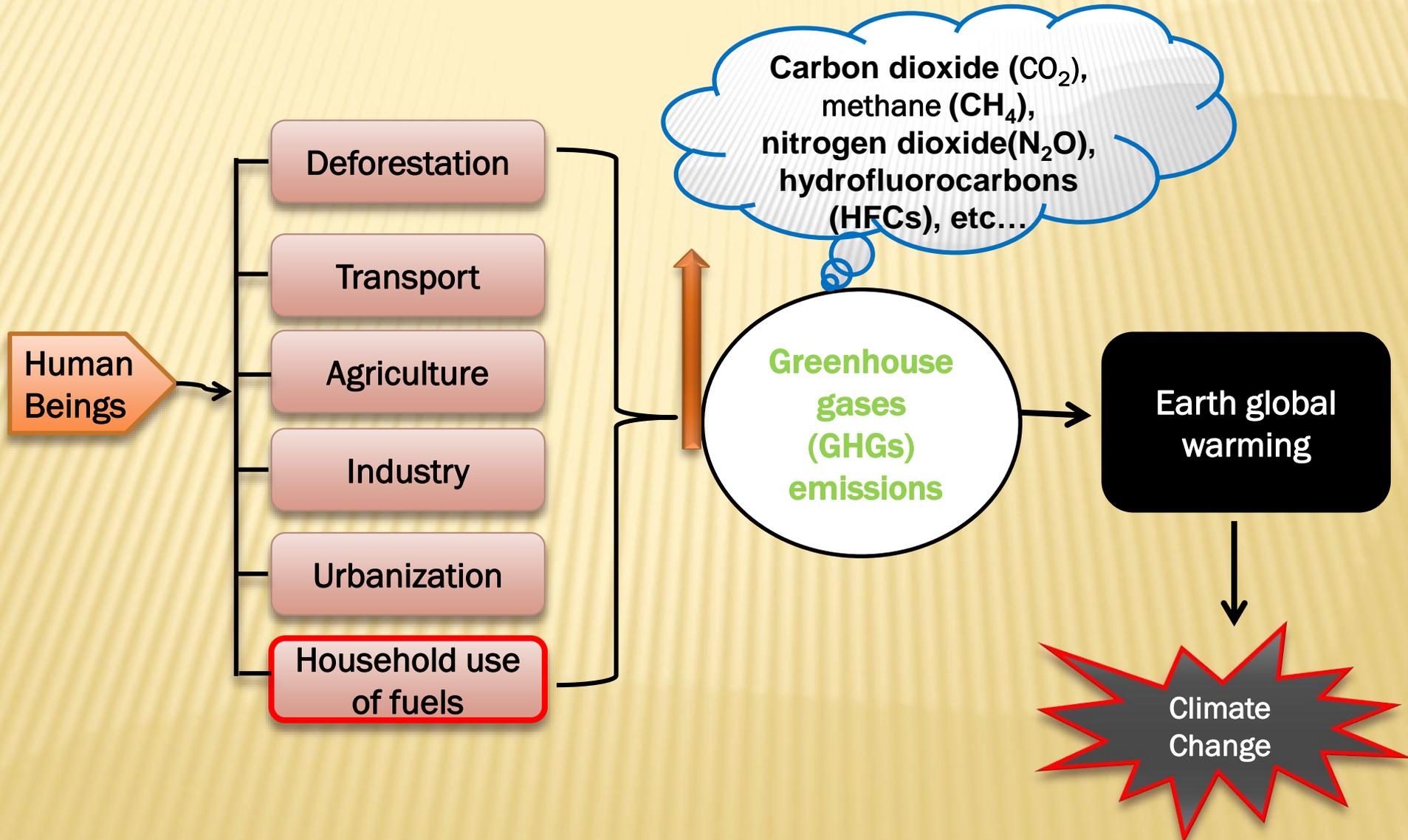
- The *United Nations Framework Convention on Climate Change (UNFCCC)*:

“**Climate change**” : Change of climate which is attributed **directly** or **indirectly** to **human activity** that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (UNFCCC, 1992).





# Climate change processes





# Climate change : Urgent challenge !!!

- **Climate change** is increasingly affecting our daily lifestyle and this phenomenon has become the whole world's concern that needs to be addressed **by everyone**.



Take urgent action to combat climate change and its impacts

Sustainable Development Goals (SDGs)  
September 2015.  
UN General assembly, New York.



# Climate change consequences

- The consequences of climate change are perceptible through the world with the multiplication of **natural disasters** including :



Biodiversity losses

Economic losses

Human Health  
(Diseases Spread)



# Climate change & Human health

“Climate change is the biggest global health threat of the 21<sup>st</sup> century” (Lancet; 2009); and affects **directly** or **indirectly** our health.

**Heat-related illnesses:**  
Induced by heat waves or extreme heat.



**Immediate deaths and injuries:**  
Caused by natural disaster (storms, floods...).



**Access to Healthcare:**  
Destruction of health care infrastructures and roads.





# Climate change & Human health (continued)

## ☐ Vector-borne diseases: (Malaria and Dengue fever)

Transmitted by mosquitoes which are climate sensitive and need stagnant water for breeding.



## ☐ Cancers : (Skin cancer)

Could result from increased ultraviolet radiation exposure due to depletion of stratospheric ozone



# Current solutions implemented towards the impacts of climate change



- Climate change can be addressed by two strategies: **Mitigation** and **adaptation** (Dan Walmsley *et al.*, 2010).

**Mitigation:** involves policies and interventions to reduce GHGs emissions.

- Enhance the sinks of gases that remove them from the atmospheres (e.g: forests and vegetation);
- Reduce the use of oil and coal;
- Improve walking and cycling infrastructures;
- Reduce use of fossil fuel-dependent cars, supply hybrid or electric cars for fleet vehicles;
- etc...

**Adaptation:** is based on preparing for, and minimizing the predicted impacts of climate change:

- Enhance more urban green space;
- Vector control (new pesticides);
- Water treatment and sanitation;
- Warming systems, air conditioning;
- Design new drugs, diagnostic equipment, vaccination;
- Solid infrastructures and public health infrastructures;
- Education, training and public awareness.

# Adverse effects of Mitigation and Adaptation strategies on Human health



- Although those mitigation and adaptation strategies are beneficial for our planet, some of them could have **negative effects on our health**, especially on cancer development.
- For instance, **electric vehicles (Evs)** and **solar photovoltaic (PV)** are the current mitigation strategies that considerably reduce the GHGs emissions. In **2015** there were **1.26 million EVs** on the road and we expect more the next decade. In **2016**, wind and solar PV constituted **78.4%** of new capacity in the EU (Stefan Rahmstorf *et al.*, 2017) .
- However, the manufacturing of batteries for **electric cars** or **power solar systems** may increase exposure to metals such as **nickel** or **cadmium** of which high-level exposure has been associated with **cancer risk factors** (Christopher J. Portier *et al.*, 2010).
- Thereby, some **cancers** as well as other diseases may **directly** be a result of climate change or **indirectly** be a result of adaptation strategies.



# Overview on cancers

- According to recent statistic (WHO, 2012), cancer is the **second leading cause of death in the world following cardiovascular diseases** and **8.2 million cancer-related deaths** occurred in **2012** (Table 1).

**Table 1. Leading Causes of Death Worldwide by Income Level, 2012 (Thousands)**

	Worldwide			Low- and Middle-income			High-income		
	Rank	Deaths	%	Rank	Deaths	%	Rank	Deaths	%
Cardiovascular diseases	1	17,513	31%	1	13,075	30%	1	4,438	38%
<b>Malignant neoplasms</b>	<b>2</b>	<b>8,204</b>	15%	3	5,310	12%	2	2,894	25%
Infectious and parasitic diseases	3	6,431	12%	2	6,128	14%	7	303	3%
Respiratory diseases	4	4,040	7%	4	3,395	8%	3	645	6%
Unintentional injuries	5	3,716	7%	5	3,212	7%	5	504	4%

**Source:** World Health Organization Global Health Observatory Data Repository, Mortality and Global Health Estimates 2012. [apps.who.int/gho/data/?theme=main](https://apps.who.int/gho/data/?theme=main). Accessed August 24, 2014.

American Cancer Society, Inc., Surveillance Research, 2015

- GLOBOCAN 2012 predicts about **19.3 million new cancer cases per year by 2025**, due to growth and ageing of the global population.
- Cancers remain a great burden because **mechanisms of all cancer development are not completely understood**, the **lack of early diagnostic** and the **high cost of treatments**, especially in developing countries.
- Further research must be take place to tackle this problem.



# What must be done to avoid adverse effects of Mitigation and Adaptation strategies on Human health ?

- **Biologists** involved in the study of diseases must **work in collaboration** with **others scientists** to develop **appropriate mitigation and adaptation strategies** which will **positively affect both environment and human**.
- Biologists should investigate the **effects of mitigation and adaptation measures on cancer** incidence so that the best strategies can be developed and implemented.
- To understand **the possible effects of alternative fuels** (new batteries , voltaic cells, and other technologies) on human health.
- To identify specific **bio- markers for early diagnosis** of cancers.
- To discover **novel compounds from medicinal plants** with **anti-cancer activities**.



# Conclusion

- Through the study of medicinal plants we can:
- Find **new cancer drugs, cheaper with fewer side effects and readily available**, especially in the developing countries;
- **Limit deforestation** and promote the **cultivation of medicinal plants due to their importance.**
- **Contribute to curbing global warming.**
- With the involvement of biologists and other scientists, we can adapt to climate change without compromising our health now and for the future generations **for a safe and sustainable world ...**



# Acknowledgments



**Centre of Excellence in Molecular Biology**  
University of the Punjab, Lahore, Pakistan



*twas*

THE WORLD ACADEMY OF SCIENCES

*for the advancement of science in developing countries*

THE ELSEVIER FOUNDATION

A black and white cartoon illustration of a snowman melting. The snowman has a sad expression, with its eyes and nose partially melted. It is holding a rectangular sign in its right hand that reads "END GLOBAL WARMING" in bold, capital letters. In its left hand, it holds a single leafy branch. Water droplets are falling from its body, and steam or sweat is rising from its head, indicating it is melting. The background is a simple grey gradient.

**END  
GLOBAL  
WARMING**

THANK YOU!!!