

# OurPlanet

United Nations Environment Programme

May 2015



## Healthy Planet, Healthy People



**Massoumeh Ebtekar**  
Enabling Breathing  
of Clean Air

**Khaled Fahmy**  
Time to Act

**Maria Neira**  
Development's  
Healthy Heartbeat

**Nina Cromnier**  
Within Reach



UNEP

United Nations Environment Programme

# OurPlanet

Address:

**PO Box 30552  
Nairobi, Kenya**

E-mail:

**publications@unep.org**

Telephone:

**+254.20.762.1234**

For past issues visit:

**www.unep.org/ourplanet**

ISSN:

**1013-7394**

*OurPlanet,  
the magazine of the  
United Nations Environment Programme  
(UNEP)*

**Director of Publication:** *Naysán Sahba*

**Editor:** *Geoffrey Lean*

**Assistant Editor:** *Mark Foss*

**Coordinator:** *Angeline Djampou, Mohamed Atani*

**Design and Layout:**

*Hybrid Design (San Francisco)*

*William Orlale*

**Produced by:**

*United Nations Environment Programme*

*The contents of this magazine do not necessarily reflect the views or policies of UNEP or the editors, nor are they an official record. The designations employed and the presentation do not imply the expressions of any opinion whatsoever on the part of UNEP concerning the legal status of any country, territory or city or its authority or concerning the delimitation of its frontiers or boundaries.*

*\*All dollar (\$) amounts refer to US dollars.*



*Printing: UNON, Publishing Services Section, Nairobi, ISO 14001:2004-certified  
DI No : 15-01457/1000 copies/May/JW*

UNEP promotes environmentally sound practices globally and in its own activities. This report is printed on paper from sustainable forests including recycled fibre. The paper is chlorine free, and the inks vegetable based. Our distribution policy aims to reduce UNEP's carbon footprint.



# Table of Contents

## Features



Page 6

**Massoumeh Ebtekar**  
Enabling Breathing  
of Clean Air



Page 22

**Nithya Ramanathan**  
**IH Rehman**  
**Veerabhadran Ramanathan**  
Credit Where it's Due



Page 10

**Khaled Fahmy**  
Time to Act



Page 16

**Maria Neira**  
Development's  
Healthy Heartbeat



Page 28

**Nina Cromnier**  
Within Reach



Page 18

**Hans Bruyninckx**  
Breathtaking  
Challenge



Page 30

**Chris W Williams**  
**Julian Kyomuhangi**  
Silent Emergency



Page 44

**Richard Fuller**  
Pollution – The  
Greatest Killer



Page 34

**Hugh Montgomery**  
Terminal Blow?



Page 48

**Gladys Kalema-Zikusoka**  
Felling Trees  
Brings Disease?



Page 36

**Samuel S Myers**  
Clear and  
Present Danger

Page 4 Reflections

Page 14 A Breath of Fresh Air

Page 20 Extreme Beans

Page 26 The Missing Link

Page 32 Cleaning Our Air

Page 38 Off the Shelf

Page 46 Making Connections

Page 50 UNEP Publications

Page 52 Environmental Champion



Page 40

**Peggy Liu**  
A New Way to Eat



# Achim Steiner

## Reflections



Photo: © Neil Emmerson/Robert Harding Picture Library



**Achim Steiner**

*United Nations Under-Secretary-General and UNEP Executive Director*



**Margaret Chan**

*Director-General of the World Health Organization*

In a few months, the international community will gather to finalize the Sustainable Development Goals (SDGs) and create the foundations for the post-2015 sustainable development agenda that aims to build a brighter future for humankind.

The environment cuts across virtually all of the goals, as it should: the Earth's natural resource base props up much of human existence—furnishing us with agricultural land and fisheries; supporting livelihoods and growth; giving us air, water, energy and so much more.

But perhaps nowhere is the importance of a well-managed environment as clear as in human health—which is not only a standalone goal and itself an enabler of other goals such as those on education, economy and societies, but a way of measuring how we are performing across the board. This latter aspect is one the World Health Organization (WHO) will emphasize at the upcoming World Health Assembly in Geneva.

These sustainable development aspirations have come not a moment too soon. As a result of the impacts our rapid development have

wrought on the environment, our planet is straining to sustain human life in good health. The evidence to support this assertion is clear.

In March last year, for example, WHO estimated that in 2012 exposure to indoor and outdoor air pollution killed around 7 million people worldwide, making it the world's largest single environmental health risk. This air pollution is due in large part to a fossil-fuel based economy that pumps particulate matter and other harmful materials into the air. A century or so ago, perhaps we had the excuse of ignorance and a lack of alternative technologies. Today, we do not.

We have examples of sustainable urban transport systems across the globe. We have access to cleaner fuels and more-efficient vehicles. We have created more advanced renewable energy and energy-efficient technologies. We can produce clean cookstoves to slash the 4.3 million annual deaths from indoor air pollution.

Happily, all of these crucial initiatives are spreading, most notably renewables. In 2014, we saw a \$270 billion surge in investment, up 17 per cent on the previous year,



according to research from the Frankfurt School UNEP Centre and Bloomberg New Energy Finance. With further expansion of renewable energy and the other opportunities above, we can provide universal access to clean energy without compromising human health.

We have similar challenges and opportunities in how we manage chemicals, a topic that is particularly pertinent given that this May the Basel, Rotterdam and Stockholm Conventions met to boost efforts to minimize human health and environmental impacts from chemicals, including pollution, and from waste.

Chemicals are an integral part of today's world, and this is not about to change. Global chemical output was valued at US\$171 billion

in the 1970s, and grew to US\$4.12 trillion by 2010. Global chemicals sales are projected to grow about 3 per cent per year to 2050.

But the gains that chemicals provide must not come at the expense of human health and the environment. The health impacts include both disease and illness and death by poisoning.

And new issues are emerging. In a 2012 report UNEP and WHO concluded that despite substantial advances in our understanding of endocrine disrupting chemicals, uncertainties and knowledge gaps still exist that are too important to ignore.

The list of challenges may seem daunting, but past successes show they are not insurmountable—and tackling them head-on is imperative to the success of our post-2015 agenda. Take the Montreal Protocol, for example—under which the world collectively tackled the damage ozone-depleting substances were causing to the ozone layer, and thus human health through increased skin cancer and cataract cases.

We are now on track for recovery to pre-1980 levels, and the benefits are astonishing: new data released by the US Environmental Protection Agency showed that actions under the Montreal Protocol will have prevented 283 million cases of skin cancer by 2100. Extrapolated across the globe, this means billions of cases, and millions of lives saved.

Another achievement comes in the form of the Minamata Convention on mercury, a toxic element that can cause serious health impacts. After years of negotiation, the Minamata Convention was adopted in early 2013 and subsequently discussed at the World Health Assembly. It now has 128 signatures and 11 ratifications, and preparatory work is well underway to support nations in meeting their obligations.

This is all encouraging, but health challenges also emerge from environmental

issues that are not so obvious—climate change chief amongst them. Emerging evidence from the Intergovernmental Panel on Climate Change shows that climate change has altered the distribution of some infectious disease vectors, altered the seasonal distribution of some allergenic pollen species, and increased heatwave-related deaths.

If we do not act to reduce greenhouse gas emissions, then we will see even greater health impacts. Extreme weather events will claim many lives, while changing weather patterns will increasingly affect agricultural production. In Africa alone, climate change could reduce crop yields by up to 20 per cent by 2050 as the population nearly doubles. The health consequences of such a scenario are obvious.

This is why the second major process taking place this year, the meeting in Paris designed to produce a binding agreement on mitigating and adapting to climate change, will hold equal importance for human health. A weak agreement would undoubtedly hamper sustainable development. A strong agreement—one which commits nations to deep emissions cuts and innovative ways to build resilience to the impacts of climate change—would give us a far better chance of delivering on this ambitious agenda.

There are so many other areas we could touch upon: how human health is supported by biodiversity and ecosystem services; growing plastic contamination in the oceans and food chain; the ever-increasing amounts of e-waste that expose workers to hazardous substances.

The web of interactions between the environment and human health is undoubtedly complex, but the top-level message is simple: how we manage and use the planet's resources has a clear and obvious impact on how healthy we and future generations will be.

UNEP, WHO and many other committed organizations, governments and individuals have come a long way—both in building the evidence base that enable policies to improve human health, and implementing initiatives that reduce environmental risk factors.

This year, with the SDGs and climate negotiations concluding, we have a golden opportunity to elevate these efforts to the next level. We should not waste it. ▲

***In Africa alone, climate change could reduce crop yields by up to 20 per cent by 2050 as the population near doubles.***

# Massoumeh Ebtekar

## Enabling Breathing of Clean Air

*Iran's experience in abating air pollution shows the importance of long-term planning and social mobilization*



**Massoumeh Ebtekar**

*Vice President of the Islamic Republic of Iran and Head of Department of Environment*

*Champion of the Earth 2006*

Iranians were the first to refer to air pollution in the scientific literature. Avicenna, in his Canon of Medicine completed in 1025 AD, classifies and describes various types of air and water with potential to harm humans. Now the World Health Organization has repeatedly named air pollution as a major threat to human health and a carcinogen, showing that it is not only an environmental issue, but a global economic and public health challenge.

Air quality is important for over 35 million Iranian citizens in major cities. Rapid industrialization and urbanization has seen more than 70 per cent of the population migrate to urban areas in recent decades, creating many environmental challenges. Mashad, Tabriz, Isfahan, Shiraz, Ahwaz, Karaj and Arak are now major cities with over 1 million inhabitants. Many other provincial centres—like Kermanshah, Rasht, Ghom, Urumieh, Ghazvin, Bushehr, Kerman, Yazd and Bandar Abbas—are large cities booming with population and economic growth.

Meanwhile, Tehran—surrounded by the Alborz Mountains to the north and the east—is a mega city with 8.5 million overnight inhabitants and over 11 million during the day. Official estimates reveal there to be over 5 million vehicles on the city's roads, including more than 2.5 million motorcycles, and acute air pollution has long been a major environmental challenge. The primary pressure points leading to this untenable situation, identified in the Second National State of the Environment Report, are: population growth (leading to urban sprawl and increasing demands for energy and infrastructural development), increasing numbers of motor

vehicles on the roads, inefficient fuel consumption and a lack of pollution control facilities in industrial plants burning fossil fuels.

The late Professor Taghi Ebtekar began research on air pollution in Iran as early as 1974, at Tehran University and as an advisor to the mayor of Tehran. He set forth a strategy for substituting natural gas (CNG) as a cleaner fuel for public transportation. His studies and plans later became the basis for Tehran's roadmap to combat air pollution. This project now spans one and a half decades. In 1998, multiple studies on air pollution in Tehran were compiled, and a comprehensive plan to combat it was drawn up. After adoption by the cabinet in 1999, and allocation of resources, the scheme was implemented as seven major projects.

From 1999 up to 2005, cars came under strict emission controls, emitting 80 per cent fewer pollutants due to engine modifications and the installation of catalytic converters and filters. Lead was completely phased-out from petroleum during those years. Electronic automobile inspection centres were established, CNG-operated buses were introduced, public transport (including the underground metro and the bus system) was promoted and a nationwide awareness-raising campaign, including a national Clean Air Day, was initiated. An *ad hoc* committee met regularly with all stakeholders and major players to monitor the plan. However, after 2005 the plan faced serious impediments and delays. Over an eight-year period, Tehran faced an annual increase of between 200,000 to 400,000 new vehicles that were regulated, but which still added to the traffic and pollutant load. A plan to phase-out obsolete cars was initiated in 2002, but bureaucratic impediments delayed its implementation until several years later.

One reason for the delay was a change in development priorities. Following elections in 2005, the incoming president introduced different national priorities and widespread changes in management within administrative bodies. The inter-sector cooperation committee in charge of monitoring the pollution strategy—which had convened more than 150





Photo: © Yoko Aziz / Robert Harding

## **Rapid industrialization and urbanization has seen more than 70 per cent of the population in Iran migrate to urban areas in recent decades, creating many environmental challenges.**

---

*From 1999 up to 2005, cars came under strict emission controls, emitting 80 per cent fewer pollutants due to engine modifications and the installation of catalytic converters and filters.*

---

sessions since 1999—became inoperative. This, sadly, led to a general decline in the effectiveness of the overall plan. Nine years after its inception, many projects were lagging behind for several reasons, including this change of priorities and government policies.

In 2007, the Tehran City Council established an environmental committee that adopted a plan to combat air pollution in Tehran and mobilize local resources for it. Watchdog bodies such as the Parliament and City Council also produced reports and warned on the long-term consequences of neglecting environmental questions. Using a European-based approach, researchers estimated that the total cost of health damage from air pollution was about \$7 billion in 2001, equivalent to 8.4 per cent of Iran's nominal gross domestic product (GDP). This is predicted to reach \$9 billion in 2019 in the absence of any effective and efficient intervening measures.

After the election of President Rouhani in 2013, tackling environmental challenges again became a national priority. The president undertook a serious strategy to improve national indicators in all fields, including the environment.

Nationwide programmes are now in process to improve energy consumption patterns and energy efficiency, audit energy for industries and build combined cycle power plants and renovate old ones. Alternative, clean energy power plants were reinstated and are now under way. The government has also provided budgetary and economic incentives for private sector energy efficiency projects and supported public transport, including Tehran's metro which served 3 million commuters daily in 2014. Similar air pollution mitigation roadmaps have been implemented in seven other major cities, promising better air quality for more than 30 million citizens.

After the installation of the new government, a systemic arrangement led to drafting a bill on the national action plan to combat air pollution in 2014, dealing with the gaps and unimplemented aspects of the programme. A 16-member cross-sector national committee, with a strong referral and follow-up mechanism, was established and regular meetings have been convened. Local action plans and committees are also maintained at each city.

As a result, and based on the bill, the Ministry of Petroleum expedited processes to upgrade the standards of its refineries and their products. Euro 4 petroleum and diesel fuel replaced the low-grade, polluting compounds in all major cities during 2014. This achievement—accomplished despite the ongoing unjust sanctions against our country, impeding our access to new clean technologies—was an important stride forward.

In the same year, the automotive industry implemented Euro 4 emission standards after several years of delay. With government incentives, more than 350,000 obsolete passenger cars were phased out, resulting in a drastic lowering of emissions. Substituting natural gas for heavy fuels used in power plants and strict online monitoring near large cities were also important measures.

Annual analysis of results from multiple monitoring stations in major cities indicates that a significant improvement in air quality has occurred as a result of these intensive efforts and intersectoral work. During the Iranian calendar year 1393 (starting on March 22, 2014), monitoring stations showed that Tehran experienced 44 days of better air quality. Other cities also produced similar results.

During this period, Iran's civil society enjoyed substantive governmental support—breathing new life into this vital peoples' mechanism—in sharp contrast with the practices of the previous government. The number of green non-governmental organizations grew rapidly from 370 to 730 in just 18 months between 2013 and 2015, indicating the latent potential of our society in this area.

This wave of awakening gave a significant boost to the government initiative on air pollution. Local and national media launched information campaigns, and very widespread Clean Air Days encouraged citizens to take responsible decisions to use public transportation or apply inspection regulations for private cars. President Rouhani joined in, riding the underground metro to his office: this received widespread publicity and was welcomed as a responsible, natural gesture on Clean Air Day.

As a result of the plan of action now under way, the quality of air in our major cities has gradually improved over a period of 18 months. Systematic monitoring of air quality and reporting on implementation and intersectoral collaboration will continue.

Meanwhile, dust storms have also caused deterioration in air quality in Iranian cities over the past decade. The harmful dust mostly originates in neighbouring areas, including

Saudi Arabia, Iraq and the borders of Syria and Jordan. Negotiations and preparations for a regional agreement and fund have been under way, but some regional states have not collaborated, while fundamental insecurity in many areas has resulted in a setback for the regional fund.

Nationally, the Department of the Environment has established an *ad hoc* committee for intersectoral collaboration, developing a national action plan, identifying dust hotspots and defining clean strategies and scientific methods to minimize them. Large areas in the southern, western and eastern regions have been screened. Strategies to combat the formation of the hotspots have been adopted, the government has allocated funding and the plan is gaining traction. New air quality monitoring stations have been established in many regions of the country to measure particles smaller than 2.5 microns.

In some areas, large tree and shrub plantations have been created to prevent desertification. The ongoing drought and detrimental effects of climate change have aggravated the situation. Besides its effect on the health of our citizens, the huge dust phenomenon has inflicted damage on our natural, pristine Zagros forests and range lands, and on agriculture.

Local communities have been integrated into management schemes for protected areas and wetland, such as the restoration of Parishan wetland in Kazeroun. Wetlands become sources of dust when they dry out. A drastic change in irrigation policy and water consumption has been put into practice with local farmers in many areas. For example, the Houralazim wetland in the south western borders—dried out in previous years for oil exploration—now receives a constant influx of water, restoring much of the natural landscape and vegetation.



Photo: © Ashley Cooper / Robert Harding

## *The Hournalazim wetland in the south western borders—dried out in previous years for oil exploration—now receives a constant influx of water, restoring much of the natural landscape and vegetation.*



---

*The number of green non-governmental organizations grew rapidly from 370 to 730 in just 18 months between 2013 and 2015.*

---

Media coverage of these measures has also surged, again bringing a wave of awareness and hope to the public, though it has been emphasised that such large-scale climate-related phenomena can only be resolved through long-term planning and regional collaboration. Recent polls conducted by major media groups indicate that 51 per cent of those surveyed were satisfied with government efforts to improve environmental conditions.

The prioritization of Iranian environmental issues by Dr. Rouhani's government comes while it is also under pressure over inflation rates, the need for economic growth and new investment and strong demand for employment.

Its positive approach is also improving relations with the global community, beginning with neighbouring countries. Its extension to the resolution of the nuclear dispute and lifting of all unjust sanctions is proving itself instrumental in this context as well. Promoting peace and security are vital strategies in the West Asia region: without them sustainable development is not possible—even in some areas outside the immediate zone. Insecurity leads to mismanagement of natural resources and crises over such bedrock questions as land and water.

The drying up of the Mesopotamian Wetlands was once attributed to the policies of Saddam in Iraq, and currently the increase in wastelands and desertification are a consequence of the emergence of DAESH—an entity of terror and insecurity wrongly attributed to Islam.

These environmental complications of conflict and insecurity signify the importance that United Nations bodies should attach to conflict resolution. The role of Iran as a promoter of peace and moderation, and the country's influential role in both regional and global equations, can serve as a deterrent force to curb extremism and ameliorate the current lack of security that is now a mainstay of global political attention.

Our experience in Iran makes clear the importance of long-term planning for air pollution control, as well as the detrimental effects of political short-sightedness and disregard for environmental planning. It highlights the importance of efficient intersectoral cooperation and project management mechanisms and the role of social mobilization and civil society. And it also shows how badly mistaken it would be to overlook the pivotal role of the media. Perseverance and continuity in supporting local and national initiatives, creativity and inspirational activities are all important keys to success.

Although we have taken great strides during the past year and a half, we still have a long journey ahead to ensure standard air quality for our major cities to curb dust storms at the local and regional level. Responsible action at all levels is required to ensure a better quality of life for all. We look forward not only to national efforts and collaboration, but also to regional and international support, as it has become evident that environmental issues are global ones, with no political or geographical boundaries. ▲

# Khaled Fahmy

## Time to Act

*Africa needs to invest in health and environment for sustainable development*



**Khaled Fahmy**

*Minister of Environment, Egypt and President, African Ministerial Conference on the Environment*

**T**he *Future We Want*—the outcome document of the United Nations Conference on Sustainable Development (Rio+20)—indicated that “health is a precondition for, and an outcome and indicator of, all three dimensions of sustainable development”: social, environmental and economic. As we look towards the Sustainable Development Goals, health stands out as a continuing concern for communities worldwide. Being able to mitigate adverse health impacts from the environment efficiently is a key issue in sustainable development. Therefore, while Africa has the potential to achieve sustainable development, realizing this will largely depend on deliberate efforts to address the crucial environmental and health problems hindering the continent’s socioeconomic advancement.

Human health is intimately related to the state of the environment, which contributes significantly to it through the quality of air we breathe, the food we eat and the water we drink. Ecosystems—the planet’s life-support system—are becoming degraded by climate change, pollution, agricultural practices and urban development. Pollution and other aspects of poor environmental quality have well-established effects on human health and the quality of life. Air pollution, inadequate management of chemicals and wastes, poor water quality and climate change—among others—pose significant threats to human health, both individually and collectively. Many of these challenges continue to grow and develop, both in ways that we can reasonably forecast and in ways that we cannot.

Humans have altered their environment, and will continue to do so, while remaining dependent upon ecosystems for food, water and materials like timber and biofuels.

Evaluating and managing the resulting impacts on ecosystems and human health have generally been largely separate activities, under the auspices of different disciplines with no obvious interaction. Hence, many of our perceptions of the relationships between the natural environment and human health are very limited, and still relatively unexplored. These limitations cause a knowledge gap for those seeking to develop effective policies for using resources sustainably and protecting environmental and human health.

Our understanding of the functioning of the biosphere, and our connections with it, must be adequate to inform policy and decision-making processes. New developments and improvements in our scientific understanding of how environmental change affects the linkages between ecological integrity, environmental goods and human health will help us develop an acceptable standard of living for many more people.

Africa continues to grapple with environment-related health issues affecting life expectancy and commercial productivity. It carries a hugely disproportionate disease burden. Cancer, respiratory diseases, allergies and asthma, cardiovascular disease, neurological



Photo: © *Frans Jansing, Picturing Our World*



Photo: © Jorgien Schulte/Robert Harding Picture Library

**Countries should mitigate the underlying causes of ecosystem degradation, while simultaneously improving human health, capacity building, dissemination of knowledge and good practices.**

Supplying safe drinking water and environmental hygiene, for example, could reduce morbidity from diarrhoea related diseases by **40 per cent**.

effects, and different reproductive and developmental disorders are among the health outcomes associated with environmental factors. How African governments manage issues associated with the environment-health nexus will therefore partly determine whether they stay on the path to sustainable development.

Extreme weather events and disasters—and the recent emergence and re-emergence of certain diseases—have been harsh reminders of the critical linkages between human health and environmental conditions, and of the human, social and economic costs of ignoring them. The burden of disease is likely to increase as we lose health-promoting ecosystem services and have more contact with its sources.

The recent Ebola outbreak highlights the links between health, environmental change and socio-ecological systems—and shows how exploring them is critical to finding solutions. The epidemic—with its serious impacts on public health, economies and societies—may be the starkest warning yet that, as we tear down

forests, we open ourselves up to new disease strains. Deforestation increases opportunities for contact between people and wildlife.

Demonstrating the critical linkages between health and environment is only the first stage: what is important is how we respond. It has become increasingly evident that there are immense opportunities to manage the African environment for better health. Indeed, African ministers of health and the environment held a joint meeting in Libreville, Gabon, in August 2008 to explore avenues for a multisectoral approach to address both issues. Its outcome, the Libreville Declaration on Health and Environment, called for promoting knowledge sharing and information exchange between and among countries, and providing guidance and support for assessing and managing environmental risk factors for human health and ecosystem degradation. It also committed to improved knowledge management on health and environment issues.

The third *Africa Environment Outlook* report—an AMCEN flagship publication—reported that environmental factors contribute about 28 per cent of Africa’s disease burden, dominated by diarrhoea, respiratory infections and malaria that collectively account for 60 per cent of known environmental health impacts. Increasingly, African governments are committing to improve environmental conditions to protect their peoples’ health and well-being.

The World Bank’s report, *Investing in Health*, concluded that managing ecosystems better could significantly reduce disease burdens. Already-established interventions such as supplying safe drinking water and environmental hygiene, for example, could reduce morbidity from diarrhoea-related diseases by 40 per cent. Numerous measures have been taken to address environment and health challenges, and others continue to be discussed.



Significant ongoing efforts to implement the Libreville Declaration and the Luanda Commitment on Health and Environment in Africa are being undertaken, for example, by countries with the support of UNEP, the World Health Organization (WHO), the African Development Bank and other stakeholders.

***Extreme weather events and disasters—and the recent emergence and re-emergence of certain diseases—have been harsh reminders of the critical linkages between human health and environmental conditions.***

However, political commitment, concerted action and shared responsibility between health and environment sectors are still required. Countries should mitigate the underlying causes of ecosystem degradation, while simultaneously improving human health, capacity building, dissemination of knowledge and good practices.

We should strongly consider creating national frameworks and mechanisms for intersectoral action adequately to address the inter-linkages between health and the environment; to invest in the required infrastructure related to health and environmental services; to build from past and current experiences; to revitalize expertise in environmental management for health; and to increase communication and community education to raise awareness of how individual practices can affect human health and the environment.

African countries need to be able to monitor, prevent or mitigate risks that may develop into full-scale crises by strengthening their national health and environment institutions, investing in them to enable them to assess the impacts of development projects and ensuring the integration of objectives related to health and





***Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.***

the environment into national poverty reduction strategies and development plans.

Governments should integrate health and environmental impact considerations into economic development processes; support integrated policy assessment of the health and environment linkages using qualitative and quantitative valuation methodologies; define priorities based on such an assessment; identify knowledge gaps; refine normative health and environment standards and guidelines; support local applied research to build technical capacity; and strengthen cooperation among key actors in solving practical policy questions.

Governments may wish to consider including the following in their policy agendas: monitoring new and emerging environmental threats; reviewing their emergency preparedness plans to ensure that managing new or emerging environmental risk factors has been adequately addressed; developing and implementing awareness-raising campaigns on the most important risk factors; and undertaking community sensitization and education.

Although data on environment-related health costs and cost-benefit ratios of environment policy interventions will never be as precise as market values for other goods, the available evidence strongly suggests that measures to improve the quality of the environment can prove to be very worthwhile investments.

The benefits of many environmental policies in terms of reduced health-care costs and increased productivity significantly exceed the costs of implementing them. Providing a clean and healthy environment—now and for future generations—will reduce mortality, improve human health and well-being and lead to substantial savings in associated health-care costs.

We have the human and material resources to achieve these goals, not as an abstract concept but as a concrete reality. Let us harness them to reduce the unacceptably high and preventable environmental health burden and move towards development that is truly sustainable.

AMCEN is aware of the need for urgent action, greater relevance, collaboration, coherence and impact, and will actively work towards achieving this goal. ▲



# UNEP at Work

## A Breath of Fresh Air

*Reducing short-lived climate pollutants in the waste and transport sectors can harness health and environment benefits*

Photo: © Gary Crabbe / Enlightened Images Photography

Every year, 7 million people die from diseases related to indoor and outdoor air pollution, including smog and particulate matter (PM<sub>2.5</sub>). Methane is a precursor of tropospheric ozone, or smog. Black carbon, emitted through incomplete combustion of fossil fuels and biomass, is a major component of PM<sub>2.5</sub>. Both are so-called short-lived climate pollutants, which have not only important impacts on the quality of our air, but also on our climate system. They stay in the atmosphere for a relatively short lifetime—from a few days to a few decades.

As one of seven founding partners to the Climate and Clean Air Coalition (CCAC) and

as the host of the CCAC Secretariat, UNEP is working to reduce emissions of black carbon and methane, among other short-lived climate pollutants, to generate air quality, near-term climate and food security benefits. To that end, UNEP is co-leading two of the CCAC's seven sectoral initiatives: Municipal Solid Waste (MSW) and Heavy Duty Diesel (HDD).

Municipal solid waste creates hazards on several levels. Globally, landfills are the third largest source of anthropogenic methane emissions, while open burning of waste is a significant source of black carbon. In addition, uncontrolled leachate contaminates ground

water and increases vector-borne diseases. To date, the MSW Initiative has supported baseline assessments of waste in 20 cities and action plans in 10 cities. It has delivered a number of tools such as a calculator for quantifying emissions. And it has set up a peer to peer learning process between participating cities. Other lead partners are Canada, Japan, Mexico, the United States, C40 Cities Climate Leadership Group, the International Solid Waste Association and the World Bank.

The HDD Initiative targets the transport sector, which generates about 19 per cent of global black carbon emissions, 99 per cent





Photo: © Michael Christopher Brown/Magnum Photos

*Globally, landfills are the third largest source of anthropogenic methane emissions, while open burning of waste is a significant source of black carbon. In addition, uncontrolled leachate contaminates ground water and increases vector-borne diseases.*

policy in science, and provide regional-specific information that will allow countries to prioritize action.

**Regional and national implementation:** UNEP's regional offices are supporting institutional strengthening and the development of national action plans in 14 countries—Bangladesh, Chile, Colombia, Cote d'Ivoire, Ethiopia, Ghana, Jordan, Liberia, Maldives, Mexico, Morocco, Nigeria, Peru and Togo.

**Mobilizing finance:** Through its Finance Initiative, UNEP is helping tailor finance strategies for CCAC-sector initiatives, develop collaborative tools for knowledge and innovation, build the CCAC's knowledge on finance and use the UNEP network to develop high-impact partnerships.

**Cities:** UNEP is co-leading the Urban Health Initiative alongside Norway, the United States, the World Health Organization, the World Bank, ICLEI – Local Governments for Sustainability and the International Centre for Integrated Mountain Development (ICIMOD). Both MSW and HDD also have strong urban components: UNEP's International Environmental Technology Centre is supporting MSW assessments and action plans to reduce emissions; as part of HDD, UNEP is supporting cleaner city bus fleets.

See more at: [www.unep.org/ccac](http://www.unep.org/ccac)



Photo: Ashley Cooper/Robert Harding Picture Library

of which come from diesel engines. Among other results, the initiative has supported regional and national regulatory processes to develop stringent fuel quality and vehicle tailpipe emission standards.

For example, the HDD Initiative has supported China and Mexico in their national processes, and the East African region in its regional process.

Furthermore, UNEP is actively engaged in all four cross-cutting initiatives of the CCAC:

**Science to policy interface:** UNEP is co-leading the regional assessment to further ground

# Maria Neira

## Development's Healthy Heartbeat

*Proven, affordable strategies can address the one-quarter of the global burden of death and disease that is due to unhealthy environmental factors*



### Maria Neira

*Director for Public Health, Social and Environmental Determinants of Health, World Health Organization*

**W**orld Health Organization (WHO) estimates released last year reported that in 2012 around 7 million people died—one in eight of total global deaths—as a result of exposure to air pollution. This finding more than doubles previous estimates and confirms that air pollution is now the world's largest single environmental health risk. Reducing it could save millions of lives. The new data particularly reinforce evidence about the links between air pollution exposure and cardiovascular diseases, such as stroke and ischaemic heart disease. This is in addition to air pollution's role in developing respiratory diseases, including acute respiratory infections and chronic obstructive pulmonary diseases, as well as cancers.

The estimates are based both on more knowledge about the diseases caused by air pollution, and on better assessment of human exposure to it, enabling scientists to make a more detailed analysis of health risks from a wider demographic spread that now includes rural as well as urban areas.

As our world faces an unprecedented epidemic of non-communicable diseases (NCDs), health and environment policymakers need to understand how health risks are exacerbated by air pollution, as well as more broadly by unhealthy home and urban environments.

Some 3.7 million deaths globally are attributed to outdoor air pollution. Among the key sources are traffic emissions, power

generation, outdoor waste, biomass burning and the use of energy in buildings. Another 4.3 million deaths are linked to household air pollution, mostly from exposures to smoke emissions from rudimentary biomass and coal cookstoves and fires, upon which nearly 3 billion people worldwide primarily depend. Many people are exposed to both indoor and outdoor air pollution. Due to this overlap, mortality attributed to the two sources cannot simply be added together, hence the total estimate of around 7 million deaths in 2012.

Most morbidity and mortality assessments related to air pollution are made on the basis of airborne concentrations of PM<sub>2.5</sub>—particulate matter less than 2.5 microns ( $\mu\text{m}$ ) in diameter. Meanwhile, ground level ozone, formed from a mix of urban air pollution emissions, is a factor in chronic asthma and respiratory disease.

Many of the air pollutants that are most harmful to health also damage the climate. These include the so-called short-lived climate pollutants such as ozone and black carbon (the sooty component of small particulate matter that is emitted by both diesel engines and cookstoves) that get their name from their short lifespan in the atmosphere. Cleaning up these, in particular, can generate immediate health and near-term climate benefits.

Many air pollution sources also generate other health risks. Unbridled urban traffic, for example, exacerbates the risk of injury and creates barriers to walking and cycling, which in turn inhibits people's access to outdoor space for physical activity.

Households with inefficient cookstoves are often poor, and may be vulnerable to a range of other environmental health risks, including lack of clean drinking water, sanitation and structural deficits that make inhabitants more vulnerable to extreme weather or natural disasters related to climate change. The need for ensuring structurally safe construction in rapidly developing cities has been particularly evident



Photo: Arjen Van De Merwe/Robert Harding Picture Library

## Unsafe drinking water, sanitation and hygiene remains a factor in 58 per cent of under-five deaths from diarrhoeal disease—despite significant declines in both WASH-related and overall mortality.

---

*Over 80 per cent of the disease and injury conditions monitored by WHO are influenced somehow by environmental or occupational factors.*

---

in the aftermath of Nepal's recent earthquake, where widespread building collapses have claimed thousands of lives.

Unhealthy diets may include excessive consumption of processed foods and red meats that may both be “carbon intensive” and increase risks of obesity and obesity-related NCDs. Dietary choices may, in turn, be heavily influenced by urban environmental factors such as the decline of neighbourhood fresh food markets and the predominance of fast food chains.

Unhealthy urban and rural environments also remain a major source of communicable diseases. Indoor smoke from rudimentary cookstoves, for example, is a cause of over one-half of childhood pneumonia deaths. Unsafe drinking water, sanitation and hygiene (WASH) remains a factor in 58 per cent of under-five deaths from diarrhoeal disease—despite significant declines in both WASH-related and overall mortality. Tuberculosis is transmitted in crowded housing

with inadequate ventilation. Vector-borne diseases, such as malaria and dengue, may be combated through environmental measures like screens on doors, windows and water containers, as well as sustainable irrigation. Undernourished or malnourished children are more vulnerable to a range of infectious diseases. Changing climate conditions—leading to drought, floods, increased heat and changed patterns of infectious disease transmission—can also increase vulnerabilities.

All in all, WHO estimates that about one-quarter of the global burden of death and disease is due to unhealthy environmental factors that could be addressed with proven, affordable development strategies. Over 80 per cent of the disease and injury conditions monitored by WHO are influenced somehow by environmental or occupational factors.

While framing the problems is an important first step, doing something about them is the greater long-term challenge. Public policies can help shape a healthy environment in which to live, work and raise families through all stages of the life cycle. WHO works to promote such policies for primary prevention in housing, energy, transport and food production through a range of upstream activities such as:

**Quantifying death, disease and disability from different environmental and, where feasible, social risks.** WHO is updating its (2005) estimates of the proportion of diseases caused by environmental and occupational factors through a systematic review and synthesis of the literature on risk conditions and diseases, as well as of evidence about available interventions.

**Health-linked sustainability indicators.** WHO has documented health-linked indicators that could contribute to monitoring post-2015 Sustainable Development Goals. Examples include reduced urban air pollution concentrations as an indicator for healthy and sustainable cities; reduced household air pollution as an indicator for “sustainable energy”; and reduced childhood stunting and obesity as dual indicators of improved nutrition from sustainable food production.

**WHO norms and guidelines.** WHO guidelines for indoor air quality, household fuel combustion, ambient air pollution concentrations, safe drinking water, radiation and chemical exposures are used by countries around the world as the basis for national legislation, standards and enforcement.

**Leadership and advocacy.** We join with our fellow United Nations agencies, national governments and ministries, and civil society in campaigns and coalitions. Examples include the UNEP-hosted Climate and Clean Air Coalition to Reduce Short-lived Climate Pollutants, where WHO is a leader of a new health initiative. WHO has also long been active in United Nations-supported campaigns to phase out lead in gasoline and paint; end the use of asbestos; eliminate mercury from medical devices; and support safer management of chemicals.

Together, all these activities touch every one across the planet—rich and poor, newborns and elderly. They help support health and well-being in our journey through life by avoiding and eliminating unnecessary illness, injury and death. This is the healthy heartbeat of sustainable development. ▲

# Hans Bruyninckx

## Breathtaking Challenge

*Air pollution still harms Europeans' health, and shortens their life expectancy*



**Hans Bruyninckx**  
*Executive Director,  
European Environment  
Agency*

**E**urope has clearly improved its air quality in the last decades. This has been achieved through a combination of direct and indirect measures, including effective legislation, technology and higher public awareness. As a result, the concentrations in the air of many pollutants, including sulphur dioxide, carbon monoxide, lead and benzene, have decreased significantly. But despite these achievements, air pollution, especially of particulate matter (PM), ground-level ozone (O<sub>3</sub>) and nitrogen dioxide (NO<sub>2</sub>), continues to impact the health of Europeans.

Air pollution affects everyone, particularly people breathing higher levels of it in urban areas. Some are especially vulnerable, including those suffering from cardiovascular and respiratory diseases, people with airway allergies, the elderly and infants.

The effects of air pollution on heart disease and respiratory illnesses are well known, but new studies show that it can also affect our health in other ways, from fetal development to illnesses late in life. According to recent research, co-funded by the European Union (EU), air pollution in Europe reduces life expectancy by around 8.6 months per person. To a large extent, this is caused by fine particulate matter (PM<sub>2.5</sub>).

Particulate matter is the single pollutant that causes the greatest harm to human health in Europe. Some of these particles are so small that they not only penetrate deep into

our lungs—they also pass into our bloodstream. According to our estimates at the European Environment Agency (EEA), fine particulate matter concentrations in 2011 were responsible for around 430,000 premature deaths in the EU.

Particulate matter is formed in different ways. Some particles are emitted directly into the atmosphere. Others come about as a result of subsequent chemical reactions of different precursor gases in the atmosphere, namely sulphur dioxide, nitrogen oxides, ammonia and volatile organic compounds. These particles can be composed of many components, with their impact on health and the environment depending on their chemical composition.

In the last decade, Europe has reduced emissions both of PM and its precursors. But these reductions have not always resulted in lower exposures.



Photo. © eyn/Robert Harding Picture Library



Photo: © Cornelius Paas/Robert Harding Picture Library

## ***Air pollution is a local, pan-European and global issue. Air pollutants released in one country may be transported in the atmosphere, contributing to or resulting in poor air quality elsewhere.***

---

*According to recent research, co-funded by the European Union (EU), air pollution in Europe reduces life expectancy by around **8.6 months** per person.*

---

The share of the EU urban population exposed to concentration levels of PM<sub>10</sub> above the values set by EU legislation remains high: between 21 and 30 per cent (2010-2012). Under the World Health Organization's (WHO) stricter guidelines, 64-83 per cent of the urban population in the EU was exposed to excessive PM<sub>10</sub> concentrations.

Similarly, the amounts of ozone precursors emitted into the atmosphere have dropped significantly in the last decade, but the exposure of urban populations still remains high. For example, in the period 2010-2012, between 14 and 17 per cent of the EU urban population was exposed to ozone levels above EU target values, mostly in southern Europe where warmer summer temperatures lead to higher rates of ozone formation. By WHO's stricter guidelines, more than 95 per cent of EU urban residents were exposed to excessive levels. The EEA has estimated that exposure to high-levels of ground-level O<sub>3</sub> concentrations in 2011 caused 16,160 premature deaths in the EU.

A considerable number of EU countries fail to achieve their emission targets set by EU or international legislation for one or more air pollutants (particularly nitrogen oxides). Limiting the concentrations of air pollutants is also a challenge. Many urban areas struggle with levels of particulate matter, ground-level and nitrogen dioxide

ozone higher than the thresholds set in legislation. There are different reasons why controlling air pollution remains challenging. For example, nitrogen dioxide has not fallen as fast as expected. This is partly because vehicles are an important source of NO<sub>2</sub>, and vehicle emission standards have not always led to reductions in the real world. Air pollution is also a local, pan-European and global issue. Air pollutants released in one country may be transported in the atmosphere, contributing to or resulting in poor air quality elsewhere.

Our consumption patterns can also contribute to high concentrations of certain pollutants. Overall, fuel combustion is clearly a key contributor, arising from energy demand across various economic sectors, from road transport and households to energy use and production. Besides road transport sources, coal and wood burning in small stoves for home heating in some urban and rural areas constitutes a major local source of pollution. The choices made by individual households for heating can depend on several factors, including the affordability of fuel, and can have significant impacts on local air quality.

Clearly, we cannot ignore the impacts of air pollution on our health—and we should not forget that air pollutants harm our ecosystems, economy and buildings as well. ▲



# Extreme Beans

*New heat-tolerant varieties offer environmental and health benefits*

*For years, researchers at the International Center for Tropical Agriculture (CIAT) have been developing beans that could resist drought and tolerate poor soil.* Now, spurred on by new evidence, they have recently developed 30 “elite” lines of bean that can combat an emerging threat: extreme heat. These new “heat-tolerant” lines promise to help farmers adapt to climate change, while protecting a vital source of protein and minerals.

Based in Cali, Colombia, CIAT is one of 15 research centres in the CGIAR, a consortium that works together on cross-cutting agricultural issues. The CIAT research on heat-tolerant beans was published as part of CGIAR research programmes on grain legumes, and on climate change, agriculture and food security. Among other recent evidence, the CIAT report draws on *Africa’s Adaptation Gap 2*, which projects that temperatures will rise between 2-6°C in Africa between 2050-2100—more rapid and earlier climate deviations than any other region. Moisture stress from extreme heat will particularly affect agriculture, which is both a crucial source of food and livelihood. Even a 2°C rise is expected to lead to undernourishment and loss of livelihood for half of Africa’s population. The World Bank predicts yield reductions in Africa of 25-90 per cent by 2050.

For all these reasons, climate change adaptation is imperative to ensure food and nutritional security for Africa. UNEP’s preliminary assessment, *The Global Adaptation Gap Report 2014*, identifies the need for more drought-resistant, early maturing varieties. Heat-tolerant beans, as documented in the CIAT report, are one example of a technological innovation that can help strengthen community resilience to climate change.

While drought and disease have long been threats to beans, recent climate models have suggested that extreme heat renders bean pollen less fertile, which reduces both the quantity and quality of the crop. Given predicted temperature increases, some countries in Africa and Latin America could lose up to half of their land suitable for bean crops by 2050.

“We were surprised to find that heat stress will be the biggest threat to bean production,” said Steve Beebe, who leads CIAT’s bean programme. The 30 elite lines of heat-tolerant beans developed by Beebe’s team are expected to cut loss of land from 50 to 5 per cent. In fact, the new varieties may allow farmers in some parts of Africa and Latin America to expand production, using land that was previously too hot for bean crops.



Photo: © CIAT project/Flickr



Photo: © CIAT project/Flickr



Apart from helping farmers adapt to climate change, the new varieties also have health benefits. For many poor smallholders who cannot afford meat, dairy or fish, beans and other grain legumes provide a rich source of protein. By preserving—and possibly adding—land for bean production, the new varieties will help promote both food security and nutrition.

Beans are also a vital source of iron, an essential micronutrient that strengthens the immune system, helps fight off anaemia and promotes the physical and cognitive development of children. More than a decade ago, CGIAR researchers successfully created bean varieties that offered twice as much iron as common beans. “We’ve been fortunate that a few of the new heat-tolerant bean lines had been previously fortified with iron,” said Beebe. “That’s an added bonus to the extensive health and environmental benefits that the new lines will offer.”

Developing new heat-tolerant varieties is an ecosystems-based (EbA) approach to adaptation, one that works with nature rather than against it. Apart from being more cost effective than conventional techniques, EbA measures are known to increase yields, as well as to enhance nutrition, community resilience and ecological capacity. The CIAT project, therefore, has the potential to produce all these benefits and should be promoted. In the coming months, the CIAT team will continue its research with formal yield trials.

See more at: <http://ciat.cgiar.org/bean-research>

# Nithya Ramanathan

# IH Rehman

# Veerabhadran Ramanathan

## Credit Where it's Due

*Giving carbon credits to households with advanced cookstoves is a scalable solution to providing clean energy, and combating indoor air pollution and climate change*



**Nithya Ramanathan**

*President, Nexleaf Analytics*



**IH Rehman**

*Director, The Energy and Resources Institute, New Delhi*



**Veerabhadran Ramanathan**

*Professor, University of California, San Diego*

Energy access is a basic requirement for human development and well-being, but it is vastly different for the poorest 3 billion people on Earth than it is for the richest 1 billion. The top billion consume 50 per cent of available fossil energy while—more than two centuries after the industrial revolution—the poorest 3 billion are still forced to rely on traditional fires (fueled by wood, dung, agricultural waste, charcoal and coal) to cook and heat their homes. One third of them are also forced to use kerosene and candles for lighting. This imbalance in access to modern energy comes at enormous costs to human health and the environment, and creates further disparities in how the effects of those costs are experienced.

In their use of fossil fuels, the top 1 billion contribute more than half the emissions of carbon dioxide and other greenhouse gases that cause global warming. If they (and the middle-income 3 billion) continue current rates of fossil fuel consumption, the world will witness warming of 2°C or more in a few short decades. The brunt will be borne by the bottom 3 billion, who live on the edge of subsistence and are most vulnerable to the resulting droughts or other changes in weather and climate.

At the same time—through being limited to using inefficient cooking fires and lamps—the poorest 3 billion are exposed to large quantities of soot (or black carbon) and brown carbon.

Once emitted, black carbon particulates both escape into the atmosphere and contribute to household health risks. They are unquestionably deadly. About 4 million people die each year from the toxic smoke emitted by household fires and lights. Exposure to household air pollution kills more people than malaria, TB and HIV combined.

Such household emissions may also contribute as much as 20 per cent to black carbon emissions worldwide. This is vastly significant because black carbon (from stoves and other sources) is the second largest contributor to global warming after carbon dioxide and leads to crop loss, deforestation and the melting of glaciers, threatening critical food and water sources.

The consequences of energy imbalance are dire.

But the new United Nations initiative Sustainable Energy for All, which aims to provide access to sustainable and renewable energy sources to everyone, is unprecedented and extremely productive.

The health benefits of providing energy to the bottom 3 billion would be far ranging, and the climate benefits would be felt by all.

Project Surya, which we lead, focuses on clean energy solutions for the poorest that achieve benefits in health, climate and sustainability by employing clean cooking and lighting technologies that reduce smoke emissions by 90 per cent or more. One chronic issue with these advanced technologies—which still use locally available solid biomass—is that with the





Photo: © Robert Harding Picture Library

## The health benefits of providing energy to the bottom 3 billion would be far ranging, and the climate benefits would be felt by all.

About **4 million people** die each year from the toxic smoke emitted by household fires and lights.

Exposure to household air pollution kills more people than malaria, TB and HIV combined.

added performance comes additional cost. The costs—typically, about six weeks of income for rural households—along with the lack of robust supply chains, inhibit scaling up the technologies to the hundreds of millions of households where they are needed.

Yet the use of advanced energy technologies enables us to leverage the link between household pollution and climate change. Surya now provides users of advanced improved stoves with the credit they deserve for mitigating climate change. Households that employ them generate quantifiable reductions in black carbon and carbon dioxide, with direct positive impacts on the climate—and so should be able to sell the resulting credits in a market. Much as a company can sell carbon credits for cleaning up its operations, we believe individual women should also receive financial benefits for their actions to reduce emissions of carbon dioxide and black carbon.



Photo: © Robert Harding Picture Library



Photo: © Tanvi Mishra



Photo: © Tanvi Mishra

***Project Surya’s Climate Credit Pilot Project combines cutting-edge air pollution and climate change science with pioneering wireless sensor technologies to work towards universal access to advanced cook stoves and solar lighting systems.***

Generating carbon credits for switching to improved stoves is nothing new. After all, burning firewood leads to 1-2 billion tons of carbon dioxide emissions every year. The contributions from each household do not reflect the total potential climate mitigation achieved, although improved stoves also help to reduce deforestation. But quantifying the black carbon reductions—which work separately from carbon dioxide—reveals that their true carbon savings are two to three times greater. Moreover, including black carbon may bring new investors and buyers to carbon markets because reducing it has more immediate climate mitigation impacts than cutting carbon dioxide and has clear health and sustainability benefits. So this new approach could catalyze new funds to support energy access at scale.

While this seems straightforward in principle, there are some formidable challenges. One example of these is verifying the use of clean stoves on a house-by-house basis. Another is accurately translating stove usage to “climate credits”, saleable via a carbon market (or results-based financing mechanism), which encompass reductions in both carbon dioxide and black carbon particulates from adopting the cleaner energy technology.



Photo: © Robert Harding Picture Library

And a third is distributing the financial credits to the women using the stoves, or the stove distributor.

Project Surya’s Climate Credit Pilot Project (C2P2) combines cutting-edge air pollution and climate change science with pioneering wireless sensor technologies to work towards universal access to advanced cook stoves and solar lighting systems. Through an international partnership that includes



Photo: © Robert Harding Picture Library



Photo: © Robert Harding Picture Library

*Project Surya focuses on clean energy solutions for the poorest that achieve benefits in health, climate, and sustainability by employing clean cooking and lighting technologies that **reduce smoke emissions by 90 Per cent** or more.*

NGOs, private donors, academics, government banks, The Gold Standard Foundation's Voluntary Carbon market, rural entrepreneurs, village chiefs and small women's groups, Surya uses wireless sensors integrated into kitchens to document climate credits generated by using improved stoves. Close to a quarter of households now use the improved stoves for 50-100 per cent of their daily cooking needs. Each household that uses the stove for all cooking could earn approximately \$35 per year (assuming an estimate of \$6 per tonne of CO<sub>2</sub> equivalent). Carbon markets ensure a level of transparency and standardization of methods for verification and validation that will be important if this initiative is to scale up beyond Surya or any single institution. Surya is now working to expand this carbon

market approach to encourage the adoption of clean lighting, as well as cooking, technologies.

Through this work, Project Surya is celebrating and rewarding the role of the poorest women in the world as climate warriors.

*We acknowledge the contributions of Tara Ramanathan in leading the Nexleaf Analytics cookstove programme in the field and significant contributions from Omkar Patange in India. We thank Charlie Kennel and Ellen Lehman, Mac McQuown, Qualcomm Wireless Reach, UK AID, and the United Nations Environment Programme for their explicit support of C2P2. ▲*

# UNEP at Work

## The Missing Link

*Scientists are studying how Ebola jumps from great apes to humans—for the sake of both species*

Photo: © Simon De Gitanville/Robert Harding Picture Library

*Scientists have proven that all eight of the human Ebola outbreaks in Gabon and the Republic of Congo in the last quarter century were initiated by poachers handling infected ape meat.*

Since its discovery in 1976, Ebola has struck the human population more than 20 times across the tropical belt of Africa. Scientists believe that Ebola jumps from wildlife populations to humans through the preparation and consumption of wild meat—a stark reminder of the interaction between human health and the environment.

The Great Apes Survival Partnership (GRASP) takes the issues surrounding Ebola very seriously. A unique alliance of 98 partners that includes national governments, conservation organizations, research institutions, United Nations agencies and private companies, GRASP focuses on zoonotic disease as one of its six priorities.

Given that great apes are highly susceptible to Ebola, the GRASP Scientific Commission and several partners have helped prepare tools and resources should Ebola outbreaks affect great ape populations now or in the future.



Photo: © Jan Fritz/Robert Harding Picture Library



Photo: © Robert Harding Picture Library

Humans, too, are vulnerable to Ebola. Past outbreaks in Central Africa and West Africa showed clear links between chimpanzees and gorillas in those regions and human interactions. Indeed, scientists have proven that all eight of the human Ebola outbreaks in Gabon and the Republic of Congo in the last quarter century were initiated by poachers handling infected ape meat. For that reason, it's important to monitor great ape populations to predict and, if possible, prevent disease transmission to humans.

The most recent outbreak in West Africa, which has claimed more than 10,000 human lives, underscores the urgency. In response to the crisis, GRASP contracted Dr. Siv Aina Leendertz to conduct a strategic review of the relationship between Ebola in great ape and human populations. Working with leading epidemiologists from the GRASP Scientific Commission and other experts, Dr. Leendertz examined the role of increased interaction between humans and great apes in the wake of human population growth and expansion into previously uninhabited forests.

According to initial results, maps showing Ebola's impact on great apes could be helpful in predicting future outbreaks, giving public health officials lead time to prepare for possible human exposure.

Dr. Leendertz's results, which will be published in a scientific journal, will help craft

***The collection of more data that maps the exposure of great ape populations to Ebola could predict future outbreaks and give public health officials lead time to prepare for possible human exposure.***



Photo: © Christian Hütter, Robert Harding Picture Library

GRASP's Ebola policies. In the meantime, GRASP prepared infographics to warn communities about the dangers of killing or consuming great apes. A report in 2015 on the host of zoonotic diseases that now threaten human beings and great apes is under consideration.

Ebola is not the only disease that has been shown to jump between the species, making community health an important cornerstone of conservation in biodiversity hotspots. GRASP partners such as Conservation through Public Health ([www.ctph.org](http://www.ctph.org)) and Gorilla Doctors ([www.gorilladoctors.org](http://www.gorilladoctors.org)) have set the standard for community disease treatment and monitoring around great ape populations. They have even established health safety protocols for tourists visiting mountain gorillas. Although these programmes are helping communities across East Africa, more needs to be done in Ebola target zones in West and Central Africa.

See more at: <http://www.un-grasp.org/>

# Nina Cromnier Within Reach

*Sound management of chemicals is an essential part of sustainable development nationally, regionally and globally*



**Nina Cromnier**

*Director-General,  
Swedish Chemicals  
Agency and Chair  
of the Management  
Board of the European  
Chemicals Agency*

**S**ustainable development cannot be achieved nationally, regionally or globally unless chemicals are managed safely. Sound chemicals management is relevant for all three dimensions of sustainable development: environmental, economic and social.

Chemicals contribute in many ways to improved standards of living, but when used incorrectly can have serious adverse effects on human health and the environment, which in turn damages the development of countries. Land and water resources polluted by hazardous chemicals may become unusable for a long time and pollution can also make food sources, such as fish, unusable for human consumption. People are exposed to chemicals at work, in the home and indirectly through the environment, and this can lead to death or acute or long-term effects on health.

There are wide differences in the capacity of the world's countries to manage chemicals safely. Their production is steadily increasing all around the world. However, a growing proportion of the production and use of hazardous chemicals takes place in developing countries, where chemicals control is often inadequate, exposing their people and environments to unacceptable risks. Poor people are exposed significantly more often than others to hazardous substances. Exposure of fetuses and children is particularly serious, as this can affect their development and impair their prospects in life.

Sweden has 16 national environmental quality objectives, adopted by the Swedish Parliament in the late 1990s, with

the overall aim of solving its major environmental problems by 2020. One of the objectives is a Non-Toxic Environment, meaning that the environment must be free from man-made or extracted compounds and metals that represent a threat to human health or biological diversity. Other objectives include Reduced Climate Impact, Clean Air, Good-Quality Groundwater, Sustainable Forests and a Varied Agricultural Landscape. Work towards a Non-Toxic Environment will contribute to almost all the other goals, as reducing the levels of hazardous substances is a prerequisite to improving the quality of most parts of the environment.

Chemicals are spread globally, by air, water and not least through trade, by themselves or in other products—so no country can reach national objectives on its own. Chemical pollution is a serious global problem that needs to be tackled in cooperation between countries.

The most severe problems with globally spread hazardous chemicals must be addressed by global measures. International agreements must be further developed continuously to enable new and emerging problems to be handled.

However, for the vast majority of the chemicals in use, the most important control needs to take place on a national (or in some cases regional) level.

The Swedish Chemicals Agency has long worked with a number of development cooperation projects—especially, for example, working as far as possible with preventive measures, making roles and responsibilities clear between industry and governmental authorities and sharing as much data as possible between countries.

Control of chemicals when—or even before—they are placed on national markets can substantially help to reduce health and environmental problems that would otherwise occur later in the life cycle. This approach is often very cost effective compared to measures for taking care of chemicals once they are already spread in society or the environment.



Photo: © Knut Klippner/Robert Harding Picture Library

## Ensuring an infrastructure for managing chemicals soundly can avoid both significant risks to human health and ecosystems and substantial costs to national economies.

---

*A growing proportion of **hazardous chemicals** is produced and used in developing countries where controls are often inadequate, exposing people and environments to unacceptable risks.*

---

Industries in the chemicals sector value-chain—including producers, importers and commercial users—have a key role in the sound management of chemicals in both developing and developed countries. Industry can and should have more detailed knowledge on the properties and safety of the products they place on the market. Public authorities need to ensure that industry fulfils its roles and responsibilities, which should be clearly defined in national legislation. Authorities need to have enough capacity for enforcement to avoid “free riders”, while capacity for a dialogue between relevant agencies and enterprises or industry associations is also important.

A clear regulatory framework for chemicals management is an asset for doing business in a country. It gives industry that meets product and food safety standards an improved potential for expansion and international trade, and it makes the conditions clear for those who would like to establish new businesses in a country.

The EU Reach regulation, a comprehensive legislation on chemicals control, is largely based on the above principles, and is now being implemented.

One prerequisite for well-functioning chemicals control is the availability of knowledge of the impact of substances on the environment and health. One of Reach’s requirements is that the companies should register information about the health and environmental hazards of the chemicals that they produce or import. The quality of the registrations is important. Based on this information a register is built up at the European Chemicals Agency. All countries in the world can use this, together with information from other sources, through the OECD e-ChemPortal. By sharing data between countries, considerable resources can be saved globally.

Implementing the Globally Harmonized system on Classification and Labelling of Chemicals is among the most important measures a country can undertake, as it provides information on the hazards along the supply chain. As hazardous chemicals are often incorporated into other products, better information on this aspect is also essential. This is a truly global issue and the global programme on Chemicals in Products—within the Strategic Approach to International Chemicals Management (SAICM)—is a good starting point. This programme focuses on increasing availability and access to the information actors need—throughout the life cycle of products—so that they can properly manage products and the chemicals in them.

Based on the right information on the hazards and occurrence of chemicals, both industry and governmental authorities can fulfil their respective responsibilities to contribute to sustainable development. Handling chemicals safely is part of national, regional and global sustainable development. Ensuring an infrastructure for managing them soundly can avoid both significant risks to human health and ecosystems and substantial costs to national economies. When addressing means of implementation, it is fundamentally important to adopt a preventative approach and a perspective where roles and responsibilities are clearly defined. ▲

# Chris W Williams Julian Kyomuhangi Silent Emergency

*Providing access to sanitation for all is both the key public health challenge of our time and a moral obligation*



**Chris W Williams**

*Executive Director  
of the Water Supply  
& Sanitation  
Collaborative Council*

**T**wo and a half billion people live without access to improved sanitation and hygiene facilities, 1 billion currently defecate in the open and 748 million live without safe drinking water. The world may have 6 billion mobile phone subscriptions, but only 4.5 billion people have access to a toilet.

This is a silent health emergency of enormous proportions. But the challenge is not only a moral one. Sanitation and hygiene are engines that drive health, social and economic development, and contribute to a cleaner environment.

Good sanitation and hygiene practices are vital for human health. Adopting them reduces morbidity and mortality rates, and mitigates the spread of disease. Yet—in contrast to the financial and human mobilization dedicated to immunization and bed net distribution—almost 520,000 children under five die from diarrhoeal diseases every year due to a lack of safe water, sanitation and basic hygiene.

A world that lacks adequate sanitation, hygienic facilities and clean water prohibits us from attaining other development goals, such as maternal and child health, education, gender equality, and ending extreme poverty and hunger. In 2002, the international community acknowledged the importance of sanitation and hygiene by including them in the Millennium Development Goals (MDGs).

However, as the MDGs' deadline looms close, the target is likely to be missed by half a billion people worldwide, making it the most off-track goal. In fact, if the current trend continues, Uganda will only reach its MDG target by 2051.

In many countries, the political will to allocate resources and support sanitation and hygiene promotion remains inadequate. Across the health sector, there is limited advocacy for improved access to water and sanitation. This costs countries enormous resources, especially during epidemic outbreaks. Indeed, World Bank research indicates that hygiene is the most cost-effective health intervention available, and has the ability to significantly reduce extreme poverty. For every dollar spent on eliminating open defecation in rural areas, approximately \$6 of economic gains are generated. Likewise, providing universal access to basic sanitation at home will return \$3 for every dollar spent.

In Uganda, expenditure on sanitation and hygiene has historically been low, and progress in improving coverage has stagnated. In some districts, sanitation coverage is below 20 per cent. Sadly, the water, sanitation and hygiene (WASH) sector's share of the national budget more than halved between 2004 and 2012.

Achieving decent standards of sanitation and hygiene for everybody in the world is possible, and the positive news is that increasing numbers of countries are committing their energy and resources towards this. Madagascar, Nepal and Malawi are just a few of those that are taking huge strides and maximizing their political commitments.

By some estimates, investments of around \$10 billion per year—a tiny sum by global standards—could give access to basic sanitation and hygiene to all the people in the world in the next two or three decades. Money is therefore not the problem.



**Julian  
Kyomuhangi**

*Assistant  
Commissioner of  
Health Services –  
Environmental Health  
for the Republic of  
Uganda*





Photo: © Mark Edwards/Robert Harding Picture Library

## ***A world that lacks adequate sanitation, hygienic facilities and clean water prohibits us from attaining other development goals, such as maternal and child health, education, gender equality, and ending extreme poverty and hunger.***

---

*Every dollar spent on eliminating open defecation in rural areas generates about*  
**\$6 of economic gains.**

---

The major obstacles are low political interest, the need for clear lines of responsibility within different ministries, and the lack of awareness of the need for community-led behaviour change.

Many in the development world believe that building toilets is a sufficient measure for providing total sanitation. But this is not so. All too often large sums of money are spent on providing toilets to communities that are never used. It is increasingly becoming clear that 100 per cent latrine coverage is not enough to mitigate sanitation and hygiene-related diseases, and that the answer lies in stopping open defecation through sustained changes in hygienic behaviour.

In March 2008, the Water Supply & Sanitation Collaborative Council (WSSCC)—the only United Nations body devoted to the sanitation and hygiene needs of vulnerable and marginalized people around the world—launched the Global Sanitation Fund, the first global mechanism for financing sanitation and hygiene. Its purpose is to boost the flow of money to organizations in developing countries with expertise in demand-driven sanitation and hygiene programmes. National programmes it has supported have so far ensured that 7 million people in 20,600 communities in Africa and South Asia now live in environments free of open-defecation (ODF); 7.9 million people have access to

hand-washing facilities; and more than 4.2 million people now use improved toilets.

The WASH coalition in Uganda, the National Sanitation Working Group (NSWG), was set up in 2003, to coordinate, lobby and promote hygiene and sanitation in the country. There are now more than 1.5 million people living in ODF environments, and more than 3 million people that have received hygiene messages as a result of decentralized local government intervention.

For Uganda, as in the rest of the developing world, health means wealth, particularly for people who cannot go to work because they're ill, or for children who lose almost 200 million school days a year to inadequate sanitation and unhygienic facilities, thus growing up to an insecure future. The relationship to environmental protection is also clear, given that around 90 per cent of sewage in the developing world is discharged untreated into streams and rivers.

Sanitation is still often surrounded by taboos, and lack of political will and sustainability. More commitment and resources are needed from governments and civil society. Providing access to basic sanitation to 40 per cent of the world's population is not merely the right thing to do. It is the key public health challenge of our time—and a moral obligation. ▲

# UNEP at Work

## Cleaning Our Air

*Reducing urban air pollution  
through cleaner transport*



Photo: © Eurasia/Robert Harding Picture Library

The lung of an urban resident having lived his or her life in a city is grey with many black spots, while that of someone who has lived far from the city, like in the Himalaya, is pink. This is what air pollution does to our body—our lungs are the filters of the air we breathe—day in and out.

But our lungs can't filter everything. Small particulate matter, known as PM<sub>2.5</sub>, is one hundredth the size of a human hair. It can pass through lungs and cause all sorts of health effects—from strokes to cancer.

Small particulates air pollution is rapidly making its way up the ladder of the most pressing and challenging health problems. According to the World Health Organization

(WHO), more people worldwide are affected by small particulates pollution than by any other pollutant.

WHO also estimates that 3.7 million people die prematurely every year due to outdoor air pollution (with a similar number due to indoor air pollution)—more than HIV, malaria and TB together. The main culprit is vehicle emissions,

which are responsible for the majority of this small PM pollution.

The damage, however, is largely preventable through a proven, cost-effective, two-track approach. First, we need a rapid introduction of cleaner fuels and vehicles, especially diesel vehicles. Existing diesel technology, proven to reduce small particulate emissions by more

***We need to change the way we look at urban mobility by redesigning cities around people instead of vehicles, by promoting walking and cycling, and by introducing effective, quality public transport systems.***



*According to the World Health Organization, more people worldwide are affected by small particulates air pollution than by any other pollutant.*



Photo: © ROM/Robert Harding Picture Library

than 95 per cent, is already in place in many countries. UNEP is helping other countries adopt standards to introduce these low-sulfur diesel fuels and set standards for vehicles.

But technology is not the entire solution. The vehicle fleet in low- and middle-income countries is set to triple by 2050, and thus the sheer number of new vehicles will offset the benefits of technology.

Therefore, as a second track, we also need to change the way we look at urban mobility by redesigning cities around people instead of motorized transport, by promoting walking and cycling, and by introducing effective, quality public transport systems. Many developed and developing countries and cities have successfully implemented such strategies.

UNEP is leading or partnering in global initiatives to improve urban air quality through reducing small particulate emissions from transport, working in close alliance with governments, civil society and the private sector.

Two examples are the public-private Partnership for Clean Fuels and Vehicles (PCFV-[www.unep.org/transport/pcfV](http://www.unep.org/transport/pcfV)) and the Clean Diesel Initiative under the Climate and Clean Air Coalition (CCAC – [www.unep.org/ccac](http://www.unep.org/ccac)).

This work is part of a renewed focus within UNEP on air quality and health as requested by governments that adopted an Air Quality Resolution at the inaugural UN Environment Assembly in June last year.

See more at: [www.unep.org/transport/](http://www.unep.org/transport/)



Photo: © Klaus-Werner Friedrich/Robert Harding Picture Library

# Hugh Montgomery Terminal Blow?

*Climate change, the greatest threat to health this century, is striking at an already weakened world*



**Hugh Montgomery**

*Prof of Intensive Care, University College, London and Director of its Institute for Human Health and Performance*

**D**eath in an intensive care unit usually results from a sudden insult striking an individual already bearing an accumulated burden of disease. Historically, the same has been true of mass extinction events—a major insult striking an already weakened biosphere. We now face the same peril: humanity has chipped away at the base of the ecological pyramid on top of which it sits and, now teetering, faces what could be a terminal blow.

It took some 540 million years for the human species to develop from the first multi-celled life, and a further 150,000 years or so for its population to reach 1 billion. That population doubled again in only 123 years, with another billion added in just 33 years, and still another 15 years later. There are now over 7 billion of us worldwide—and each uses more. From 1804 to the present, world population rose seven-fold, but world gross domestic product (GDP) multiplied some 500 times over—from \$175 billion (in “1990 US dollars”) to over \$75 trillion. This growth has been largely underpinned by use of the planet’s resources, whether fossil fuels or phosphates.

Humanity harvested 90.4 billion kilograms (kg) of wild fish in 2011, with aquaculture adding a further 63.6 billion kg. In 2012, 304 billion kg of meat were produced for human consumption, as were 2.5 trillion kg of cereals in 2014. Such escalations in agriculture demand more pesticides and phosphates. They also require more fertilizer (use up

by 25 per cent in 10 years to over 200 billion kg a year); more water (1,000 litres [l] to grow 1 kg wheat, but 15,000 to produce 1 kg of red meat): and more land (we cut down 130 trillion square metres of forest a year).

Land use leads to erosion: 68 billion tons of fertile soil are lost annually, and much (if not all) of the world’s topsoil may be exhausted this century. Meanwhile, much of the world’s agriculture is supported by groundwater drained faster than it can be replenished, and by “mining” (non- or slow-filling) “fossil aquifers”. The depth of the main aquifer under the North China Plain—which supplies the wheat for 570 million people—is falling by more than 3 metres a year. The Ogallala aquifer under the USA’s Great Plains—which supplies 30 per cent of the water used for irrigation in the country—lost 2 per cent of its volume in the 8 years to 2009 alone and, once depleted, will take 6,000 years to refill.

Such impacts extend beyond the geological to the biological: whether through mining, building, farming, logging or pollution, human activity is destroying the ecosystems upon which it depends. In the 27 years to 2012, Australia’s Great Barrier Reef lost over half of its coral cover. Since 1970, the world’s vertebrate populations have been halved. Up to eight species are becoming extinct every hour. We are living through a mass extinction of our own making. More precisely, through demolishing the delicate base of the ecological pyramid, we may soon be part of a mass extinction.

Such is the “chronic disease burden” that our planet faces. In this weakened (and rapidly weakening) state, the world and its inhabitants now face the force of rapid and extreme climate change.

Fossil fuels hold “carbon dioxide” (as carbon) sequestered over hundreds of millions of years. We are now releasing it on a timescale of tens of decades. The first commercial jet ticket was sold only 63 years ago, while 98 passengers now

---

Land use leads to erosion: **68 billion tons** of fertile soil are lost annually, and much (if not all) of the world's topsoil may be exhausted this century.

---

board every second. The world's first mass-produced car only appeared some 114 years ago, but there are now over 1 billion motorized vehicles on the planet. We now burn 166,000 l of oil, 248,000 kg of coal and 108 billion l of gas each second. In a little over 150 years, humans have driven the concentration of CO<sub>2</sub> beyond 400 parts per million—greater than at any point in the last 10-15 million years.

Simple physics means that the resulting emissions will lead to a “net positive energy balance” in our atmosphere—the equivalent of five Hiroshima bombs a second. The oceans have absorbed over 90 per cent of this energy of late, and their surface temperatures have risen. Land surface temperatures are rising, too. Arctic sea ice is disappearing at a rate of up to 50,000 square km a year, while the Antarctic ice sheet is losing 159 billion tons of ice annually.

Sea levels are rising inexorably. The effects will continue for millennia: 7 per cent of CO<sub>2</sub> emitted today will still be warming the planet in 100,000 years. But emissions continue to grow at a rate beyond the Intergovernmental Panel on Climate Change's (IPCC) “worst case scenario”, putting us on track for a global average temperature rise of more than 4°C above pre-industrial temperatures in the next 85 years.



Photo: © Philip Walltck / Robert Harding Picture Library

## *Rising sea levels—combined with increasingly frequent and severe extreme weather events as the atmosphere gains energy—will lead to poverty, starvation, displacement, migration and conflict.*



Photo: © Mark Weber / Robert Harding Picture Library

Added to the existing mass destruction of our biosphere, climate change threatens our well-being and survival. In 2009, the UCL-Lancet Commission on Climate Change and Health called it “the greatest threat to global health of the 21st Century”. Impacts can be direct (e.g. through heat waves and extreme weather events), or indirect (e.g. through agricultural losses and changing patterns of disease, or the impacts on economies and social structure, migration and conflict).

After only 0.85°C warming so far, many such anticipated threats have occurred. Others come from altered bacterial growth; algal sea blooms; groundwater contamination with salt and nitrates; changes in disease vector distribution and activity; and altered concentrations of ground-level ozone. And rising sea levels—combined with increasingly frequent and severe extreme weather events as the atmosphere gains energy—will lead to poverty, starvation, displacement, migration and conflict.

Such “planetary plague” might be open to some forms of symptomatic relief, but is not readily curable. “Environmental” issues are now military issues, health issues, survival issues. As in any crisis, an emergency team response is required—in this case, involving business and civil society. Lumbering diplomacy may deliver inadequate first aid, long after the patient is condemned to die. ▲

# Samuel S Myers

## Clear and Present Danger

*New research is identifying threats to health and nutrition from the Great Transformation being forced on natural systems*



**Samuel S Myers**

*Senior Research Scientist, Harvard School of Public Health*

**H**uman civilization has flourished during the uniquely stable biophysical conditions of the Holocene. But over the past decades, the combination of rapid population growth and rapid increases in per capita consumption have led to an extraordinary ballooning of humanity's ecological footprint. We have converted roughly half the ice-free, desert-free land surface to croplands and pastures. We have cut down 50 per cent of the world's tropical and temperate forests. We have dammed 60 per cent of the world's rivers and exploit 85-90 per cent of monitored fisheries at, or beyond, sustainable limits. Our activities have reduced the populations of vertebrate wildlife species by roughly 50 per cent since 1970 and are driving species extinct at 100-1,000 times the baseline rate. Our greenhouse gas emissions are increasingly disrupting the global climate system. And most of these trends are accelerating.

We have tended to view this Great Transformation of Earth's natural systems as an environmental problem—a threat to birds and fish, but not so much to us. But increasingly, our group at Harvard is learning that this couldn't be more wrong.

Recently, for example, we've learned that emissions of carbon dioxide into the atmosphere are driving not just global climatic disruption, but also significant reductions in the nutritional value of food. We grew 41 cultivars of rice, wheat, corn, soy, sorghum and field peas in open field conditions in seven locations on three continents over 10 years using free air carbon dioxide enrichment methods. Comparing crops

grown at ambient CO<sub>2</sub> with those grown under identical conditions but at 550 parts per million (ppm) CO<sub>2</sub> (concentrations that our atmosphere is expected to reach in roughly 40 years), we found that the edible portion of the ones grown at elevated CO<sub>2</sub> had significant reductions in protein, iron and zinc. This is important because roughly 2 billion people suffer from zinc and iron deficiencies at an estimated cost of 63 million life years lost annually. We also found that 2.75 billion people live in countries whose populations consume at least 70 per cent of their dietary zinc and/or iron from the type of crops showing strong reductions. Additional analyses suggest that these CO<sub>2</sub>-induced nutrient changes will drive hundreds of millions of people into zinc deficiency, while exacerbating the condition for billions already suffering from it.

We have also developed a new approach to estimating the importance of animal pollinators for human nutrition around the world, through overlaying data on the pollinator dependence of all food crops, the estimated consumption of each food per capita and the concentration of 23 different nutrients found in each food. Thus we can model how pollinator declines would alter intake of different foods and what



Photo: © Mark Edwards/Robert Harding Picture Library

## Over the past decades, the combination of rapid population growth and rapid increases in per capita consumption have led to an extraordinary ballooning of humanity's ecological footprint.



Photo: © Eric Woods/Robert Harding Picture Library

---

*In total, we found that pollinator declines could lead to over **1 million deaths** annually and a very large global burden of disease.*

---

these changes in dietary intake would mean in terms of the total amount of a particular nutrient available per capita per country. In research published in January 2015, we showed that pollinator declines would significantly increase the risk of vitamin A deficiency for populations in Mozambique and Uganda, with smaller effects in Bangladesh and Zambia. More recently, we have conducted a global analysis of how such declines around the world would impact the global burden of disease by increasing the risk of vitamin A deficiency, folate deficiency and low intake of fruits, vegetables, and nuts and seeds. In total, we found that pollinator declines could lead to over 1 million deaths annually and a very large global burden of disease.

Loss of animal pollinators is only one of many ways that biodiversity loss is likely to impact human nutrition and health. We also have been investigating an even more direct one—the loss of access to both terrestrial and marine wildlife for food. My colleague Chris Golden has shown that bushmeat is an important source of dietary iron in Madagascar and that removing it from the diet of the population he works with would lead to a 30 per cent increase in anemia in children—an outcome of enormous public health importance as iron-deficiency anemia leads to increased maternal and neonatal death, reduced IQ and reduced work

capacity. We are now investigating more comprehensively the role bushmeat plays in the diet as a source of other important micronutrients like zinc, omega-3 fatty acids, and vitamins A and B12. We are concerned that what we are finding in Madagascar is occurring in populations around the world—the quiet erosion of a nutritional cornerstone as access to wild-caught meat becomes scarcer.

Access to seafood is likely to be of similar, or even greater importance, for coastal populations, and we have started investigating relationships between it, fisheries management, micro- and macronutrient status of local populations and health outcomes. We have put together a strong team of fisheries ecologists, economists and nutritional epidemiologists to begin quantifying the role that global fisheries play in nutrient intakes and nutritional status around the world. In this way, we can explore the extent to which sustainable fisheries management is not just a conservation imperative, but also a public health one.

These issues impact billions of people, but are just the tip of the iceberg. Enormous questions remain: how will the combination of increasing water scarcity, land degradation, pollinator declines, fisheries degradation and climate change interact to alter the quality and quantity of food when we need to roughly double production over the next 40 years? What will be the associated nutritional and health outcomes for different populations around the world? How many people will need to find new homes as a result of changes in climate, food production, natural hazards and sea level?

Such questions are finally beginning to receive the attention they deserve. A group of universities, NGOs and other organizations is coalescing to support the growth of a robust, policy-focused, research field addressing such topics—Health & Ecosystems: Analysis of Linkages (HEAL). It aims to help build a community of practice, identify or construct core educational materials, disseminate research methodologies, provide links to policy communities and communicate developments in the field. In July, 2015, The Lancet will publish a commissioned report of the Rockefeller-Lancet Commission on Planetary Health, detailing the human health risks associated with the accelerating transformation of Earth's natural systems and emphasizing a set of actions to address them.

The Great Transformation poses a clear and potent danger to human health. It is more important than ever to understand and quantify the relationships between our management of Earth's natural systems and the health of populations around the world. Only then can we manage them to optimize both health and conservation outcomes for future generations. ▲

# UNEP at Work

## Off the Shelf

*Access to online resources is transforming health and environmental research*



Photo: © Research4Life

In 2007, when he first joined Makerere University in Uganda as an agricultural librarian trainee, Onan Mulumba spent most of his time re-shelving books. Now he accesses thousands of online journals, books and databases to help farmers deal with pest infestations and plant diseases.

“The (farmers) want an immediate solution because the new crop pests in Uganda are very destructive,” he said. “We can now search the databases to get the knowledge they need.”

The transformation to electronic resources in libraries is part of Research4Life, a

UNEP-supported programme whose origins date back to 2000.

Studies of research productivity in Canadian, British and American universities have found that productivity is related significantly to access to information resources.<sup>1</sup>

Yet 15 years ago, large portions of the world did not have access to the knowledge contained in international scientific publications.

<sup>1</sup> (H. Dunder and D. Lewis, Determinants of research productivity in higher education. *Research in Higher Education* 39 (1998) 607.

In 2000, the World Health Organization (WHO) found that 56 per cent of institutions in 75 of the world’s low-income countries—those with annual per capita gross national product (GNP) of under US\$1,000—had had no journal subscriptions for the previous five years; 34 per cent of institutions in countries with an annual per capita GNP of US\$1,000-3,000 had had no subscriptions for five years; and another 34 per cent averaged only two subscriptions over the past five years.

Not surprisingly, the survey revealed that one of the researchers’ greatest difficulties was lack of access to the key research literature





*Through Research4Life, UNEP is working with other partners to make research more accessible, a strategy that ultimately aims to improve health and environmental incomes.*

found mainly in refereed journals published in high-income countries.<sup>2</sup>

In response, WHO and six major biomedical publishers announced a scholarly publishing partnership in July 2001 that WHO Secretary General Gro Harlem Brundtland called “the biggest step ever taken towards reducing the health information gap between rich and poor countries.” HINARI (Access to Research in Health) opened access to institutions in low- and middle-income countries in January 2002.

Building on the proven concept of HINARI in the health realm, the Food and Agriculture Organization (FAO) launched AGORA (Research in Agriculture) in October 2003. Then, on the strength of HINARE and AGORA, UNEP launched OARE (Online Access to Research in the Environment) in October

2006. The three efforts, which collaborated with each other, created a larger and stronger partnership now called Research4Life.

Research4Life is an online programme providing access to the full text of scientific books and journals. Access is available for researchers, primary healthcare workers, and environmentalists and policy managers working in not-for-profit research institutions, academic institutions and government ministries.

Research4Life users gain access in the same way as paying customers, which makes it simpler for partner publishers. Institutions register via a Research4Life web form and then receive a user name and password that can be shared with all users affiliated with the institution. Authenticated users then log in to get access to available full-text content on the publishers’ websites. To date, more than 5,000 institutions in more than 100 countries have access to Research4Life. For Makerere University, Research4Life has helped boost

the quantity and quality of faculty publications and student dissertations. Among other scientific innovations, Makerere researchers have developed a new bacteria-resistant tomato and bred four high-yielding and early maturing soybean varieties that are resistant to leaf rust disease.

“Instead of viewing librarians as mere book dust removers, (users) see us as resourceful information agents without which research is impossible,” said Onan Mulumba, whose successes are one of several captured by the partnership.<sup>3</sup>

Ultimately, Research4Life aims to improve health and environmental outcomes. In a world where healthy people and a healthy environment are becoming increasingly intertwined, it is more important than ever that research is informed by evidence contributed by the entire global community.

2 Improving Access to Scientific Information for Developing Countries: UK Learned Societies and Journal Access Programmes. UK National Commission for UNESCO. 2008.

3 Making a Difference. Research4Life; 2011.

# Peggy Liu

## A New Way to Eat

*Chinese diets increasingly imperil both health and the planet, but a bid to change this is starting at the beginning*



**Peggy Liu**

*Chairperson of  
JUCCE*

**W**hen Cui Fengqing was 16, she was sent from Shanghai to a rural village to plant vegetables in a commune. Every year, the local government sent her household a block of frozen raw eggs so they could celebrate the New Year with egg dumplings. For seven years, she had no meat in her meals. Until she was in her 50s, she didn't go grocery shopping and didn't cook.

Since then, China has lifted 200 million out of food poverty. Every rural school lunch is subsidized by 4RMB (US\$0.68). In the 30 years to 2009, the disposable income of China's urbanizing middle class has increased nine times over, while the proportion of all its people in poverty slumped from 63 per cent in 1981 to just 10 per cent in 2004.

That is an amazing achievement, but there is a big downside. A whole generation of parents has neglected to teach its kids to cook, making them dependent on convenience foods or restaurants. Starbucks has turned China from a tea-drinking nation to one infatuated with sweet coffee, and KFC is the number one franchise.

Now, Lawrence Chang's parents treat him regularly to McDonald's. His mother believes that a multinational corporation will have stricter regulations on food safety, so the hamburgers and fried chicken must be healthy. As a chubby Little Emperor (precious only son), he dictates what he

wants for meals, and makes his mom give his friends expensive toys to win them over at playdates. He prefers to spend his time indoors studying, and on video games, than on running around outside playing sports.

Although one in five people in the world live in China, one in three of those with diabetes are Chinese. In 1980, less than 1 per cent of Chinese adults had the disease: now it's more than 10 per cent. By 2011, up to 20 per cent of 7-18 year-olds were overweight and obese, and 15 per cent were pre-diabetic.

The deputy secretary of the China Diabetes Society, Xu Zhangrong, said "The sudden rise of diabetes in China is not only a health threat, but an economic one. It could bankrupt the country's healthcare system. China needs to shift its focus from treating diabetes to preventing it."

Yet China has no formal food education program. And its National Institute of Nutrition and Food Hygiene said, "China has just over 10,000 qualified nutritionists nationwide, but needs at least 4 million, based on international standards of one nutritionist for every 300 people."

China's dietary and health crises are also a planetary one. Its huge appetite for imported foods impacts the agriculture resources of countries around the world. New Zealand is turning pastures into dairy farms to produce milk and infant formula for it.

Our food system is to blame for up to 30 per cent of global greenhouse gas emissions. With 800 million people in the process of entering the Chinese middle class by 2025, they are replacing shared stir fries containing tiny slivers of meat with huge individual Western-style steaks. That's bad news for methane emissions, deforestation, China's already dwindling sources of water and land that could be



Photo: © Tim Graham/Robert Harding Picture Library

***A whole generation of parents has neglected to teach its kids to cook, making them dependent on convenience foods or restaurants.***

used to produce tons and tons of vegetables instead of one slab of meat.

The time to make a massive change starts in first grade, in the school curriculum. A survey by the China Center for Disease Control showed that primary school kids' diets are controlled by school lunches and cooks at home. Middle school children's diets, by contrast, are largely influenced by their peers and, by the time they reach high school, their food habits are largely set. If we want to make a dramatic change, we must start with the 94 million children in primary school.

"A New Way to Eat"—an initiative by my non-profit JUCCE—is doing just that, setting out to meet the lack of nutritional education. The challenge is how to keep children—with their short attention spans—interested, and how to explain to them complex sustainable diet concepts of which most adults are not yet aware.

Our initiative uses "playducation" to turn such terms as "biodiversity", "micronutrients", "high blood sugar" into fun themes like "Eat a Rainbow Everyday", "Where Our Food Comes From", and "Icky Sticky Sugar". Children can jump around, play speed games, get blindfolded. And, of course, there are lots and lots of stickers.

The curriculum is based on three simple Food Hero Rules:

1. Food fuels your mind and body
2. Quality foods & exercise give you extra fuel
3. You can save the planet by eating healthier.



Photo: © Ingolf Pomme/Robert Harding Picture Library



Photo: © Tao/Robert Harding Picture Library

*The challenge is to keep children—with their short attention spans—interested in nutrition, and to explain complex concepts about sustainable diet of which even most adults are not yet aware.*

---

*In 1980, less than **1 per cent** of Chinese adults had diabetes: now it's more than **10 per cent**.*

---

Complex food pyramids and calorie concepts are turned into a simpler “Eat This First” table that blends healthy eating for both kids and the planet. Requests to pilot activities of the initiative—even as it is being developed—are proving to be overwhelming. It has received enthusiastic feedback from kids, parents and teachers in school classrooms, extracurricular academies, subscription educational magazines, mother and child groups, restaurants and corporate employee activation programmes.

Of course—though China has 15 per cent of the world’s primary school children—it is hardly alone in facing dietary and planetary challenges. So we are partnering with the EAT Forum with the aim of eventually taking the programme global, with regional partners adapting it to local language and tastes.



Photo: © Guillen Lopez/Robert Harding Picture Library



Photo: © Fumio Okada/Robert Harding Picture Library



Photo: © Tim Graham/Robert Harding Picture Library



Photo: © Sean Sprague/Robert Harding Picture Library

Today's children are the first generation not expected to live longer than their parents. They are also the first to be imperiled by dangerous climate change. By learning to eat differently, they can tackle both threats at the same time—and have fun doing so. ▲

# Richard Fuller

## Pollution – The Greatest Killer

*Tackling the health effects of pollution  
should be a core focus of development*



**Richard Fuller**

*CEO of Pure Earth/  
Blacksmith Institute,  
New York*

**H**ealth issues have always been rightly at the top of the world's development agenda. Ebola, swine flu and avian flu—and the triad of malaria, tuberculosis and HIV—all deserve attention. Yet there is another scourge that has not yet received enough focus, which kills slowly, silently, but massively, and takes far more human lives than malaria, tuberculosis and HIV combined.

It is pollution. Contaminated air, water and soil were responsible for 8.9 million deaths in 2012, according to data from the World Health Organization (WHO) and the Institute for Health Metrics and Evaluation. That's more than one in seven deaths worldwide, a greater number than is due to smoking, war or malnutrition. Pollution has been steadily growing, as has its health impact, so that it is now the leading cause of death. And, of course, it also damages economies, slowing down development in countries that sorely need to grow.

Pollution comes in many forms, including particulates in smoke from wood-burning cookstoves, contaminated water from mining effluent, sewage in poor slums and belching smokestacks from poorly run industry. It rarely

kills directly, but it causes a range of diseases, from cancer to asthma, and wreaks gastrointestinal, cardiovascular, immunological and neurological damage.

One in seven deaths occur every year because of the damage we inflict on our environment. But they are preventable.

This is first and foremost a development issue: 94 per cent of these deaths occur in low- and middle-income countries, and most of the 6 per cent that take place in high-income countries are in the poorer Eastern European Member States of the European Union (EU).

Wealthy nations have generally managed pollution well in the last few decades. They have safe drinking water, clean air for the most part and good sewerage systems—especially compared to poorer countries, many of which have been industrializing with few or inadequate pollution controls. The results can be seen in pictures of Beijing and Delhi shrouded in toxic particles, in rivers filled with chemicals, garbage and sewage, and in poisoned fish and contaminated food around the globe.

It needn't be like this. It is possible to have clean and green economies: richer countries are already on such a trajectory. It is also possible to clean up the messes that have already been made. We could solve this issue in our lifetimes, saving millions of lives each year, and ensuring that children achieve their full potential.

Part of the reason we have not done this so far is that we have abdicated responsibility for pollution to sectors other than health. Many think it should instead be considered as



Photo: © Egmont Strig/Robert Harding Picture Library

---

*Contaminated air, water and soil were responsible for **8.9 million** deaths in 2012, according to data from the World Health Organization and the Institute for Health Metrics and Evaluation.*

---

a focus of transportation, energy or climate change. Health systems focus on health service, such as treating diseases, and prevention rarely features in national strategies. Meanwhile, pollution has been fragmented into a list of innocent-sounding categories that fail to communicate the severity of the problem; the death and disease. It has fallen off our maps.

At first glance, tackling pollution appears overwhelmingly complex, but solutions are quite doable, and most are very cost effective. At Pure Earth—my non-profit focusing on contaminated sites—we have cleaned up towns destroyed by lead pollution at the cost of a few dollars for every year of life saved. Communities blighted by chemicals from weapons manufacturing have also been made safe again. There have been successful efforts by many actors to bring clean water to cities and villages across the globe. Policies to control air emissions have worked in the richer countries, and should be replicable in the developing world. In general, it is not large international companies that cause the majority of these problems. Most of the pollution is created locally, by small-scale artisans or smaller domestic companies, or result from abandoned toxic sites.

Important things can be done on a strategic international level to make progress in managing pollution and improving health. While affected countries need to do the majority of



Photo: © Tim Graham/Robert Harding Picture Library

the work, local capacities are usually inadequate. Donors can help with technical assistance and projects that build real on-the-ground capacity through learning by doing. The Global Alliance on Health and Pollution brings together agencies around the world to provide help to willing countries, and its efforts should be expanded and supported. Pollution must also be a focus of the Sustainable Development Goals. An International Commission on Pollution and Health (along the lines of the Stern Report on Climate Change) should define the economic and health costs, and bring attention to the problem.

A change in focus is needed. We need to evolve the way we think about pollution, seeing it as an interdisciplinary issue impacting health, the environment and economic growth, and thus a core focus in development assistance—not just as an add-on to biodiversity or climate change.

In the 1960s, the West woke up to the fact that pollution was poisoning its children and its future. It worked hard to fix the problem and largely succeeded. But now the threat has shifted to the developing world, and it's bigger than ever. It's time that we treat it with the respect it deserves, and get started. The global community has a chance to do something that is practical, doable and solvable. This is a problem with well-known and proven solutions, where we can really make a difference. ▲

***We could solve this issue in our lifetimes, saving millions of lives each year, and ensuring that children achieve their full potential.***



# Making Connections

*Ecohealth approaches integrate health, environment and social equity*

*Over the past 15 years, smallholder farmers in Ekwendeni, northern Malawi, have been working with researchers on agro-ecological techniques to improve soil fertility, food security and nutrition. Interplanting maize with legumes such as soybeans and pigeon peas, for example, helped improved maize yields and fortify family diets. The approach generated tangible results: in participating villages, 4,000 children were 1 kg heavier by their first birthday and 1.5 kg heavier at three years of age. In 2013, the UN Special Rapporteur on the Right to Food called the project a food security model for Malawi.*

The project was funded in part by the International Development Research Centre (IDRC), which has been pioneering research that integrates environmental and health concerns since 1996. The “ecohealth” approach recognizes the need to break down silos between disciplines, and look for connections that can ensure benefits for both ecosystems and people. To that end, scientists collaborate with practitioners, civil society and decision makers to make healthy, equitable and sustainable changes.

For all its success, the farmer-led research in Malawi identified knowledge gaps and social inequity in the context of climate change. In 2009, IDRC supported a new phase of research involving Ekwendeni Hospital, the University of Malawi and Canada’s Western University. Broadening research to include Kasungu district in central Malawi, the team assessed the value of farmer-to-farmer exchanges and



Photo: © Carmen Beznar Kerr



Photo: © Carmen Beznar Kerr



Photo: © Carmen Beznar Kerr





community institutions to foster adaptive responses to climate change, with sensitivity to inequities linked to issues such as HIV.

Following initial discussions about climate change and agro-ecology with researchers, the 400 participating farmers developed their own experiments. In one village, farmers used local clay to build woodstoves that used less fuelwood and generated less smoke. Through peer exchanges, two other villages learned about the woodstoves, and adapted the idea.

The woodstoves proved popular with women farmers—who traditionally collect fuelwood—since they saved time. But the labour-saving technology also appealed to HIV-positive households. And farmers living with HIV also found intercropping useful: not only did this technique produce greater yields of maize, it also meant less planting and weeding.

“There is still stigma associated with HIV,” said Dr. Rachel Beznar Kerr, who has coordinated research since the project’s inception in 2000. “At the same time, we found that farmers with HIV who felt weak on certain days got help with their weeding from other participants. The project triggered a collaborative spirit that points to social impacts that went beyond individual households. It gave the community a sense of hope.”

With support from Cornell University, where Dr. Kerr teaches in the sociology department, a new phase of the project will integrate agro-ecology, gender and social equity, and nutrition with popular education tools. “We will use drama, role play, poetry and graphic novels to show how families are struggling with different elements of climate change,” said Dr. Kerr. “In June, we will meet face-to-face with farmers in Malawi to develop the ideas further, and then test and refine them over the next year.”

See more at: <http://soilandfood.org/>  
<http://www.idrc.ca/>



# Gladys Kalema-Zikusoka

## Felling Trees Brings Disease?

*Deforestation and wildlife exploitation lead to outbreaks of Ebola and other diseases*



**Gladys  
Kalema-Zikusoka**

*Founder and Chief  
Executive Officer,  
Conservation Through  
Public Health*

**E**arly in my career as a wildlife veterinarian, I realized that human public health and biodiversity conservation were interlinked. As the first veterinarian for the Uganda Wildlife Authority, a government parastatal mandated to manage the country's wildlife, I led a team in 1996 that investigated the first scabies skin disease outbreak in the critically endangered mountain gorillas of Bwindi Impenetrable National Park. Humans—the gorilla's closest “domestic” relatives—were found to be the source of the scabies, a disease of poverty, which caused the death of an infant gorilla and sickness in the rest of the group: it only recovered with Ivermectin treatment, commonly used to treat scabies in people. Gorillas—sharing 98.4 per cent of DNA with humans, yet naive to the scabies mite infection—succumbed to the disease when they ventured outside the national park to forage in community gardens and came into contact with mite-infested clothing.

Zoonotic diseases, such as scabies, that spread between people and animals, travel in both directions in Central Africa: Ebola has resulted in the deaths both of thousands of gorillas and chimpanzees and of people who have handled or eaten them. Disease is now recognized among the major threats to biodiversity along with habitat destruction, invasive species,

pollution, population growth and over-harvesting. We started an NGO, Conservation Through Public Health, [www.ctph.org](http://www.ctph.org), in 2003 to address disease as a threat to biodiversity conservation—and have found that poverty and high human population growth rates are also part of the problem.

How is Ebola, a disease of significant public health importance that has caused the loss of over 10,000 human lives within a year in West Africa, linked to biodiversity conservation?

The disease, caused by a virus of the Filoviridae family that includes Cuevavirus and Marburg virus, results in haemorrhagic fever. It was first discovered in 1976, with two outbreaks at Nzara in Sudan, and Yambuku in Democratic Republic of Congo, in a village near the Ebola River. People can develop it from contact with infected wildlife, and it can then spread quickly through their families and communities.

Of the five Ebola species identified—Zaire, Bundibugyo, Sudan, Reston and Tai Forest—the first three have been associated with large outbreaks in Africa: the 2014 West African outbreak belongs to the Zaire species. The disease has a case fatality in humans ranging from 25 per cent for the Bundibugyo Ebola virus to 60–90 per cent for the Zaire one, although survival can be improved with appropriate intensive care of rehydration and symptomatic treatment. Licensed Ebola vaccines are undergoing evaluation in both humans and great apes, although the cost and practicality of vaccinating great apes in the wild make it highly unlikely that initiative could proceed in the near future.

People go into forests to cut trees and hunt wildlife in order to feed their families. In Africa, the poorest people tend to live next to protected areas, and rely on natural resources



Photo: © Michael Runkel/Robert Harding Picture Library



Photo: © Michael Runkel/Robert Harding Picture Library

---

While Western Lowland gorillas still number over **100,000**, Ebola has wiped out as many as **5,000** of them in the past **15** years.

---

to meet their most basic needs. Unfortunately, this creates a high risk of contracting emerging infectious diseases like Ebola and Marburg harboured by fruit bats in the forests. People also cut down trees for firewood to cook for large families and sell commercially. And logging companies can create an unsustainable demand for timber resulting in rapid deforestation and even closer contact between people and wildlife.

People also hunt wild animals to earn a living, especially in this part of the world where bush meat is a delicacy and in great demand. And beliefs also come into it. For example, when a child falls sick in Bwindi Impenetrable National Park, the father goes into the forest to hunt a duiker believing that it will make his child better. In Central Africa, people believe that eating a gorilla or chimpanzee makes you as strong or as intelligent as them.

Infected fruit bats are believed to be another source of Ebola. More recent studies have shown that insectivorous bats may also be a source of the disease. Monkeys and great apes that come into contact with fruit bats also contract it and die. Western Lowland gorillas still number over 100,000, but are listed as “critically endangered” by the IUCN Red List because

of Ebola, which has wiped out as many as 5,000 of them in the past 15 years. So people who hunt and eat bush meat from the forest are therefore at great risk of contracting Ebola.

Reducing the risk of wildlife-to-human transmission from contact with infected fruit bats, monkeys and apes and consumption of their raw meat depends on both public health and conservation. Public health measures—including handling animals with gloves and other appropriate protective clothing and thoroughly cooking animal products before consumption—are important in dealing with the symptoms, but not the cause.

To address the causes of Ebola, there should be an end to wildlife meat consumption and deforestation, particularly through commercial concessions for oil palm and timber. Viable and less harmful alternatives can be explored, including community education on the risks of zoonotic disease transmission from consuming bush meat; planting softwood forests for timber outside protected areas; promoting consumption of alternative animal protein from “safer” domesticated animals such as goats, pigs and cows; or farming wildlife—such as guinea fowl—outside the forest.

The Great Apes Survival Partnership (GRASP)—which accepted CTPH as a partner in 2013 and unites nearly 100 organizations dedicated to great ape conservation—counts zoonotic disease monitoring among its six priorities. The World Health Organization (WHO), CTPH and Uganda Wildlife Authority are members of the Uganda National Disease Taskforce. Led by the Ministry of Health or Ministry of Agriculture, Animal Industries and Fisheries, the taskforce engages all concerned sectors in disease outbreak response using a “One Health” approach, including Ebola, Marburg and Anthrax, all linked to wildlife.

Collectively, we can prevent further loss of human lives and critical biodiversity by ending deforestation and wildlife exploitation. ▲

***Disease is now recognized among the major threats to biodiversity along with habitat destruction, invasive species, pollution, population growth and over-harvesting.***

# UNEP Publications



## *United Nations Environment Programme: Annual Report 2014*

The United Nations Environment Programme Annual Report tells the story of the environment and the organization's work in 2014, through stunning photography and inspirational stories of change from the ground.



## *Increasing Private Capital Investment into Energy Access: The Case for Mini- Grid Pooling Facilities*

Mini-grids are viewed as one of the key elements in securing universal energy access in the developing world. However, current levels of investment into renewable decentralized energy are insufficient to reach the development goals identified by initiatives such as the UN's Sustainable Energy for All. In order to reach such levels of deployment, new models of financing need to be designed.

In this report, we provide a conceptual framework for the development of a private sector facility to pool and cross-collateralize diverse capital to support international mini-grid portfolios. We begin by discussing the current status of electrification initiatives in developing countries, and the approaches adopted to access finance for their implementation. We then argue that two key barriers exist to the effective financing of mini-grids. First, mini-grids in emerging markets have a complex risk profile that is difficult to mitigate at the individual project level. Furthermore, individual mini-grid projects are so small that their fixed transaction costs reduce their financial viability.



## *Responsible Food Purchasing: Four Steps Towards Sustainability for The Hospitality Sector*

Responsible food sourcing, to be successful, requires cooperation. To achieve your selected sustainability targets fully, you will need to work closely with your supply chain, supporting your suppliers, incentivizing good practice and explaining to them why and how your business has committed to new standards of responsible environmental and social performance.

This guidance document, will help food purchasers to understand better the importance to their business of responsible food purchasing, while providing practical advice and guidance to enable them to make the right decisions and choices. This guidance outlines an approach to integrating food sustainability into your business, with practical steps, checklists and tips reinforced by case studies that provide valuable learning from those already embarked on responsible food purchasing. The resources listed at the end of the document will enable you to explore the wider sustainability agenda further, as responsible food purchasing remains a rapidly evolving field.



## *Establishing China's Green Financial System*

In 2014, the Research Bureau of the People's Bank of China convened a Green Finance Task Force made up of 40 experts from ministries, financial regulators, academics, banks and other financial institutions, complemented by international experts brought together by the UNEP Inquiry to consider the steps that China could take to establish a green financial system.

This report is the outcome of this process, and in it the Research Bureau of the People's Bank of China presents an ambitious framework of recommendations. Pan Gongsheng, Deputy Governor of the People's Bank of China, states in the forward that "the People's Bank of China is spearheading the drafting of the 13th Five Year Plan for the reform and development of China's financial sector; green finance will be a key element of this plan".



## *Benefits of Forest Ecosystems in Zambia and the Role of REDD+ in a Green Economy*

The main objective of the study was to assess the economic value of Zambia's forest ecosystem services. The study estimates that, when ecosystem services provided by forests are accounted for, forests make a direct contribution to the national economy equivalent to about 4.7 per cent of gross domestic product (GDP), which rises to 6.3 per cent with the application of multiplier effects.



## *Global Trends in Renewable Energy Investment 2015*

According to UNEP's 9th "Global Trends in Renewable Energy Investment 2015", prepared by the Frankfurt School-UNEP Collaborating Centre for Climate & Sustainable Energy Finance and Bloomberg New Energy Finance, the United Nations Environment Programme (UNEP) and Bloomberg New Energy Finance, the past year brought a rebound of green energy investments worldwide with a surge of a solid 17 per cent to \$270 billion.

Brushing aside the challenge of sharply lower crude oil prices, this sudden increase reversed the investment dip of the past two years and was mainly driven by investments in solar and wind energy.

*All UNEP publications are available online at:*  
[www.unep.org/publications](http://www.unep.org/publications)

# Environmental Champion Jamie Oliver

*Jamie Oliver has joined other celebrity chefs to campaign against the practice of discarding hundreds of thousands of caught, but unwanted, fish at sea*



Photo: © David Loftus

Celebrity chef and author, restaurateur and campaigner, Jamie Oliver has started giving up eating meat for several days a week as a result of his commitment to sustainable development. “I believe we are at a point in our history where we need to take a much more serious look at how we’re using land and how we’re going to need to use it in the future,” he told *Our Planet*. “Personally, I have started going vegetarian two or three days a week, not merely for my own health, but because I’m increasingly worried about the sustainability of eating meat every day.” Oliver, who has hosted many television series and written 19 best-selling books, has long campaigned for better food in schools. Born in 1975, his parents ran a pub/restaurant in Essex, England, where he used to practise cooking when young. It was then that he first became interested in the relationship between food and the environment, which he describes as “one of the absolutely key issues facing our planet.”

He explains: “My Dad was my first mentor. He would always buy locally and seasonably, grow food in the pub kitchen, and make sure he knew the local farmers and hunters so he could get the freshest, higher welfare produce.”





***“I believe passionately in taking great care of the animals we breed for food both because it is the right thing to do and because you are what you eat.”***

Dyslexic, he left school at 16, with few qualifications, but attended catering college and—after a series of jobs—ended up at London’s celebrated River Café as a sous chef. There he was noticed, aged just 22, by the BBC, which was making a documentary about the restaurant. Two years later, he had his first TV series and a cookbook topping the best-seller list. He never looked back and, more importantly, moved forward into campaigning for better nutrition and health.

In 2005, he launched his first campaign to move schoolchildren to eat more healthily and avoid junk food, succeeding—over the years—in making it a hot political issue, and bringing radical improvements to British school meals. He was awarded the 2010 TED Prize for his efforts “to create change on both the individual and government levels” in the UK and the US. Two years later, he was given the Healthy Cup Award of the Harvard School of Public Health for tackling the childhood obesity epidemic—and campaigning to provide whole, freshly-cooked food in schools—on both sides of the Atlantic.

He has set up 16 charity restaurants around the world, which train disadvantaged young people to work in the hospitality industry, and has joined other celebrity chefs to campaign against the practice of discarding hundreds of thousands of caught, but unwanted, fish at sea. He believes that

a tax should be placed on soda drinks and health warnings and age-restrictions on caffeine-laden energy ones—and that advertising of “unnecessary products which undermine breastfeeding” should be banned. And he has suggested that “all supermarket deals and promotions for processed foods would have to be matched with ones for fresh ingredients, to make it a level playing field and encourage people to cook from scratch.”

He told *Our Planet*: “I believe passionately in taking great care of the animals we breed for food both because it is the right thing to do and because you are what you eat. Who wants to be made of animals pumped full of growth hormones and antibiotics? Who wants to eat vegetables that have been soaked in dangerous pesticides that poison the land?”

“For me, the relationship between nutrition and the environment is one of the absolutely key issues facing our planet and our species, as we use more and more land to create food and water for animals, as opposed to using it for food for us to eat.

“It all comes down to food education. I have launched a petition at [change.org/Jamieoliver](https://change.org/Jamieoliver). Please sign it and share it because we need to teach our kids not just about food and cooking, but (also) how to eat seasonably and sustainably. We need to educate them about the ways food is produced to enable them to make the right choices.”

# Seven Billion Dreams. One Planet. Consume with Care.

This year, **World Environment Day** challenges everyone to re-imagine their dreams for a good life, delinked from excessive consumption.

*If seven billion people were to each make one positive change towards a sustainable lifestyle, what would our world be like?*

## Share your dreams with us!

Celebrate **World Environment Day** on 5 June by sharing your vision for a life of wellbeing on a sustainable planet. Make a pledge. Register your activity—all at [www.unep.org/wed](http://www.unep.org/wed)



World Environment Day 2015  
**Seven Billion Dreams.  
One Planet.  
Consume with Care.**  
June 5

