JUSTICE AND PROGRESS

Lagos State Government

Ministry of The Environment

PLANT A TREE TODAY

LAGOS STATE

MAIDEN SUMMIT ON

CLIMATE CHANGE

MARCH 24-26 2009

REPORT OF PROCEEDINGS

REPORT OF PROCEEDINGS OF THE LAGOS STATE MAIDEN SUMMIT ON CLIMATE CHANGE

HELD BETWEEN MARCH 24-26 2009 AT THE EKO HOTELS & SUITES, VICTORIA ISLAND, LAGOS, NIGERIA

Published by:

Ministry of the Environment

The Secretariat

Alausa-Ikeja

Lagos

Published 2009

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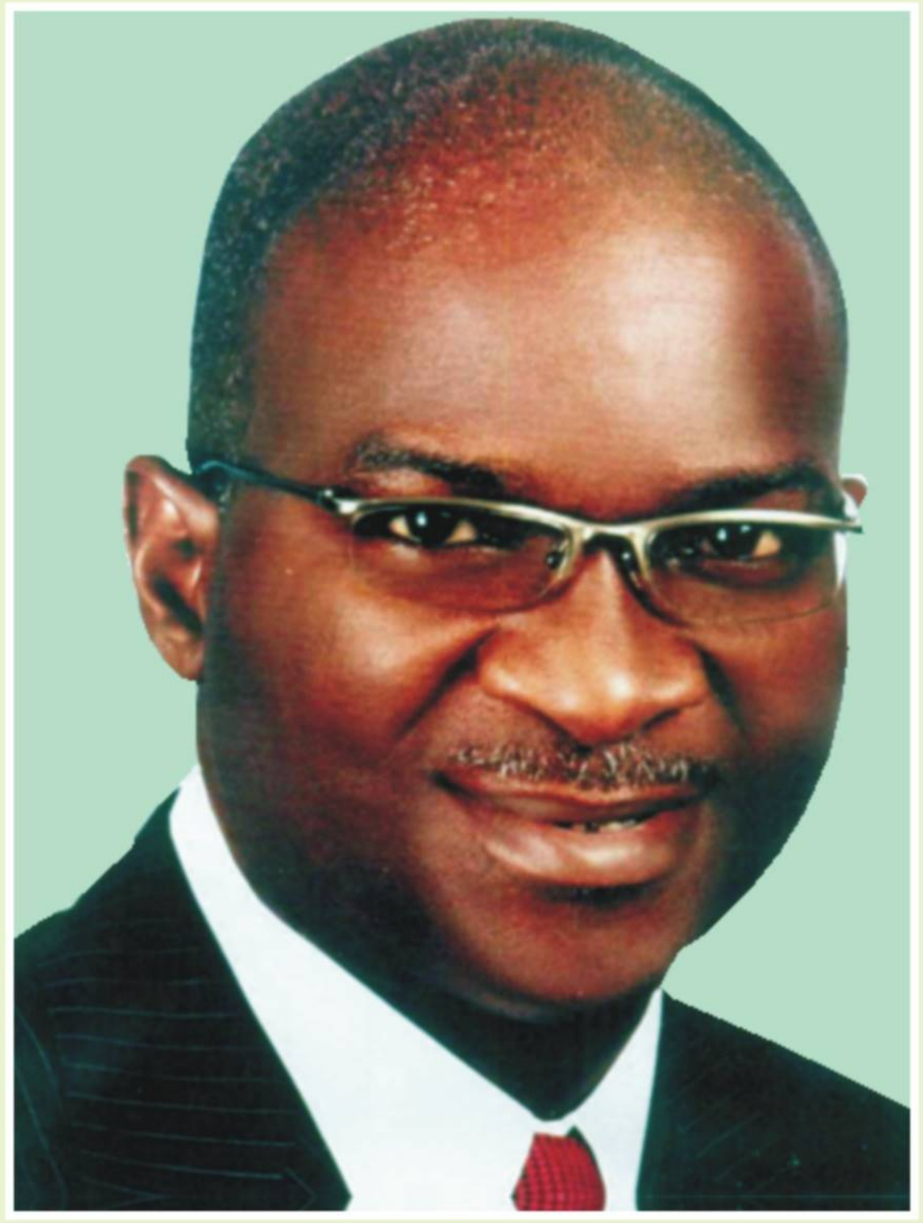
CONTENTS

Page	
10	Welcome Address by Dr. Muiz A. Banire
12	Keynote Address by His Excellency, Mr. Babatunde Raji Fashola (SAN)
15	Goodwill Messages
24	Communique
29	Photo Gallery
31	Programmes Schedule
38	Speakers' Profiles
62	Plenary sessions
429	LGA/LCDA Delegates
432	Members of the Lagos State House of Assembly
433	Members of the Lagos State Executive Council
434	Private Participants



His Excellency,

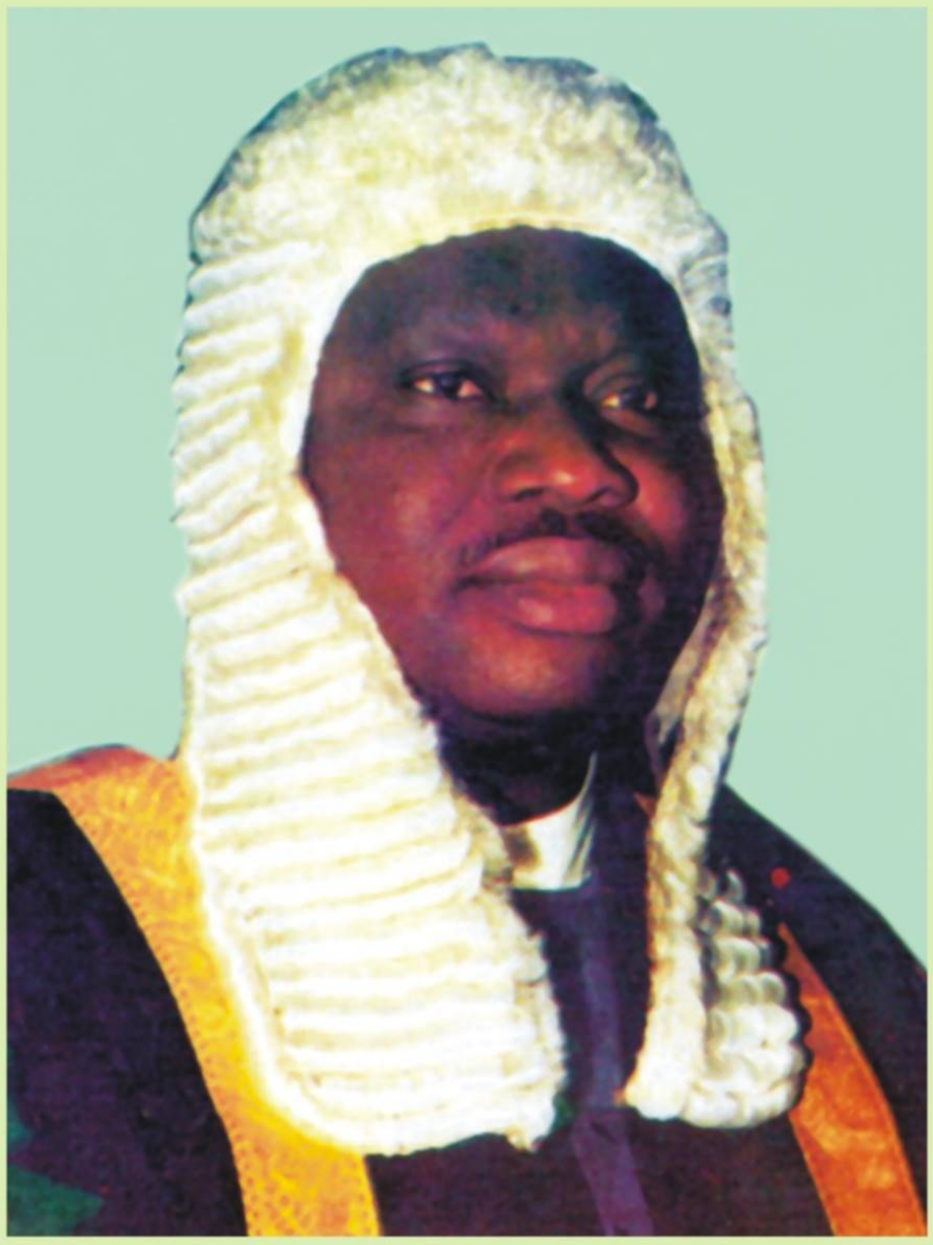
Mr. Babatunde Raji Fashola (SAN)

Governor of Lagos State

Her Excellency,

Princess Adebisi Sarah Sosan

Deputy Governor of Lagos State,



Rt., Hon. Adeyemi S. Ikuforiji

Speaker, Lagos State House of Assembly

Dr. Muiz Adeyemi Banire

Honourable Commissioner,
Ministry of the Environment

Hon. Sesan Olanrewaju
Special Adviser to His Excellency
on the Environment

Dr. (Mrs.) Titi Anibaba
Permanent Secretary,
Ministry of the Environment

National Anthem

Arise O compatriots, Nigeria's call obey
To serve our fatherland
With love and strength and faith
The labour of our heroes past
Shall never be in vain
To serve with heart and might
One nation bound in freedom
Peace and unity.

Oh God of creation,
Direct our noble cause
Guide our leaders right
Help our youth the truth to know
In love and honesty to grow
And living just and true
Great lofty heights attain
To build the nation where peace and justice
Shall reign.

National Pledge

I pledge to Nigeria, my country
To be faithful, loyal and honest,
To serve Nigeria with all my strength
To defend her unity
And uphold her honour and glory
So help me God.

Join the clean crusade
Keep Lagos State clean and beautiful

WELCOME ADDRESS DELIVERED BY DR. MUIZ BANIRE, THE HON. COMMISSIONER FOR THE ENVIRONMENT AT THE MAIDEN LAGOS SUMMIT ON CLIMATE CHANGE HELD AT EKO HOTELS & SUITES LAGOS, TUESDAY 24TH - THURSDAY 26TH MARCH, 2009.

Your Excellencies
Distinguished Ladies and Gentlemen

I am extremely exited to welcome all of you to this Lagos maiden summit on climate change. The theme for the summit, “Reclaiming the environment: Challenges and Consequences of Climate Change” was carefully selected to draw attention to the threat climate change poses to our continued existence on the planet earth and what needs to be done to mitigate it

The United Nations Secretary General, Mr. Ban-Ki Moon in a recent 3-day Conference held on Sustainable Development in New Delhi warned that unless Nations of the World urgently tackle climate change, major economic upheavals that will compound the current global meltdown will hit the world. He added that deserts are spreading, water scarcity is increasing, tropical forests are shrinking, our once prolific fisheries are in danger of collapse and that failure to combat Climate change will increase poverty and hardship, destabilize economies, breed insecurity in many countries and undermine our goals for sustainable development.

Similarly, in a special report, the Intergovernmental Panel on Climate Change (IPCC) discussed the regional impacts of climate change. The report assessed the vulnerability to change by all regions of the world. Africa in that report, stood out as the most vulnerable to climate change ostensibly because of poverty, recurrent draught and over dependence on rain- fed agriculture Regrettably, while most developed Nations of the World have put formidable mitigation and adaptation strategies in place to survive the impact of this threat, most African Nations are yet to come to terms with the reality of this scourge. Permit me not to delve into the challenges posed to the global fight against Climate change by lack of commitment by some developed Countries to cut down green house gas emissions in line with Kyoto protocol but suffice it to say that, developed nations have better adaptation capacity than developing Nations.

It is against this background that Lagos State government took the initiative to organize this summit aimed at raising public awareness

about Climate Change and the danger it poses to our continued existence on earth as well as developing appropriate mitigation and adaptation strategies.

The essence of the summit is to train the Trainers, which explain the composition of the delegates which is made up of top government functionaries- the Executive, Legislators and the Judiciary, Local Government Executives, management personnel in both public and private sectors who are expected to further spread the gospel in their various organizations and immediate environment.

It is expected that after this summit, concerted efforts will be put into further greening of the environment, proper waste disposal, recycling and reuse of waste in order to further create a more sustainable environment.

The 3 day summit has been structured to have robust plenary sessions, informed panel discussions and films show. It will x-ray the implication of Climate Change for food crisis, water supply, Energy supply and waste management. It will also explore the relationship between good governance and Climate Change as well as the health implications and the opportunities it offers.

You will all agree with me that these topics are well thought out and have implications for our continued existence on the earth and that is why I wish to urge all of us to be active participants at the 3 day event so as to take adequate advantage of this opportunity.

This summit has been organized with the assistance of a retired United Nations Consultant on Climate Change. As you might have observed from the programme, the resource persons are clearly the best brains on Climate Change assembled from across the globe. I have no doubt in my mind that with this caliber of brilliant and experienced resource persons, and the broad spectrum of participants, this summit will be a fruitful one and the communiqué that will come out of it will form a veritable blueprint for mitigating and adapting to the threat of climate change in Nigeria.

Finally, I wish to formally welcome all our invited guests to Lagos and wish you a happy stay.

Dr. Muiz Banire
Hon. Commissioner,
Ministry of the Environment.
24th March, 2009.

KEYNOTE ADDRESS

KEYNOTE ADDRESSS DELIVERED BY HIS EXCELLENCY, MR. BABATUNDE RAJI FASHOLA (SAN), GOVERNOR OF LAGOS STATE AT THE MAIDEN LAGOS SUMMIT ON CLIMATE CHANGE HELD AT EKO HOTELS & SUITES LAGOS, TUESDAY 24TH - THURSDAY 26TH MARCH, 2009

PROTOCOLS

The human family is at once confronted today with immense opportunities for greater progress and improvement as well as very real dangers to the survival of the specie on our vulnerable home – mother earth.

Advances in technology continually open new vistas of achievement for mankind but unpredictable changes in nature equally endanger human habitation on the planet. The reality of the threat of unsustainable development has become a major source of worry to all discerning minds the world over.

The 1992 United Nations Conference on Environment and Development in Rio, Brazil and the 2002 world summit on Sustainable Development in Johannesburg, South Africa, reflected growing global concern over environmental issues that have driven the need for more comprehensive and reliable environment information.

Declarations from both summits emphasized the need for sustainability and respect for precautionary principles to protect the environment while also calling for the development of appropriate indicators. This in my view is the essence of this summit.

Our economic, social, industrial and personal activities have no doubt impacted negatively on the ecosystem resulting in global warming and change in climatic condition of the world. Using Lagos State as a case study, a retrogressive glance at the climatic condition of the State over the past years, clearly reveal significant changes in weather, temperature, rainfall, wind and precipitation patterns.

Gone are the days when we could succinctly draw a line between the rainy season and dry season; gone are the days when harvest was predictable and bountiful; gone are the days when select species of certain fish were readily available on the menu table.

Sometime in 2007, one Robert Lazorba from Lagos wrote a most revealing letter, which was read on the British Broadcasting Corporation (BBC). In his words, “growing up in the 70’s I remember that the harmattan used to be cold. Not any more, the only thing you notice today is the stinging heating. The rains do not fall as easily as they used to. We once had the “7 days rain” when rain falls continually for 7 days. Now that too is gone. All we have is stinging heat. Even the air is still”.

Against this background, you all will agree with me that the theme for this summit “Reclaiming the Environment: Challenges and Consequences of Climate Change” is most apt and relevant.

This summit is a practical demonstration of the determination of our Administration to reclaim and safeguard our environment. Indeed, our Nation, Nigeria is obviously one of the most susceptible to the vagaries of global warming with desertification ravaging arable land in the North while the South also grapples with the effects of coastline erosion and flooding.

This precarious situation makes us vulnerable to food crisis, health hazards and deepening poverty and thus imposes on us the responsibility to take proactive remedial measures. Faced with these realities, my Administration is not leaving anything to chance given the peculiarities of Lagos as a coastal State and its vulnerability to flooding, a major effect of global warming.

These challenges informed the organization of this summit, which will empower participants with the awareness and knowledge to take the necessary messages back to their various States, Ministries, Local Government Areas and Organizations.

Local Governments in particular are hereby enjoined to organize their own local version of the summit where traditional rulers, artisans, market men and women and the civil society will be educated on the outcome of this summit.

The question now arises, what can we do to adapt to these climatic changes? What future do we bequeath to posterity and our children? What are the opportunities and the threats? The body of experts here assembled from across the globe will no doubt proffer valuable answers to these questions. On our part, we will treat suggestions and policy options emanating from this summit with utmost importance in our determination to continue to make issues of Environment a top priority.

In this regard, public awareness and enlightenment must be a cardinal priority. It has been observed that the level of public awareness about environmental issues and the need to protect it for sustainable living is very low. Even lower is public knowledge about climate change and available adaptation and mitigation measures. The awareness deficit on these critical specie-threatening issues must be urgently and decisively addressed.

The solution to reclaiming the environment is simple – we must change our attitude to the environment and re-order the use of nature's gift. The methodology requires everybody to be involved. The most potent weapon to achieve this is advocacy.

Equally critical is the need to mitigate the impact of green house gas emission through energy efficiency and conservation of resources. It is especially important to conserve energy in the form of electricity and fossil fuels. This is to minimize wastage and also reduce green house gas emission into the atmosphere. To have the greatest effect, energy efficiency should be factored into the whole city design including its urban layout, transport system, buildings and industrial facilities.

I believe strongly that we can still improve our energy efficiency by encouraging the use of BRT instead of clustering the roads with cars; reducing the use of air conditioners; relying more on fans or natural air instead and embracing low energy bulbs.

It is on this note that I wish to call on corporate organizations to pursue vigorously the use

of staff bus schemes to decongest our roads of private vehicles, reduce energy use and green house gas emission into the atmosphere and properly landscape and beautify their premises.

Another desirable strategy is to move towards clean and renewable energy like wind and solar power, which have a smaller carbon foot print. This administration has taken a lead in this regard through the Eko Solar Project. Through this initiative, the State Government has started replacing major street lights in the State with solar power.

I have already requested our University to start the process for establishing a degree programme to develop our capacity for training people in various techniques and skills for renewable energy development.

Needless to mention the importance of Tree Planting as a natural carbon sequester in mitigating the impact of Climate Change. In this regard, the State Government has perfected strategies to plant over 1 million trees before the end of this year. It has also institutionalized 14th July of every year as a Tree Planting day in the State.

In conclusion, I see a challenging and exciting journey ahead for reclaiming the environment and saving our planet. This challenge is no doubt daunting but the very survival of the human species depends on our surmounting it. All we need is the will to conquer. The secret lies in ceaseless innovations, building capabilities and the sharing of our expertise.

This summit offers a great opportunity for the meeting of minds and I trust that we will all reap the benefits of this mutual exchange of ideas. On this note, it is my honor and privilege to declare this summit open and wish you successful deliberations and a happy stay in Lagos

Eko o ni Baje o!

Babatunde Raji Fashola (SAN)
Governor of Lagos State
24th March, 2009

GOOD WILL MESSAGE AT THE LAGOS SUMMIT ON GLOBAL CLIMATE CHANGE MARCH 24, 2009

BY
ONNO RUHL
THE COUNTRY DIRECTOR, WORLD BANK, ABUJA NIGERIA

Protocol:

Your Excellency, the Governor of Lagos State
The Deputy Governor
Members of the State Executive Council
Members of the State Assembly and Judiciary
Your Royal Majesties
Members of the Diplomatic Corps
Friends of the Environment
Members of the Press
Distinguished Ladies and Gentlemen

Introduction: Climate Change poses of the greatest challenges to the very existence of life and living on planet earth! It is particularly precarious for Africa characterized by exceptionally high climate variability. Climate Change hits the poor hardest and soonest. It could have implications for vision 2020.

"Climate Change impacts directly on the World Bank's Mission of Poverty Reduction, and has the potential to hamper the achievement of many of the United Nations Millennium Development Goals, including those on poverty eradication, child morality, combating malaria and other diseases, and environmental sustainability. Climate Change is clearly not just an environmental issue but one with severe socioeconomic implications, particularly in developing countries. ".. Robert Zoellick

Meaning for Nigeria: desertification, drought, extreme temperature, natural disasters, deforestation, coastal erosion & flooding, lower agricultural productivity, water supply shortage, loss of arable land, proliferation of diseases. It is a serious threat to Vision 2020

What should Nigeria do? Nigeria is responsible for 30% of Green House Gas (GHG) emission of Africa! Nigeria should: develop national climate change action plan, embrace sustainable energy: by replacing diesel with gas, addressing gas flaring, solid waste management, transportation, water supply, drainage, agriculture, coastal erosion and flood control, leadership in Africa Copenhagen, December 2009.

Meaning for Lagos State. Lagos is also a contributor to GHG Emissions. However, Lagos is located in low lying area and is prone to increase risk of:

- Coastal Erosion
- Sea level rise and flooding
- Sea Water Intrusion
- Wetland Depletion
- Mangroves are endangered
- Millions of People would be flooded every year

What should Lagos State Do

Energy: Generation, Transmission and Distribution Efficiency

- Transportation: More fuel efficient vehicles
- Building: Efficient Lighting
- Flood: Resilient Building
- Industry: More efficient & Use of Electricity
- Waste Management: Landfill Methane Capture
- Coastal Defense and Drainage
- Climate Change Resilient Strategic Planning
- Provide Leadership in Nigeria
-

The World Bank's Role:

- Support adaptation and mitigation actions in country-led development processes.

- Mobilize additional concessional and innovative financing through market based instruments, private sector investment and the recently-launched Climate Investment Funds.

- The Bank is also aiming to accelerate the development and deployment of Climate friendly technologies, and foster new research, knowledge and capacity development for climate-smart development.

- The World Bank is undertaking a major study on the “Economics of Adaptation” which will help decision makers assess the risks posed by Climate Change, design better strategies to adapt, and understand the costs involved.

In Nigeria, current portfolio supports Vision 2020

In Lagos:

- LUTP Emission Reduction

LMDGP Methane Capture from Landfill Sites

Composting Project (Odogunyon, Ikorodu)

CPS 2 Green + Growth= Sustainable Development

Conclusion

The world is now certain to face temperature increases that will cause profound changes in weather across the globe. Climate change is much than an environmental issue – it is an immense development challenge because the poorest people are especially at risk (Ngozi Okonjo Iweala, 2008). It will be important for the government to address the issue of climate change in the development plan for Lagos.

Let me end with a plea for a sense of urgency in dealing with the “ultimate crisis” to development posed by climate change. Climate change is threat to Development. The good news is the World Bank is prepared to work with the Government of Lagos State on Climate Change mitigation and adaptation issues.

Thank you.

GOODWILL MESSAGE OF THE WHO COUNTRY REPRESENTATIVE, DR. PETER ERIKI, DELIVERED AT THE LAGOS STATE MAIDEN SUMMIT ON CLIMATE CHANGE ON 24TH MARCH 2009

Your Excellency, the Governor of Lagos State
Members of the Lagos State Executive Council hereby present
Members of the State House of Assembly present
Members of the Diplomatic Corps
My Lord Spiritual and Temporal
Members of the Press
Distinguished Ladies and Gentlemen:

The theme of the summit is apt at this time in our development since we need to work together to reclaim the environment for now and the future. From the air we breathe and the water we drink to the timber that provides us with materials for fuel and construction, and to fisheries that are the primary source of animal protein for a large proportion of the our population, the world's ecosystems are essential to human health wellbeing.

Nevertheless, human pressure on such ecosystems "services" has increased over the years. The sustainability of many vital ecosystems has been strained on many fronts, with varying health impacts-some direct, but most others indirect, involving complex ecological mechanisms. These global changes are synergistic. They constitute a new type of health challenge; one that transcends the traditional definitions of environmental health issues and that demands a recognition that the foundations of long-term good health-at the personal, community and population level-rely on the continued stability of life-supporting ecosystems.

Ladies and gentlemen; Health and environmental issues have been included in several high-level initiatives, including the United Nations Millennium Declaration. Only recently 28-29 August 2008, the African Ministers responsible for health and environment held an inter ministerial meeting resulting in what we now call the Libreville declaration.

The need to preserve the environment and promote health has figured among global policy priorities for the past three decades as evidenced by the holding of several summits on this subject. From the 1992 Rio de Janeiro Summit initiating the global process to control climate change, protect biodiversity and eliminate hazardous toxic products, to the 2002 World Summit on sustainable Development held in Johannesburg, providing as it were, the opportunity to take stock of, and complement, the programme launched at the Rio Summit.

Latest WHO estimates show that nearly a quarter of the global burden of disease is attributable to avoidable environmental factors. That is the sad truth! In addition, the burden of disease attribute to the environment is even more serious for developing countries, especially those in Africa, with the vulnerable and poor populations most hardly hit.

The persistence of malaria, a disease which is taking a very heavy toll on Nigerians, is caused largely by poor land use practices, deforestation, mis-management of water resources and the natural environment of humans, all through irrational land use and territorial planning.

For a place like Lagos, based on the high urbanization, I would also like to mention the growing risk of tuberculosis in highly overcrowded areas especially in slumps where poverty and disease are inextricably linked.

Distinguished Guests, Ladies and Gentlemen,

You are no doubt aware of the day-to-day sanitary conditions prevailing in public markets and in most of the eating places in our countries. The unhygienic conditions, coupled with the frequent lack of running water, have turned those places into hotbeds of microbial proliferation and contamination of foods sold to the large majority of the people. Schools where children spend a substantial part of their time are also in similar situations, with more schools lacking safe drinking water and adequate numbers of clean toilets. The real challenges we face today is that we as a people must do something to remedy such a situation.

We now live in world of unprecedented awaking of the consciousness of communities and civil society organizations in regard to environmental issues and their linkages to health. It is our believe that Governments must provide adequate response to the health problems caused by environmental risks.

WHO as an organization of the Member States, working with various agencies has tried, by initiating projects on healthy schools, healthy cities, healthy markets, healthy villages, and so on. Unfortunately, in mot cases, the projects remained at the pilot phase. May I use this opportunity to appeal to Government of Lagos State, Local Government Councils and communities to support these projects and replicate them countrywide.

The use of sources of energy is also another area where health and environment converge. The majority of the world populations still use biomass and charcoal for their energy needs, and that contributes to respiratory diseases such as lower respiratory-tract infections, chronic obstructive pulmonary disease and lung cancers which claim 1.5 million lives globally, every year, with the majority occurring in Africa.

In most part of Africa and perhaps in Lagos also, most people dwelling in rural areas or in slums use wood almost exclusively for cooking and heating. Children and the elderly are more vulnerable to the adverse impact of air pollution within households. The use of this low-quality and other similar fuels, coupled with poor ventilation, leads to high levels of indoor pollutants which are aggravating or contributory factors for diseases such as asthma, bronchitis, pneumonia, lung cancer and heart disease.

The mega city status of Lagos also means that a number of people are exposed to gas emission fro vehicles. The use of a large number of second-hand cars and motor cycles that have a high capacity for exhaust gas emission and fail to meet new environmental protection standards is a major cause of concern considering the high degree of pollution occurring especially in our cities.

Climate change, another new challenge, is a very topical issue today. It is neither a mere figment of the imagination nor an abstract subject. In contrast, it is a real issue of concern because we are already experiencing its effects, specifically its adverse impact. Climate variability actually finds expression in occurrences of storms, flooding, drought with attendant destruction of infrastructures, dysfunction of health services and disorganization of agricultural production. That has led to significant reduction of the availability and the quality of food commodities. That, in turn, exerts a direct impact on the nutritional status of the population and aggravates morbidity and mortality.

In the light of the numerous challenges, old and new, national health systems must strengthen their capacities and participate actively in assessing new risks and providing response. That would require actions including advocacy, continuing political commitment to sustainable development, continuing assessment of the environmental risks to human health, disease surveillance, institutional and human capacity building, establishment of mechanisms of close collaboration between the health sector and the environment sector, development of integrated policies especially policies focused on actions for ecosystems that are more conducive to human health.

Distinguished Guests, Ladies and Gentlemen,

We in WHO are convinced that this effort by Lagos State Government is a commitment to initiate changes both in the development of policy and institutional frameworks and in making investments to reduce risks to health and environment and thereby promote sustainable development.

WHO stand ready as always to continue to work with Lagos State Government, other national authorities at all levels and other stakeholders in improving our environment for healthy living and sustainable development.

Distinguished ladies and gentlemen I wish you fruitful deliberations and I thank you all for your attention.

GOODWILL MESSAGE BY THE BRITISH COUNCIL AT THE LAGOS SUMMIT ON CLIMATE CHANGE

Her Excellency, Mrs. Sarah Sosan, the Deputy Governor of Lagos State
Her Excellency, Mrs. Raji Fashola, the wife of the Governor of Lagos State
Deputy Speaker of the House of Assembly
Dr. Muiz Banire, Honourable Commissioner of the Environment
Distinguished Ladies and Gentlemen

The British Council is the United Kingdom's international Organisation for educational opportunities and cultural relations. We operate in 220 towns and cities, 109 countries and territories worldwide. In Nigeria, we operate in Lagos, Abuja, Kano, and Port Harcourt.

The British Council focuses on building long-term relationships in the fields of arts, education, creativity, governance, leadership, and economic empowerment. These relationships are based on trust, mutual understanding and respect. The British Council in Nigeria works in three key programme areas:

- Creative Knowledge Economy
- Intercultural Dialogue
- Climate Change

Climate Change
The climate system is undergoing changes that are unprecedented and these are being driven by the increasing concentrations of green house gases in the atmosphere. We are now in a unique position to categorically state that human activity is the prime driver of these changes through our emission of GHGs and land-use change. Through a rigorous programme of international scientific activity we are, with a high degree of confidence, able to understand what the future changes in the climate system are likely to be as a result of increases in atmospheric GHG emissions and subsequent atmospheric concentrations.

We are already starting to observe the changes and feel the impacts of climate change through increasing global temperature, rising sea level and the changing nature and frequency of extreme weather events. Climate change is by its very nature pervasive and will impact upon all sectors of the global society, economy and environment.

In answer to this, the British Council has created and will deliver an excellent strategic portfolio of programmes at a global scale, which will build trust and influence through successful partnerships, which will strengthen cultural relations throughout the world. Climate Security is one of the three main aims of the British Council.

Its outcomes are to:

- Increase understanding of the case for tackling climate change
- Increase support for the achievement and implementation of international

agreements that address the threats of climate change

- Strengthen relationships and networks which lead to action on climate change mitigation and adaptation

By using our extensive international networks to develop a range of perspectives, we will help to increase the understanding of climate change issues, leading to consensus building about climate actions and solutions.
There are currently seven British Global products within Climate Security

- International Climate Champion (ICC) programme
- Challenge Europe
- Climate Cool East Asia
- Low Carbon Future, India and Sri Lanka
- Climate Cool China
- Climate Watch Brazil ' De Olho No Clima'
- Cape Farewell Canada

British Council Climate Change Programmes in Nigeria

International Climate Champions Programme
Climate security is a strategic priority for the British Council and central to this is the International Climate Champion (ICC) programme. With in-country partners, the British Council has initially set up ICC programmes in each of the G8+5 countries where BC is present.

Climate change affects everyone but it is young people who will inherit the impacts of climate change for many decades to come. The ICC initiative involves young people as they are highly effective agents of change, be it in their schools, homes, or communities. They are a persuasive global generation, can network very effectively, and are skilled at engaging the media and key decision makers.

The project aims to change the level of understanding and awareness of the challenge of climate change among young people. It hopes to do this by engaging people through activities and websites, creating a long-term global network of champions who have multi-lateral relationships, and influencing international agreements on climate change.

The purpose of the climate Champions programme is to find and help talented young people to communicate about climate change to their peers, the public and key decision-makers directly and via the media so that more positive actions to tackle climate change are taken.

Climate and Cities
This is focused on raising awareness about climate-based issues in key cities in SSA. The key areas of activity in this theme will be to look at different cities and

- How these cities could become sustainable
- How they become models for change
- How simple solutions could be applied to make quick impact
- How architects and designers can develop green solutions

In SSA we are planning to work in 10 cities and will be building on alliance with different stakeholders groups.

Policy Dialogue

This will involve a series of publications, policy forums and discussion on the key themes emerging from the research into climate and attitudes. The aim is to be able to demonstrate our credibility through leveraging our networks and to sharpen policy debate.

The climate champions will be key within this process supporting policy engagement and contributing to the publications – they are central to all our work.

BBC Research and Climate in SSA

Last year the British Council Commissioned research through BBC WST to conduct the first ever pan African survey of climate attitudes. This work will consist of three elements,

- An in country survey in 10 dedicated countries leading to a national media report and follow up discussion
- The first ever pan African report of climate attitudes in 10 countries for wider distribution.
- An on line and print publication

The BBC research will help to identify key areas that British council work will focus on and to understand the cultural dynamics on the issue of Climate Change in different areas and countries in sub –Saharan Africa.

Why is Climate Change an important issue in Nigeria

As one the most populated country in Africa with over 140 million people. Nigeria could be one of the most vulnerable countries to climate change variability and changes. Several indicators of variables that increase green –houses gases (major cause of climate change) are also very common at high volume in the country.

Tackling the cause of climate change, its impacts and implementing the necessary adaptation strategies requires multi-lateral action to deliver sustainable solutions at the global and local scale through cultural relations. Our Climate Programme will deliver global products that are applicable at all scales whilst at the same time delivering through cultural relations meaningful and measurable changes to individuals and communities. The Programme will help support the range of national activities and negotiations that are tackling the challenges that climate change poses.

Climate change will impact upon all sectors of society, economy and the environment; however it is the poor and vulnerable who suffer the worst effects. There is a need to

ensure that their needs are understood and that through our actions.

We can deliver firm measures that will lead to a greater understanding of the risks posed by climate change and implement the required adaptation solutions.

Our programme will not lobby and campaign through activism, it will champion and advocate sustainable adaptation and mitigations to address climate change through engagement with young people across globe.

Thanks for listening.

LAGOS STATE MAIDEN CLIMATE CHANGE SUMMIT

COMMUNIQUE

PREAMBLE

The First Lagos State Summit on Climate Change was organized by the State Ministry of the Environment at the Eko Hotels and Suites, Lagos, from 24 – 26 March 2009. The Summit was attended by over 700 participants drawn from various stakeholder groups in both the public and private sectors, including members of the Lagos State House of Assembly, Honourable Commissioners and Special Advisers, Ambassadors, members of National Assembly, Permanent Secretaries and Directors of various Ministries in the State, Local Government Chairmen and other Local Government functionaries, traditional leaders, academia, development partners, international and national experts as well as representatives of non-governmental organizations, the media, as well as men of the corporate world.

The Honourable Commissioner for the Environment, Dr. Muiz Adeyemi Banire, hosted the Summit. The Summit is part of the Government's overall vision of steering Lagos State on the path of sustainable development. The goal of the Summit was to raise public awareness as well as train the trainers on issues of Climate Change and the danger it poses to human development. The Summit also provided a good platform for national and international experts to exchange ideas on best practices in mitigation and adaptation measures to address the challenge of Climate Change, essentially also to agree on joint action by all and sundry.

OPENING CEREMONY

The opening ceremony was performed by the Governor of the State, Mr. Babatunde Raji Fashola (SAN), who was ably represented by the Deputy Governor, Princess Adebisi Sarah Sosan. In attendance were some members of the State House of Assembly, State Honourable Commissioners and Special Advisers, Her Excellency, the First Lady of the State, Mrs. Abimbola Fashola and members of her entourage, the Country Representative of the World Bank who also represented the UN Resident Coordinator in Nigeria, the Country Representative of the World Health Organization, the British Council and the Clinton Foundation.

His Excellency the Governor of Lagos State Mr. Babatunde Fashola (SAN) in his remarks at the Dinner reception he hosted for participants expressed the State Government's satisfaction with the success of the maiden summit and challenged the Ministry of the Environment to ensure the continuity on an annual basis of such summit as well as full implementation of all the outcome of the summit, particularly proposed mitigation and adaptation strategies for climate change impacts in the State.

The Honourable Commissioner for the Environment presented the welcome address. This was followed by goodwill messages by the Country Director of the World Bank in Nigeria,

Mr. Onno Ruhl, Representatives of the World Health Organization, the British Council and the Clinton Foundation (represented by the Country Director, Dr. Owen Wiwa). The Permanent Secretary of the Ministry of the Environment, Dr. (Mrs.) Titi Anibaba gave the vote of thanks.

PLENARY SESSIONS

The Summit had ten Plenary Sessions during which papers were presented and Panel Discussions were held on the following themes:

i. Global Climate Change Overview: Challenges and Prospects.
ii. Governance and Climate Change
iii. Climate Change and Public Health
iv. Climate Change, Sea Level Rise and Coastal Adaptation
v. Climate Change and Food Security
vi. Climate Change and Energy
vii. Climate Change and Waste Management
viii. Climate Change and Urban Development
ix. Climate Change and the Imperative of Adaptation
x. Partnership in Climate Change Adaptation: Prospects for a German (Bavarian) - Lagos State Collaboration

OBSERVATIONS

The Summit made many observations, including but not limited to the following:

i. Climate change is a reality, with a high potential to lead to social and economic crises and derail Lagos State's efforts at achieving its ten-point agenda, if no appropriate action is taken.
ii. Climate Change is adversely affecting everybody and every sector of development in Lagos State to varying degrees through increasing variability in the security of water supplies, increasing risk to existing infrastructure, adverse health effects, and increasing threat to ecosystems and coastal development. In general, the poor, children, women and the elderly are likely to be most vulnerable.
iii. Global warming-induced sea level rise is having serious negative consequences on coastal cities and settlements in the State.
iv. Rapid urbanization in Nigeria is a major contributor to Climate Change and its impacts. The situation has been worsened in the past by poor urban governance, outdated plans and lack of long-term planning horizon. However, the situation is now changing for the better in Lagos State.
v. Inadequate implementation of Agenda 21 in the country has worsened environmental degradation, making Lagos State more vulnerable to the adverse effects of Climate Change.
vi. There is limited investment in multi-disciplinary research identification, assessment, understanding and modeling resulting in lack of data on Climate Change and its impacts in the country.
vii. Existing policies, programmes, actions and measures are insufficient to meet the level of risk posed by Climate Change.
viii. Nigeria is responsible for 13% of the gas flaring going on in the world. This is equal to 23billion cubic metres /year of flared gas, which is sufficient to meet Nigeria's energy needs, leaving a healthy balance for export.
ix. Much of the waste generated in Nigeria is either burnt or left to rot, and this constitutes a significant source of the country's contribution to greenhouse gases

(GHGs), particularly methane. However, Lagos State Government has taken giant strides in the area of sustainable waste management (e.g. daily conversion of 750 metric tonnes to 200 bags of compost, plastic conversion and paper bailing to attain 12% of the zero waste initiative, and development of eco-friendly integrated landfills) to reduce GHG emissions from waste.

X. In the face of more frequent and intense extreme weather events that will be associated with Climate Change, there is inadequate emergency preparedness and response plans for disaster risk reduction.

xi. There is a weak national technical capacity, lack of appropriate institutional framework and governance instruments to utilize opportunities of accessing global funds available for mitigation (e.g. Carbon Emission Reduction) and adaptation projects and programmes.

xii. Much of our national development process is energy-inefficient and is too dependent on technologies that are not climate friendly.

xiii. The insufficiency and epileptic nature of energy supply due to the over-centralization and inefficiency of the sector is responsible for the proliferation of carbon-emitting generating sets.

xiv. Poor implementation of agricultural policies and food security initiatives causing food insecurity which may be exacerbated by impacts of Climate Change.

xv. The most effective way to address climate change is to adopt a sustainable development pathway that shifts our development process to environmentally sustainable technologies and promotes energy efficiency, renewable energy, bio-diversity (particularly forest, conservation), reforestation, water conservation, etc.

xvi. Tackling climate change will require a combination of mitigation and adaptation measures that should involve the participation of all stakeholders, including public and private sector operators, academia, local and international communities and civil society.

Summit delegates noted and commended the Lagos State Government for the numerous ways it is already changing the environment of the State for the better and for enabling Lagosians to live and work more sustainably. It however agreed that more needs to be done. In this regard, participants see a number of challenges and opportunities. The challenges include:

- Increasing and intensifying awareness about climate change to the grassroots;
- Promoting and sustaining reduction of greenhouse gas emission;
- Increasing community resilience to the impacts of a changing climate;
- Ensuring that the State transits to a “low-carbon” or “green” economy in order to capture the opportunities that will emerge.

The opportunities identified include:

- Developing adaptation strategies, including indigenous knowledge and diverse livelihood support systems for coping with climate change impacts in the State.
- Channelling the entrepreneurial capacity of Lagosians to drive emission reductions through the global market and capture opportunities that offer both financial and environmental dividends;
- Development, deployment and marketing of climate-friendly technologies in the State’s massive urban renewal programme to ensure that its major cities and

infrastructure are resilient to climate change.

RECOMMENDATIONS

The Summit made the following recommendations:

i. Lagos State should develop a State Climate Change Action Plan with a clear and ambitious vision of the future to drive the major changes that will be necessary to combat change in climate.

ii. Government should partner with and support the private sector to encourage them to capitalize on the opportunities under Climate Change mitigation and adaptation options to transit to the low carbon (green) economy.

iii. The State approach to climate change should integrate closely with national actions and promote progressive and forward-looking, growth-oriented policies tailored to the State's specific development needs.

iv. All levels of government in the State should be actively involved in raising awareness of actions that Lagosians can take to combat adverse impacts of Climate Change. The State Government should intensify climate change awareness programmes for all local governments in the State.

v. The State Government should establish and fund mechanisms for research and studies on climate change and its impacts on all sectors of Lagos State economy in order to provide required data and knowledge to drive intervention strategies. Such shall include partnering with private sector and research institutions as appropriate.

vi. The State government should embark on upgrading existing, and installation of up-to-date real-time weather monitoring, prediction instruments and early warning systems for the State.

vii. The State Government should institutionalize a comprehensive assessment of the impact of Climate Change on its development activities;

viii. The State Government should build capacity to take advantage of the opportunities provided in climate change mitigation and adaptation, particularly in the energy, service, building and transportation sectors, financial services and water sector.

ix. The state Government should initiate steps to incorporate climate change issues in schools curricula at all levels particularly for children and adolescence.

x. The State government should collaborate with international partners for technology transfer on climate change, mitigation and adaptive strategies.

xi. The State should develop and implement an energy policy in which a substantial part of electricity is from renewable sources, especially solar, wind and biogas from waste;

xii. There should be the deregulation of electricity distribution in the country to allow both States and the private sector to participate;

xiii. The State Government should intensify its efforts in promoting emission reductions in the transport sector, including encouraging improvements in vehicle fuel efficiency and more use of public transport. The BRT system should be expanded to cope with increased demand and promote further emission reduction. xiv. T h e State Government should intensify its eco-friendly and "green" waste management technological approach and support the private sector for similar initiatives. Appropriate policies should be put in place to drive these initiatives and to move towards zero waste.

xv. The State Government should initiate energy efficient buildings and greenhousing

tenets and codes in the housing sector of the State.

xvi. Planning across the State and in every development sector should integrate appropriate measures that would make communities more resilient to Climate Change-induced extreme weather events.

xvii. The State government should establish appropriate funding mechanisms including adequate budgetary provisions annually for the implementation of the State climate change action plans.

xviii. The State Government should work with the Federal Government to champion the African cause at the forthcoming UN Climate Change Conference (COP 15) holding in Copenhagen, Denmark, in December 2009.

xix. The State Government should strengthen its on-going collaboration with international organizations (e.g. InWEnt in Bavaria, Germany for capacity building to manage Climate Change, and facilitating the establishment of a Centre for Renewable Energy, etc.) and work with development partners in Nigeria (e.g. UNDP, World Bank, AfDB, DFID, British Council etc.) to develop and implement community-based mitigation and adaptation projects to tackle Climate Change and sustain people's livelihoods.

xx. Lagos State Government should work with development partners (e.g. UNDP, World Bank, DFID, British Council etc.) to develop and implement community-based mitigation and adaptation projects to tackle Climate Change and sustain people's livelihoods;

xxi. The Climate Change Summit should hold annually to evaluate progress made in the implementation of its Action Plan and, in view of its importance, Local Governments are encouraged to replicate it;

APPRECIATION

The Summit delegates hereby wish to express their appreciation to the Governor of Lagos State, Mr. Babatunde Raji Fashola (SAN) for the total support which he gave to the State Ministry of the Environment towards the organization of the Summit, and for hosting one of the Summit's dinners. Delegates also thank the management of Eko Hotels & Suites, Lagos and Messrs Elizabeth R for providing excellent facilities for the Summit. Special thanks go to members of the Press for the good coverage, which they have given of the Summit.

PHOTO GALLERY

HIS EXCELLENCY, MR. BABATUNDE RAJI FASHOLA (SAN)
IN GROUP PICTURE WITH SPEAKERS AND RESOURCE PERSONS

L-R: HC,DR MUIZ BANIRE; HER EXCELLENCIES D.G. PRINCESS SARAH SOSAN
AND MRS. ABIMBOLA FASHOLA DURING THE OPENING CERMONY

LAGOS CULTURAL TROUPE TREATING THE PARTICIPANTS TO
SOME CULTURAL PERFORMANCES

SOME OF THE RESOURCE PERSONS DURING ONE OF THE SESSIONS

SOME OF THE RESOURCE PERSONS DURING A SESSION

PANELIST, DISCUSSANTS AND RESOURCE PERSONS
AT THE END OF A PLENARY SESSION

PARTICIPANTS LISTENING TO A LECTURE WITH RAPT ATTENTION

HE, MR. BABATUNDE RAJI FASHOLA SAN PRESENTING A GIFT TO
JACOB KUMARESAN WITH THEM IS DR MUIZ BANIRE.

RESOURCE PERSONS ADMIRING AND APPRECIATING THE GIFTS

PHOTO GALLERY

CROSS SECTION OF PARTICIPANTS AT THE SUMMIT

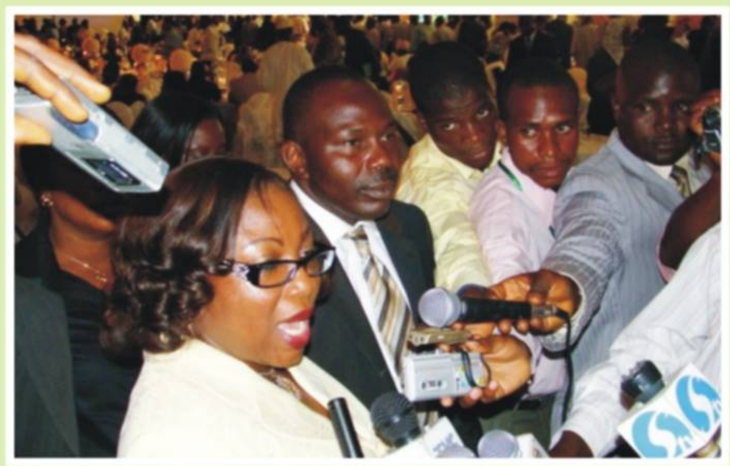
CROSS SECTION OF PARTICIPANTS AT THE SUMMIT

CROSS SECTION OF PARTICIPANTS AT THE SUMMIT

SPECIAL ADVISER TO H E. ON THE ENVIRONMENT
HON. SESAN OLANREWAJU AND HON COMM. FOR HOME AFFAIRS
& CULTURE MR. BABATUNDE BALOGUN

L-R: PERM. SEC., DR. (MRS.) MRS. TITI ANIBABA
AND PROF. ADEMOLA SALAU

H.E MRS ABIMBOLA FASHOLA H.C ENV. DR MUIZ BANIRE
& H.C ECONOMY PLANNING & BUDGET MR BEN AKABUEZE



H.E DG PRINCESS SARAH ADEBISI SOSAN
AND DR MUIZ BANIRE AT A SESSION WITH THE PRESS

DR MUIZ BANIRE DURING AN INTERVIEW WITH PRESS

CROSS SECTION OF PARTICIPANTS AT THE SUMMIT

PROGRAMMES SCHEDULE

LAGOS STATE SUMMIT ON CLIMATE CHANGE

LAGOS STATE MAIDEN SUMMIT ON CLIMATE CHANGE

RECLAIMING THE ENVIRONMENT:

Challenges and consequences of Climate Change

23RD – 26TH MARCH 2009

DAY ONE	Time	Activity/Topic	Responsibility/Speaker
Monday, 23rd March 2009	12.00- 18.00	Arrival of participants & Check-in	Secretariat

DAY TWO	Time	Activity/Topic	Responsibility/Speaker
Tuesday, 24th March 2009	08.00 - 09.00	Arrival and Registration	Secretariat
	09.00 - 09.15	Participants seated	Secretariat
	09.15 - 09.30	Introduction of Special Guests	MC/Moderator/Chairman
	09.30 - 09.45 10.00	Arrival of the Governor and National Anthem Opening Prayer	MC/Moderator/Chairman
	10.05	Welcome Address	Honourable Commissioner for the Environment **Dr. Muiz Banire**
	10.15 - 10.30	**Film Show :** "On the Trail of a Storm Surge"	
	10.30 - 11.00	**Goodwill Messages** - UNDP - World Bank - WHO - British Council - Clinton Foundation	
	11.00 - 11.30	**Keynote Address and Formal Opening of the Summit**	The Governor of Lagos State, **His Excellency,** **Mr. Babatunde** **Raji Fashola** (SAN)

DAY TWO	Time	Activity/Topic	Responsibility/Speaker
Tuesday, 24th March 2009	11.30 – 11.35	**Vote of Thanks**	Permanent Secretary, Ministry of the Environment **Dr. (Mrs.) Titi Anibaba**
	11.35 – 11.40	**TEA/COFFEE BREAK**	
		PANEL 1: CLIMATE CHANGE OVERVIEW	
	11.40 – 12.10	**Global Climate Change:** Challenges and Prospects	**Prof. Ogunlade Davidson**, (Vice-Chairman, IPCC & Dean, School of Graduate Studies, University of Sierra Leone,)
	12.10 – 12.30	**Discussion Panel** (2 members @10 mins. each) Moderator:	**Dr. Jerome Weingart,** CEO Jerome Weingart & Associates, Arlington, Virginia, USA **Prof. Emmanuel Oladipo** (Regional Coordinator, IEM Project Niamey, Niger) **Mr. Ben Akabueze** Honourable Commissioner for Economic Planning and Budget
	12.30 – 13.00	**Questions and Comments**	**Moderator**
	13.00 – 14.30	**LUNCH**	GROUP LUNCH
		PANEL 2: GOVERNANCE AND CLIMATE CHANGE	
	14.30 – 15.20	Governance, Environmental Sustainability and Climate Change (20 mins each) Climate Change and Environmental Sustainability	**Prof. Babajide Alo,** Head of Department of Chemistry, University of Lagos, Akoka, Lagos **Wendy Aulakh**, is Director of Registry and Client Services, American Carbon Registry™, Winrock International
	15.20 -15.40	**Discussion panel (@10 mins max. each)** **Moderator:**	**Prof. D.O. Adefolalu,** Center for Climate Change, Federal University of Technology, Minna **Mr. Paul Kirai,** Executive Director, ECM Centre, Nairobi, Kenya **Rotimi Oyekan**, Honourable Commissioner for Finance

DAY TWO	Time	Activity/Topic	Responsibility/Speaker
Tuesday, 24th March 2009	15.40– 16.20	**Questions and Comments**	**Moderator**
	16.25– 17.00	**Film Show**	**Secretariat (PR UNIT)**
	18.00 – 21.30	**Conference Dinner**	**Invited Guests, All participants**
		CLOSURE/END OF DAY TWO	Secretariat

DAY THREE	Time	Activity/Topic	Responsibility/Speaker
		PANEL 3	
Wednesday, 25th March 2009	09.30-10.25	Climate Change and Public Health – 2 Panelists (20 mins. each)	**Dr. Jacob Kumaresan**, Director, WHO Centre for Health Development, Tokyo, Japan **Prof. Akinyinka Omigbodun**. Provost, College of Medicine, University of Ibadan
	10.25-10.35	**Discussion panel** (@ 10 mins each) Moderator	**Prof. T. Ologunorisa**, Centre for Climate Change, Oshun State University, Oshogbo **Dr. Jide Idris,** Honourable Commissioner for Health
	10.35-11.00	**Panel 4: Climate Change, Sea Level Rise and Coastal Adaptation**	**Dr. Larry Awosika**, Nigerian Institute of Oceanography and Marine Research
	11.00-11.20	**Discussion panel** (@(10 mins each) Moderator:	**Prof. Kingsley Ologe**, Ivepact Consult, Abuja, Nigeria **Dr. Amos Abu**, World Bank, Abuja **T.P.L. Fransisco Abosede** Honourable Commissioner for Physical Planning and Urban Development
	11.20 – 11.50	Questions and Comments	Moderator Secretariat
	11.50 – 12.10	**TEA/COFFEE**	

DAY THREE	Time	Activity/Topic	Responsibility/Speaker
Wednesday, 25th March 2009	**Panel 5: Climate Change and Food Security (20 mins each panellist)**		
	12.10 – 12.50	**Climate Change and Food Security:** **Climate Change, Food Security and Forestry:** Prospects for REDD	**Prof. Tomakazu Koshiba**, Tokyo Metropolitan University **Prof. Niyi Osuntogun,** (FEDDEN) **Stephen Mutimba**, ESDA, Nairobi, Kenya
	12.50 – 13.10	**Discussion panel** (@(10 mins max. Each) **Working Paper on Climate Change & Food Security** **Moderator:**	**Mr. Turhan Saleh**, UNDP Country Director, Abuja **Prof. D. O. Adefolalu** **Prof. Francis Bisong**, University of Calabar, Calabar **Mr. Yemi Cardozo**
	13.10 – 13.50	**Questions and Answers**	**Moderator**
	13.50 – 14.50	**LUNCH**	Group Lunch
	PANEL 6: CLIMATE CHANGE AND ENERGY		
	14.50 - 15.30	**Climate Change and Energy:** Issues and prospects for sustainable development in Africa **Climate Change and Energy:** Issues and prospects for sustainable development in Nigeria	**Prof.Ogunlade Davidson**, (Vice-Chairman, IPCC & Dean, School of Graduate Studies, University of Sierra Leone,) **Prof. Anthony Adegbulugbe**, (former special adviser to President Obasanjo on Energy & Triple E, Abuja, Nigeria)

DAY THREE	Time	Activity/Topic	Responsibility/Speaker
Wednesday, 25th March 2009	15.30 - 15.50	**Discussion Panel** (@10 mins max. each) **Moderator:**	**Mr. Ewah Otu Eleri**, ICEED, Abuja **Dr. Jerome Weingart**, CEO Jerome Weingart & Associates, Arlington, Virginia, USA **Jide Sanwo-Olu**, Honourable Commissioner for Establish-ment and Training
		PANEL 7: CLIMATE CHANGE & WASTE MANAGEMENT	
	15.50 - 16.30	**Climate Change and Waste Management** – **3** Panelists	**Prof. M.K.C. Sridhar**, University of Ibadan & Niger Delta University
		Discussion panel (@10 mins max.) **Moderator:**	**Prof. Ayite-Lo Ajavon**, University du Benin, Lome, Togo **Mr. Ola Oresanya**, MD, LAWMA **Princess Sarah Sosan**, The Deputy Governor of Lagos State.
	16.30 – 17.00	**Questions and Comments**	**Moderator**
	18.00 – 21.30	**Governor's Reception**	Invited Guests, All participants
		CLOSURE/END OF DAY THREE	Secretariat

DAY FOUR	Time	Activity/Topic	Responsibility/Speaker
Thursday, 26th March 2009	**PANEL 8: CLIMATE CHANGE AND URBAN DEVELOPMENT**		
	09.00 – 10.00	**Climate Change, Urban Planning and Sustainability of the urban built environment**	**Prof. Johnson Falade**, UN Habitat, Abuja, Nigeria
		Discussion Panel (10 mins each)	**Mr. Turhan Saleh**, UNDP Country Director, Abuja **Steve Thorne**, SouthsouthNorth, Cape Town, South Africa
		Moderator:	**Dr. K. Hamzat,** Honourable Commissioner for Science and Technology
	10.00 – 10.20	**Questions and Answers**	Moderator
	PANEL 9: CLIMATE CHANGE AND THE IMPERATIVE FOR ADAPTATION		
	10.30– 11.30	**Climate Change and Adaptation:** integrating adaptation to climate change in national development	**Prof. Ademola Salau** (former UNDP/GEF Team Leader and Technical Advisor on Climate Change for Africa)
		Discussion panel (@10mins each)	**Dr. E. Nzegbile**, NEST, Ibadan **Mr. Opeifa Kayode Isiak** Special Adviser on Transportation to Lagos State Governor
		Moderator:	
	11.30-12.00	**Questions and Answers**	Moderator
	12.00-12.15	**TEA/COFFEE Break**	

DAY FOUR	Time	Activity/Topic	Responsibility/Speaker
Thursday, 26th March 2009	**PANEL 10 : PARTNERSHIP IN A WORLD OF CLIMATE CHANGE: PROSPECTS FOR A GERMANY-LAGOS STATE COLLABORATION**		
	12.15 – 13.00	**Climate Change and its agricultural &hydrological impacts for West Africa: challenges and opportunities for a German-Nigerian collaboration.**	**Dr. Patrick Laux**, Institute of Meteorology and Climate Research Garmisch, Germany.
		Climate change awareness and capacity building for sustainable development: The German case study	**Dr. Karl-Heinz Koehler**, UNESCO Coordinator for School, Germany
		Decentralized renewable energy in Germany: prospect for collaboration with the Lagos State	**Prof. Ernst Schrimpff**, President of Bavarian Solar Energy Association Munich, Germany
	13.00-13.20	**Discussion panel and the road map for German-Nigerian collaboration** **Moderator:**	**Dr. F. Kayode Salau**, Senior Project Manager, InWEnt Regional Centre of Bavaria/Munich, Germany **Mr. Ade Ipaye**, Special Adviser on Taxation to Lagos State Governor
	13.20 – 13.50	**Questions and Answers**	**Moderator**
	13.50 – 15.00	**LUNCH** (to give room for rapporteurs to put the Draft Communique together)	
	15.00 – 1600	**General Discussion on follow up initiatives to the Summit** – e.g. need to have a State Plan of Action, follow-up regional Summit	**Facilitators** (Profs. Salau, & Alo,)
	16.00 – 17.00	**Deliberation and Communique**	
	17.00 – 17.10	Vote of Thanks	**Dr.(Mrs) Titi Anibaba**, Permanent Secretary, Ministry of the Environment
	17.10-17.15	Closure of Summit	Honourable Commissioner for Environment, **Dr. Muiz Banire**

Rapporteurs

Prof. E. O. Oladipo (Chief)
Prof. K. O. Ologe
Mr. Maximus Ugwuoke
Mr. K. S. A Lasisi
Mrs. T. Jeje
Mr. C. S. Ayetowo

SPEAKERS' PROFILE

SPEAKERS' PROFILE

Jerome Weingart

Jerome Weingart is a physicist by training, a consultant in private practice, and is associated with several international development NGOs in the Washington DC area. He is former Regents' Professor at UC Berkeley and led the renewable energy program at IIASA in the mid-1970s. He is a graduate of MIT (SB) and Brandeis University (MA, PhD) in physics. Since 1970 his work has been at the nexus of renewable energy, sustainable rural development, and poverty alleviation in assignments for UNDP, the UN Foundation, the World Bank, Asian Development Bank (ADB), USAID, and the private sector.

In the early 1990s he worked with UNDP headquarters in the design of the Global Environment Facility (GEF) program approaches and prepared the first UNDP guidebook for GEF project development. For UNDP/GEF RBA in the mid-1990s he advised and supported the Government of Ghana in the development of the Rural Energy Services Project (RESPRO), a project that has evolved into a national program to provide off-grid communities and enterprises with low-carbon renewable energy-based electricity services. In 2007 he led an assessment of the UNDP/GEF project on overcoming barriers to commercialization of renewable energy technologies in China. With support of the UN Foundation, ADB, and USAID he has been exploring the role of biofuels in international and rural development and the complex social, environmental, and strategic impacts of large-scale biofuels production and use.

He is currently completing a collaborative assessment of the potential role of the Programmatic CDM in facilitating the scale-up and widespread dissemination of small-scale renewable energy initiatives, especially for rural Africa and Asia. The applications include clean biomass-based modern fuels and improved cookstoves, decentralized use of PV-powered high-efficiency lighting (CFLs and LEDs), biogas digesters, and biopowered sources of mechanical energy (e.g., the UNDP-supported multi-function platform).

Steven Thorne

Stephen Thorne holds undergraduate degrees in Chemistry and Chemical Engineering, a Masters Degree in Energy Studies and is currently registered for a PhD in cleaner energy technology receptivity.

Stephen is a co-founder and Director of the SouthSouthNorth Group (SSN), which addresses the challenges of climate change and poverty in the sub-Saharan African countries. Stephen is also extensively involved in energy policy research and advocacy and in the design of mitigation projects mainly solar energy projects in Sub-Saharan Africa.

He currently serves, as an desk reviewer for the United Nations Framework Convention on Climate Change (UNFCCC); a Technical Advisor for the Gold Standard; a Board Member for Sustainable Energy Africa (SEA); and member of a closed corporation, Energy Transformations, which provides consultant services to corporate entities on cleaner energy projects.

Dr Pak Sum Low

Dr Pak Sum Low is an Adjunct Professor at the Mirvac School of Sustainable Development, Bond University, Australia. He has just completed a five-month special assignment with UNDP-Vietnam as an International Expert in the Natural Disaster Mitigation Partnership (NDMP) Secretariat based in the Ministry of Agriculture and Rural Development (MARD). He previously worked in the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in Bangkok, first as Regional Adviser on Environment and Sustainable Development (June 2001-December 2007), then as Senior Economic Affairs Officer in the Energy Resource Section, Environment and Sustainable Development Division (March-June 2008). In the past seven and a half years, he has provided technical and policy advisory services on issues relating to environment and sustainable development to over 30 countries in the Asia-Pacific region during more than 90 missions, including the development of projects for funding from the Global Environment Facility (GEF).

Dr Low has also worked in the United Nations Environment Programme (UNEP) (1991-1999) in Nairobi; the Climatic Research Unit, University of East Anglia, Norwich, UK (1988-1991); the Institute of Applied Physical Chemistry (1987-1988) and the Institute for Atmospheric Chemistry (1986-1987) at the Nuclear Research Centre, Jülich, Germany. He was a consultant for the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat (July-December 1999 and April 2000) and the United Nations Convention to Combat Desertification (UNCCD) Secretariat (May 2000; January-February 2008), both based in Bonn, Germany. He visited the Department of Atmospheric Chemistry, Max-Planck Institute for Chemistry, Mainz, Germany, from January to March in 2000.

Dr Low has published research papers in Atmospheric Environment, Journal of Geophysical Research – Atmospheres, Geophysical Research Letters, and The Science of the Total Environment. He has edited a book, Climate Change and Africa, published by Cambridge University Press, UK, in August 2005 (http://www.cambridge.org/us/0521836344).

Currently, he is editing another book entitled Global Change and Sustainable Development: Asia-Pacific Perspectives, which will be published by Cambridge University Press later this year. From 1999 to 2000, Dr Low was a member of the Advisory Board of the quarterly international scientific journal Progress in Environmental Science (PIES) published by Arnold publishers, UK (the journal was incorporated with Environmental International, published by Elsevier, in 2001). He has peer reviewed manuscripts submitted to Atmospheric Environment; Journal of Geophysical Research – Atmospheres; Journal of Air and Waste Management Association; Journal of Environmental Planning and Management; Cambridge University Press (UK); and Centre for Agriculture and Bioscience International (CABI) publisher (UK).

Dr Low has been a Fellow of the Asian Disaster Preparedness Centre (ADPC) in Thailand since 2002. He was a member of (i) the World Meteorological Organization (WMO) Meeting of Experts on Surface Ozone Data: Their Analysis and Related Issues held on 18-22 November 1991 in Geneva, Switzerland; (ii) Expert Group on Environmentally Sound Technologies convened by UNEP International Environmental Technology Centre (IETC) based in Osaka, Japan, in 2001-2002; (iii) Ad Hoc Discussion Group on Drought convened by United Nations International Strategy for Disaster Reduction (UN/ISDR), Geneva, Switzerland, in 2003; and (iv) Food and Agriculture Organization (FAO) of the United Nations Expert Group Meeting on Climate Change Adaptation and Mitigation in Agriculture, Forestry and Fisheries held on 5-7 March 2008 in Rome, Italy, in preparation for the High Level Conference on World Food Security and the Challenges of Climate Change and Bioenergy held on 3-5 June 2008. He was Chair of the UNEP Global 500 Roll of Honour Policy Sub-Committee (1996); and a member of the UNEP Global 500 Roll of Honour Selection Committee (1996-1999). He was awarded a UNEP Certificate in 1995 in recognition of his contribution to the WMO/UNEP Scientific Assessment of Ozone Depletion: 1994.

Dr Low participated in the Technical and Steering Committee of the regional project on the Prevention and Control of Dust and Sandstorms in Northeast Asia implemented by Asian Development Bank (ADB) in collaboration with UNESCAP, UNEP and the UNCCD Secretariat in 2005. He initiated and organized the Eminent Scientists Symposium chaired by Dr Mostafa K. Tolba, former Executive Director of UNEP (1976-1992), on Global Change, Environment and Development held on 24-25 March 2005 in Seoul, Republic of Korea, as part of the Ministerial Conference on Environment and Development for Asia and the Pacific 2005 convened by UNESCAP.

Dr Low holds a Bachelor of Engineering (Chemical) from the University of Canterbury, Christchurch, New Zealand; a Master of Environmental Studies from the University of Adelaide, Australia; and a PhD in Environmental Studies from the University of Tasmania, Australia.

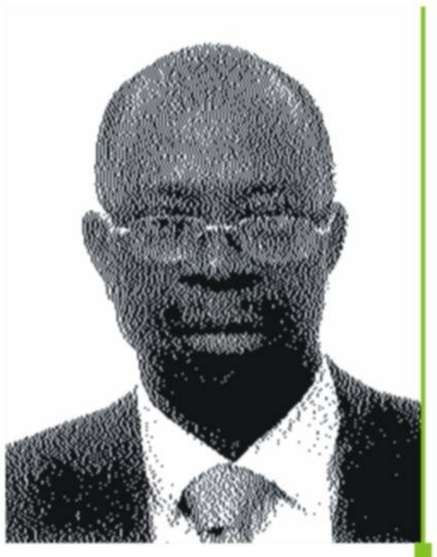
Wendy Aulakh
Senior Program Officer

Wendy Aulakh is Senior Program Officer in the Clean Energy Program at Winrock International, working to increase global access to energy services via solar, hydropower, wind, and bioenergy, to improve economic opportunity, support social development, and reduce negative environmental impacts. From 2004 until 2008, she served as Director of the Clean Energy Program where she led strategic planning and new business development and provided advisory and technical input to a range of projects addressing issues of national energy planning and security; community management for energy service delivery; renewable energy options for productive uses and social services; and cleaner options for household energy. Wendy is now leading technical assistance and business development work for Winrock's Clean Energy Program at the nexus of clean energy, community and social sustainability, and climate change and carbon finance for clean energy projects in developing countries. She is working directly with the American Carbon Registry, Winrock's registry for project-based offsets, to identify opportunities, and assess the potential of clean energy projects in Africa to create high quality offsets for the U.S. voluntary carbon market.

Wendy has 15 years experience working with rural communities, governments, electric power and municipal utilities, companies and technology developers, donor agencies and international financial institutions, and NGOs and civil society to provide technical assistance and management services to renewable energy projects. She has worked in more than 10 countries in Africa, Asia and Latin America and since 2000 has worked with NGOs primarily supporting US Agency for International Development projects worldwide.

Before joining Winrock she worked for the Academy for Educational Development where she specialized in training and institutional capacity building for the energy sector, working on the design and delivery of more than 30 training activities for more than 1000 government, NGO and private sector participants.

Prior to joining the NGO sector, Wendy was the Operations Manager for a private solar energy services company in Morocco delivering solar energy services to unelectrified communities. She holds a Master's degree (MRP) in urban and regional planning from Cornell University, Ithaca, New York, and a Bachelor of Arts (BA) degree in African Studies from Mount Holyoke College in South Hadley, Massachusetts. She has also studied at the University of Nairobi in Kenya.



Prof. Johnson Falade

JB Falade obtained a B.A.(Hons) in Town and Country Planning in 1979 from the University of Newcastle and M.Phil and Ph.D in Landscape Architecture in 1981 and 1985 respectfully from the University of Edinburgh.

He was promoted Professor of Urban and Regional Planning in 2004. He has a total of 26 years of working experience, made of 10 years of teaching, research and consultancy and 16 years in project development and management in the United Nations -System.

He is presently the Habitat Program Manager for Nigeria.

Prof. Emmanuel Oladipo

Prof. Oladipo has a doctorate degree in Climatology, with a strong background in Physical Geography and Quantitative Methods in Geography. He also has a cumulative employment experience of over 29 years after his first degree, and rose to the rank of a full Professor in 1992 in the Department of Geography, Ahmadu Bello University, Zaria before joining the United Nations Development Programme (UNDP), Nigeria where he worked for 12 years to support the building of national capacity for sustainable development and development management. Prior to his joining the UNDP in 1994, he has had an extensive consultancy relationship with the World Meteorological Organization (WMO), as well as having the opportunity of international professional exposure in Canada, Australia, New Zealand and many countries in Africa.

Between 1994 and 2006 he worked with the UNDP first as Sustainable Development Adviser (SDA) and later as Head of the Energy and Environment Unit. Since 2006, he has been working as the Regional Coordinator of a GEF-assisted Integrated Ecosystem Management Project between Nigeria and Niger. His current key responsibilities include: (i) drafting the project management plan and the annual work plans; (ii) coordination and oversight of all administrative, financial and technical activities; (iii) producing required financial, progress implementation review and other technical reports; and (iv) monitoring project implementation at country level for impact and sustainability.

Skill Summary

Technical/Knowledge

Possesses a very thorough knowledge about the broad issues of environment and energy as well as those of development in general. Capable of conceptualising and formulating thematic programmes, as well as managing their implementation, as well as drafting project briefs within the GEF framework and approach. Analytical Good analytical ability to diagnose development issues from multi-sectoral points of view; put them in proper perspectives and proffer workable suggestions and solutions. As a specialist in Climatology, he has capacity to provide scientific analysis for critical environmental issues; particularly energy/environment relations, climate change, drought, desertification, floods, erosion, and environmental change, as well as issues related to alternative sustainable energy sources. Advisory,

Advocacy and Dialogue

Capable of providing policy advice on issues of development, particularly issues on poverty eradication and environmental sustainability. Presently consults regularly with government (National, State and Local), donor agencies, civil society organisations, research institutions and other stakeholders on issues of environment, including urban environment, and plays good advisory, and advocacy roles about sustainable development. Has capacity to train, and organize conferences, workshops and seminars, not only in the areas of energy and environment for development, but also in development in general.

Management

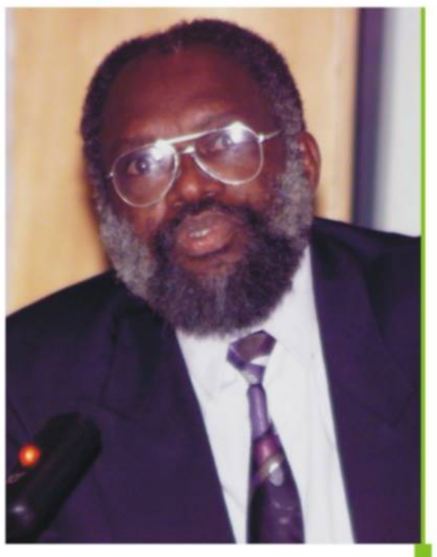
Ability to manage human and financial resources for effective programme delivery (some working knowledge of Atlas; former Head of Geography Department, Deputy Dean, Ahmadu Bello University, Zaria; former Head of the Energy and Environment Unit in UNDP, Nigeria; now a Regional Coordinator of an international GEF-supported Project) Ability to work with and lead interdisciplinary groups

Relates very well with colleagues and drives for teamwork success. Capable of leading technical teams on formulation and monitoring of development programmes, including those related to the energy, environment (physical and human) and poverty reduction.

Writing

Writes and communicates very well in English.

Office: IEM Nigeria Niger Project
Nigeria Niger Joint Commission for Cooperation, Niamey, Niger
Phone/E-Mail: Tel. 227 96108922; 227 2176803; 227 207 24286



Prof. Ogunlade
R DAVIDSON

Ogunlade R. Davidson is Professor of Mechanical Engineering and is currently the Dean of Post-Graduate Studies at University of Sierra Leone. Previously, he was Director of Research at the University, Head of Department of Mechanical and Maintenance Engineering, and Dean of the Faculty of Engineering. He is also the Chairman of the Board of the Sierra Leone Environmental Protection Agency (SLEPA). Internationally, he is the Vice-Chair of the Intergovernmental Panel on Climate Change (IPCC), and Co-Chair of Steering Committee of the Global Network on Energy for Sustainable Development (GNESD).

Between 2000 and 2003 he was Professor and Director of the Energy and Development Research Centre (EDRC) of University of Cape Town, South Africa. Before then, he was a Senior Fulbright Scholar at University of California, Berkeley and a MacArthur Scholar at Princeton University and Lawrence Berkeley Laboratory in USA. He has worked as visiting Professor at the University of Gothenburg, Sweden, ENDA-TM in Senegal, and National Technical University of Denmark.

He has published extensively in African Energy Systems and Policies, Power sector reform, Renewable Energy policy, Mitigation of Climate Change and on National Climate Change strategy. He has worked as a Consultant for UNESCO, UNIDO, ILO, UNECA, UNDP, UNEP, GEF, UNFCCC, NEPAD, ADB, and the World Bank. Professionally, he is a Registered Chartered Engineer of United Kingdom and Fellow of the African Academy of Sciences and of the Sierra Leone Institution of Engineers. He is also a Chartered Member of the Nigerian Society of Engineers.

He is currently The Honourable Minister of Energy, Sierra Leone

Ewah Otu Eleri

Eleri is an energy and environment specialist, who has worked on reform issues in several African countries. He has specialised in the practical issues associated with rapid expansion of energy access in rural areas – playing a role in energy policy reform processes, integrated rural development planning, energy and climate change linkages, privatization and public-private-partnership.

He has over the past years been consulting on government programs and private sector participation in delivering decentralised energy to the poor. Eleri's current clients include the World Bank, DFID, UNDP, the Government of Canada and the Federal Government of Nigeria. He is the Lead Author of the Renewable Energy Master Plan. Eleri is the Director of the International Centre for Energy, Environment & Development (ICEED) and Coordinator of Nigeria Climate Action Network (Nigeriacan).

Onno Rühl

Onno Rühl is Country Director for Nigeria at the World Bank. In this capacity he is responsible for managing the World Bank's Nigeria portfolio valued at $3.4 billion, as well as for the dialogue with all layers of Government and civil society in Nigeria. Prior to his current assignment, he was Manager for Results and Learning in the Africa Region of the World Bank. In this capacity he had primary responsibility for the World Bank's Results Agenda for Africa, as well as for the Region's Knowledge and Staff Learning Programs. Under Mr. Rühl's leadership, the Results and Learning Unit has built a path breaking results monitoring system for the World Bank Africa Region's programs. In addition, the unit has worked to help partner Governments improve their management for results focus, monitoring and evaluation, and statistical systems. Finally, the Unit has put a strong focus on improving the results focus of projects financed by the World Bank in Africa.

Prior to this, Mr. Rühl was Country Manager for the Democratic Republic of the Congo. In this capacity he managed the World Bank's Country Office in Kinshasa as well as the daily dialogue with the Government, civil society and the press in DRC. In addition, he played a key role in strategy formulation of the program of re-engagement with DRC during and after the conflict, as well as in implementation support, especially in infrastructure projects. Before his assignment in DRC, he was Lead Specialist for Private Sector Development in the Africa region of the World Bank. In this capacity he was responsible for a wide range of private sector development programs in Eastern and Southern Africa, as well as a Regional Trade Facilitation Project in the same region.

Mr. Rühl also worked in the Europe and Central Asia Region on guarantees for infrastructure and trade finance in Russia, Ukraine, Turkey, Croatia and Romania, and private sector development and privatization in post-conflict situations, most notably in Bosnia and Herzegovina, Albania, Moldova, Armenia and Kosovo. Before joining the World Bank's staff, he was Economic Secretary in the Royal Netherlands Embassy in Washington DC, Alternate Director on the Board of the Multilateral Investment Guarantee Agency and Desk Officer in the Multilateral Development Cooperation Department of the Netherlands Ministry of Foreign Affairs. He started his career teaching economics in Alkmaar, the Netherlands. Mr. Rühl holds a Masters Degree in macroeconomics and international economic relations from the University of Amsterdam. He also completed a post graduate course in diplomacy upon joining the Foreign Service of the Netherlands.

Prof. Ademola T. Salau

Ademola T. Salau retired from the United Nations at the end of December 2008 after fourteen years of service to the organization as a climate change senior technical advisor and team manager for UNDP/GEF. From January 1995 to January 2004, he managed UNDP/GEF (United Nations Development Program/Global Environment Facility) climate change portfolio worth more than $100 million in more than thirty five African countries. From January 2004 to December 2008, he was the regional technical advisor on climate change and team leader for the UNDP/GEF Regional Coordinating Unit based in Pretoria, South Africa with a staff of twelve and an annual administrative budget of about $2 million. This unit was responsible for a GEF portfolio of US $304 million consisting of 118 biodiversity, climate change, international waters, sustainable land management, and capacity building projects in twenty one Eastern and Southern African countries.

Ademola was a member of The African Biodiversity Consultative Group of The Biodiversity Support Program (a consortium of WWF, The Nature Conservancy, and WRI) in 1993 which resulted in the landmark publication of African Biodiversity: Foundation for the Future. He was the Vice Chairman of the Human Dimensions of Global Environmental Change Programme (HDP), formerly based in Barcelona and Geneva and now based in Berlin, Germany. HDP is an international programme of ICSU (International Council for Science) with activities in biodiversity, climate change and other environmental problems around the globe.

A co-founder and the first Chairman of an environmental NGO based in Ibadan called NEST (Nigerian Environmental Study/Action Team), Ademola was the Coordinator of the Multinational Working Group on the Environment for CODESRIA (Council for the Development of Economic and Social Research in Africa) based in Dakar, Senegal. He led the NEST team in collaborating with IIED (London) in the preparation of a five –country NGO report to UNCED in Rio de Janeiro in 1992 and was the co-editor of the 250-page book entitled The Challenge of Sustainable Development in Nigeria He was appointed a member of the Nigerian Committee on the Implementation of the Resolution of UNCED by the Government of Nigeria. He has published extensively in professional journals as well as books, proceedings and reports.

Before joining the United Nations, he taught at the Department of Geography in the Faculty of Arts and Social Sciences of Ahmadu Bello University from 1979-1983. He transferred his service to the University of Port Harcourt in September 1983. At the University of Port Harcourt, he held many positions from the Head of Department of Geography, Dean of the Faculty of Social Sciences, Dean of the Post Graduate School, Deputy Vice Chancellor to the post of Acting Vice Chancellor from January 1994 to January 1995 when he left to join the United Nations Development Programme (UNDP) in New York.

Patrick Laux

Born: January 08, 1976, Wadern, Germany Unmarried, 1 child
Mail Address: Alpsitzstraße 10, Garmisch-Partenkirchen, Germany
Email: patrick.laux@imk.fzk.de
Phone/Office: +49 (0)8821-183 259 Phone/Private: +49 (0)8821-7307456

Research Activities

- Climate variability, i.e. precipitation variability
- Impacts of climate change on the terrestrial water balance
- Statistical (empirical) and dynamical downscaling
- Agro-hydrological decision support for water scarce regions (e.g. West Africa) • Crop modeling

Working Experience

Present Post-Doc at Institute for Meteorology and Climate Research, (IMK¬IFU), Garmisch-Partenkirchen, Germany 2004 –2009
PhD Thesis at Institute for Meteorology and Climate Research, (IMK-IFU), Garmisch-Partenkirchen, Germany Title PhD thesis: Statistical modeling of precipitation for agricultural planning in West Africa, supervised by Prof. Dr. rer. nat. Dr.-Ing. habil. András Bárdossy and Prof. Dr. Jucundus Jacobeit (termination: January 16, 2009) 2001 – 2003
Contract for services at Landesamt für Umweltschutz, Saarbrücken, Germany Development of a hydro-geological database 2002 – 2003
Contract for services at Service for environmental planning, Mertesdorf, Germany Engineering services, e.g. subsurface investigations for construction trade, construction of water gauges, water quality monitoring, soil water and soil air monitoring Education 1996 – 2003 Study of Applied Environmental Sciences, Karl Marx University of Treves, Germany Major subjects: Hydrology, Meteorology, Remote Sensing, Soil Sciences; minor subject: International, European and German Environmental Law 2003
Diploma in Applied Environmental Sciences Title Diploma Thesis: Quantification of chemical parameters using reflectance spectra measurements of sediment samples of the Olewiger Bach. Comparison of methods: Partial Least Squares Regression vs. Artifical Neural Networks 1999

Prediploma in Applied Environmental Sciences 1995 A-levels, Johannes Kepler-Gymnasium, Lebach
Teaching Experience Training course in Hydro-Meteorological Decision Support for the Volta Basin at the United Nations University Institute for Natural Resources (UNU-INRA) in Accra (Ghana) from 14.01.2008 – 17.01.2008 and at the Direction Générale des Ressources en Eau (DGRE) in Ouagadougou (Burkina Faso) from 22.01.2008 – 25.01.2008
Training course in Statistics at International Summer School, University of Würzburg (Germany) from 21.07.2008 -26.07.2008, “Land Cover and Climate Change in West Africa”. Elite Network of Bavaria Graduate Program “Global Change Ecology (M.Sc.)” (www.global-change-ecology.de), organized by the Universities of Augsburg, Wuerzburg, and Bayreut, Germany

Memberships

American Geophysical Union (AGU)
European Geophysical Union (EGU)
International Association of Hydrological Sciences (IAHS)

Referee

Journal of Hydrology, Environmental Research Letters, Ecological Applications, International Journal of Global Energy Issues, Monthly Weather Review, Agricultural and Forest Meteorology, International Association of Hydrological Sciences (IAHS), Journal of Earth System Science

Jacob KUMARESAN

Jacob KUMARESAN

January 2008– Director, World Health Organization (WHO) Centre for Health Dev.
May – December 2007 Coordinator, World Health Organization, WHO office at the United Nations, New York, USA
2003 – April 2007 President, International Trachoma Initiative, New York, USA

- Led global efforts to eliminate blinding trachoma
- Planned and supported implementation / expansion of national trachoma control programmes
- Advocated and mobilized resources for trachoma elimination 2000 – 2002 Executive Secretary, Stop TB Partnership Secretariat
  World Health Organization, Geneva
- Mobilized global and national partners to expand efforts to Stop TB
- Planned strategies to support countries to reach global targets
- Established and managed the activities of the Global TB Drug Facility, including review mechanism and procurement processes
- Advocated for TB control as a response to address diseases of poverty 1992 – 1999 Medical Officer, Global Tuberculosis Programme
  Senior Adviser, Stop TB Initiative
  World Health Organization, Geneva

1989 – 1992 Senior Epidemiologist, Ministry of Health, Botswana
1988 – 1989 Acting Provincial Medical Director, Ministry of Health, Zimbabwe
1987 – 1988 Research Associate and Consultant Epidemiologist,
Hansen's Disease
Center, Carville, U.S.A.
1985 – 1986 Acting Medical Superintendent and District Medical Officer, Ministry of Health, Zimbabwe
1981 – 1984 Government Medical Officer, Ministry of Health, Zimbabwe
1979 – 1980 Senior House Surgeon and Resident Intern, various hospitals in India

PUBLICATIONS:

38 total, 1990 – 2007 Kumaresan J. Can blinding trachoma be eliminated by 20/20? Eye 2005; 19: 1067-1073.
Kumaresan J.A. What's new in trachoma control? Community Eye Health 2004; 17 No.52: 49-51.
Mecaskey J.W., Knirsch C.A., Kumaresan J.A., et al. The possibility of eliminating blinding trachoma. Lancet Infect Dis 2003; 3: 728-34.

PRESENTATIONS:

50 total, 1988 – 2007 Kumaresan J.A., "Partnerships in Public Health".
Unite for Sight's Fourth
Annual International Health Conference, Stanford, California, USA.: April 2007.
Kumaresan J.A., "Impact and Efficiency of Integrated NTD

Programs:

Research toward optimization". 55th Meeting of the American Society of Tropical Medicine and Hygiene, Atlanta, Georgia, USA.: November 2006.
Kumaresan J.A., "Trachoma elimination: The Power of Partnership". SEE Change – Business Roundtable Conference, San Jose, California, USA.: October 2006.

ACADEMIC QUALIFICATIONS:

1988 Dr.P.H. Tulane University

School of Public Health and Tropical Medicine
New Orleans, U.S.A
1985 M.P.H.& T.M. Tulane University
School of Public Health and Tropical Medicine
New Orleans, U.S.A.
1978 M.B., B.S. Kilpauk Medical College
University of Madras, India

LANGUAGES SPOKEN: English (fluent)
Tamil (mother tongue)
French (basic)
NATIONALITY: Indian
AGE (date of birth): 52 years (16 April 1955)
MARITAL STATUS: Married, with three children

COMMUNITY ACTIVITIES:
Presented Medal of Honour by the Governor of Ouarzazate, Morocco in appreciation of services and support
provided to achieve the Ultimate intervention goals for the elimination of blinding trachoma, November 2006
Awarded 2004 Union Medal by the International Union Against Tuberculosis & Lung Disease; the Union Medal is awarded to those members who have made an outstanding contribution to the control of tuberculosis or non-tuberculous lung disease, by their scientific work and/or actions in the field.

Awarded Certificate of Appreciation and Medal of Merit by Lions International for invaluable services and cooperation extended in initiating a leprosy control project in Botswana, May 1992

PROFESSIONAL AFFILIATIONS:
American Public Health Association
Glasses for Humanity, Board of Advisors
International Union Against Tuberculosis& Lung Disease
Technical Review Panel of GFATM, Member
World Lung Foundation, Vice President

Paul Kirai

Paul Kirai - MSc Environmental Mgt, BSc chemistry

Profession:
Energy, Climate Change and Environmental Management Specialist
Current Position:
Director: ECM Centre Ltd - Environmental management, climate change and Clean Development Mechanisms (CDM)
Development Advisor:
Integrated Energy Solutions (An Energy Service Company) – Energy efficiency and renewable energy
UNDP Consultant/Team Leader:
Support to East African Community for the implementation of the modern energy scale up strategy
Contact
ECM Centre: P O Box 10135 00100 Nairobi Kenya:
Phone: +254 20 2712999, Mobile: +254733 637457.
email: Pail.kirai@ecmcentre.com or paul.kirai@gmail.com

Summary of Experience
A senior energy and environmental expert with over 18 years experience in government, private sector and United Nations organizations. Has extensive experience with climate change, environmental management, and energy covering policy, programmes, regulation, impact assessments, planning and implementation. Experienced in energy management, energy efficiency, and Clean Development Mechanisms (CDM).

In 2001-2007 was National Manager for the GEF-UNDP Climate Change project in Kenya. The project created impact at industry and government levels and is hailed as a good best practice by UNDP and GEF for its efforts in mainstreaming energy efficiency in industry and national institutions. Has been a speaker in many energy forums and has authored a number of publications on energy as well as on environment and climate change.

- Member of national delegation to climate change negotiations. Chair of mitigation – industry and energy – subcommittee in Kenya.
- 2008 Member of UN Energy Expert Group on Energy Efficiency, CDM and post 2012
- 2007-2008 Resource person– Industry and energy for the development of environmental Policy for Kenya.
- May 2007 Speaker at the UNEP organized African Carbon Finance Forum in Johannesburg.
- October 2007 Organizer for the (International Emission Trading Association (IETA) mission to Kenya and the East Africa Region.
- November 2006 Speaker at UNFCCC COP 12 (Argentina) on energy efficiency and climate change
- 2003-04: Worked with government and stakeholders to develop Energy Policy for Kenya – with specific focus on Energy efficiency and conservation. In 2006, was involved in Energy Act development for Kenya.

Key competencies
- Energy Management
- Climate change mitigation and adaptation
- Environmental management,
- Energy and environmental policy analysis and programme development,
- Clean Development Mechanism (CDM)– Project identification, (PIN, PDD, overall project management), CDM methodology assessment and development
- Development and application of Energy Standards and Labels.

Education

- MSc - Environmental Chemistry: University of Nairobi, 1992
- BSc - Chemistry (Hons): University of Nairobi, 1986
- Pg Certificate Environmental Management: Oregon State University – USA 1993
- Certificate: Energy management, Energy Auditing and Financial Engineering: GEF-KAM Project 2001-2003

Certificate - Environment oriented Cost Management:
Swisscontact/GTZ, Nairobi, 1999
Certificate - Hazardous waste management :
1997, Bergstrom Associates SIDA Sweden ,
Certificate - Urban Environmental Planning and Ecology1993 - 1994,
Wageningen Agricultural University, The Netherlands, through the
Environment and Urban Development Training Project.

Employment :

2007 to date: Chief executive ¬- the ECM Centre in Nairobi.

- Providing professional services in energy and environmental management, CDM and organizational development. UNDP Consultant for energy access and energy planning in East Africa.
- Renewable energy and energy efficiency consultant for many institutions including GTZ, AFD and DEG among others.

2001-2006 GEF-KAM Industrial Energy Efficiency Project: National Project Manager. Project resulted in great savings in energy and finance by Kenya industries.

1999-2000 Executive Director: ECM Center- A consulting firm with expertise in environmental and energy management and CDM project development. Worked with a core staff of nine national consultants and four international consultants.

1995 – 1999: Senior Consultant and Director - Environmental Management Services.

Consultant and manager in charge of project development, assignment management, consultants recruitment, marketing, finance etc. Carried out numerous projects for various clients including UNDP, UNCHS(Habitat), ILO, NGOs such as GTZ, SNV and private industry.
During this period was project manager for the Dutch funded programme (SNV-Econews Africa Combat Desertification Project) which covered East Africa, and thus was able to travel extensively across the region.
1989 – 1994 Officer - Government of Kenya

Working experience:

- June 2007: Executive Director ECM Centre: Founded in 2001, the ECM Centre is credited with building CDM capacity in Kenya and for developing the first to be registered CDM project in Kenya. The Centre also provides consultancy in environmental and quality management
- 2007 to date- Team Leader UNDP Regional Bureau for Africa expert on energy access. Implementation of the East Africa Community Modern Energy Access Strategy
- 2008 UNDP Consultant for the evaluation of CDM Potential for Kenya. Presently working on a number of CDM project at various levels of development.
- 2008 Consultant for African Partnership Forum for improving Africa participation in CDM.
- 2007 -to date: Country Author. National Climate Change Vulnerability reports for HELIO International.

- 2007 - to date: Evaluator-Capacity Strengthening for Least Developed Countries to Adapt to Climate Change (CLACC) on behalf of IISD.
- 2008 Consultant for African Partnership Forum for improving Africa participation in CDM.
- 2008 Member of UN Energy Expert Group on Energy Efficiency, CDM and post 2012 considerations
- 2008 to date: Consultant in Renewable energy and energy efficiency for GTZ, DEG and AFD among others
- June2007: Development Advisor- Integrated Energy Solutions: A young company promoting the ESCO concept in Kenya and the Region. Presently developing a number of projects in energy efficiency, Co-generation, Lighting projects etc many of them with CDM opportunities. The clients include the major cement company in East Africa.
- .2001-06 National Project Manager – GEF-KAM Industrial Energy efficiency project. Overall management and coordination of the USD 3.5m GEF-KAM Industrial Energy Efficiency Project funded by GEF and UNDP.
- 2005-7: Developed GEF funded USD 2.5m project for introduction of energy standards and Labels programme (S&L) in Kenya and East Africa and wrote GEF Project Document. The Project has been approved for funding by GEF.
- 2004-05 Developed and guided implementation of CDM capacity building project (for Small Scale projects) in Kenya with Canadian support. Supported ECM Centre to develop Mumias Sugar CDM project.
- 2003-04: Worked with government and stakeholders to develop Energy Policy for Kenya – with specific focus on Energy efficiency and conservation. In 2006, was involved in Energy Act development for Kenya.
- 1999-2000 Introduced in Kenya and coordinated the implementation of industry environmental improvement programme - Environment oriented Cost Management (EoCM) through Swiss Contact and GTZ. Project covered Kenya, Uganda, Tanzania and Nigeria. Many industries were involved and they recorded great savings through waste reduction.
- 1999 -2000 Consultant in Development of Environmental Management Systems for Industries and waste management. Undertook numerous Environmental Audits, Energy Audits, Training in energy management.
- 1997-1999 - Project advisor for the Sustainable Solid Waste Management Project of UNCHS- (Habitat).
- Working with communities and private sector to develop commercial approaches to waste management
- Market research in waste management industry, facilitating appropriate technology, Community groups organization, Liaison with Government, local authority, private sector and the UN, Partnerships development, contract management and capacity building.
- 1998- 2001 - Numerous Environmental Impact Assessments and Environmental Audits for Industries and waste minimization. Client: Local Industries, National Environmental Authority, ITDG, ERM - UK and ERM Netherlands.
- 1998 - Member of expert panel, UNEP-UNIDO for the development of a manual for solid waste management in Africa,
- 1997 - Consultant for UNDP New York, on sustainable development in Africa. Organized Regional workshop in Accra, Ghana for development of indicators,
- 1996-1999 - Environmental Legislation Reviews and development of Environmental Audit procedures for industrial operations based in UK and with interests in Kenya (for the UK- based international firm Environmental Resource Management (ERM –UK)) 2002 – Kenya Environmental Regulatory Matrix – A review of environmental legislation relevant to trade in chemicals for UK firm interested in setting up operations in Kenya.

Dr. Larry Awosika

Dr. Larry Awosika is Marine geophysicists with the Nigerian Institute for Oceanography and Marine Research (NIOMR) Lagos. He holds a BSc in Geology from Howard University Washington DC., USA; MSc Geology with specialty in geophysics from George Washington University Washington DC., USA and PhD in Applied Geophysics from Obafemi Awolowo University Ile Ife. He is in charge of the geophysical survey of the Nigerian Continental shelf as well as Coastal erosion and ocean dynamics projects in NIOMR.

Dr Awosika has over 25 years of national and International experience in Marine and ocean/coastal surveys, EIA, project management, and marine environmental issues. He has published over 60 national and International papers in the above areas. He has edited nine publications in the areas of marine geology/geophysics and ocean/coastal dynamics. He led the first ever assessment of the impacts of sea level rise on the Nigerian coastal zone in 1995 using the video mapping assessment method. Dr. Awosika is member and Vice Chairman of the United Nations Commission on the Limits of the Continental Shelf (CLCS). He is also the Technical Adviser/Expert to the National Boundary Commission project on the Nigerian Extended continental shelf. He is also the Vice Chairman of the United Nationals Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP).

Dr. Awosika has received merit awards from several national and International agencies and government some of which include: Commander - Federal Republic of Equatorial Guinea; Merit award from the Intergovernmental Panel on Climate Change (IPCC) and Award of Excellence to Ocean Science by Fisheries Society of Nigeria.

Prof. M. K. C. SRIDHAR

Name: Professor M. K. C. SRIDHAR
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234-7516233 (Home)
Address: Division of Environmental Health
Department of Community Medicine,
College of Health Sciences, Niger Delta
University, Wilberforce Island, Bayelsa State
Fax: 234-2-810 3043 or 234-2-7516233
E-Mail: mkcsridhar@yahoo.com
Mailing Address: PO Box 20593 UI HO, Ibadan

Nationality: Indian; Marital Status: Married with 3 children
Education: Ph.D., 1971, Indian Institute of Science, Bangalore, India; Specialization in Biochemistry of Waste water and Sludges
M.Sc. (Biochemistry) 1964, M. S. University of Baroda, Baroda, India; Specialized in Fermentation Chemistry; (First Class)
B.Sc., 1961, Andhra University, Waltair, India; Chemistry,
Botany and Zoology (First Class)

Affiliation in Learned Societies:
Fellow of Royal Society of Health, UK, (1978).
Member of Chartered Institution of Water and Environmental Management, UK, (1984).
Chartered Chemist & Member of Royal Society of Chemistry, UK, (1985)
Member, International Society of Environmental Epidemiology (1996)

Computer Literacy:
Word Processing, Page Maker, Data Base, Spread sheets, Harvard Graphics, Epi6, Power point, etc.

Professional Career and Experience:
Professor of Environmental Health, July 2008 to date. Department of Community Medicine, College of Health Sciences, Niger Delta University, Wilberforce Island, Bayelsa State.
Professor and Head of Environmental Health. 1986 to October 2008. Department of Epidemiology, Medical Statistics and Environmental Health, Faculty f Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria; Head of the Unit, the responsibilities include teaching, research and consultancy. Advisor to Private and Governmental Organizations.
Chairman, Department of Epidemiology, Medical Statistics & Environmental Health, !999 to November 2001
Research Director, Environmental Sciences and Biotechnology 1992 todate. Postgraduate Institute for Medical Research and Training, College of Medicine, University of Ibadan; organization researches and training programmes.
Director. Ibarapa Community and Primary Health Care Programme. June 1989 – 1995. Department of Preventive and Social Medicine, College of Medicine, University of Ibadan, Ibadan, Nigeria.
The responsibilities include: supervision of research and administration for about 50 employees at the Igbo-Ora Comprehensive Hospital; Field training for over 200 students (MBBS, MPH, Nurses and Midwives, Community Health Officers and other Electives from various places in Nigeria and abroad) annually ; researches in community health and development, and service for about 155 villages.
Visiting Scientist. October 1986 - October 1987. Swiss Federal Institute of Water resources and Water Pollution Control, Dubendorf /Zurich, Switzerland. Associated with Prof. Geoffrey Hamer, Biotechnology Department, on a research project on survival of pathogenic bacteria in water and sewage; demonstrated pathogen survival tactics.

Reader (Associate Professor) and Head of Environmental Health -- October 1983 – September 1986, Senior Lecturer and Head of Environmental Health. -- 1980 – 1983 College of Medicine, University of Ibadan, Ibadan, Nigeria.
Visiting Lecturer -- February - March 1980. Dept. of Environmental Health, American University of Beirut, Lebanon.

Lecturer -- 1977-80 . College of Medicine, University of Ibadan, Ibadan, Nigeria.
Scientific Officer --September 1976 - Sept.1977. Division of chemical and Biological

Sciences, Indian Institute of Science, Bangalore, India. In-charge of the Consultancy Services in the Division on the planning and evaluation of industrial pollutants and their effects on environment; suggesting guidelines on the control or prevention of industrial waste discharges; Consultant to Government and private Organizations. Managed a reference laboratory for pollution control.
Guest Lecturer Part of 1974 – 1977. Karnataka Engineering Research Station, Mysore, India.
Project Assistant Jan. 1976 - Aug. 1976; Senior Research Assistant 1970 – 1975; Research Fellow 1964 – 1970 – division of Chemical and Biological Sciences, Indian Institute of Science, Bangalore, India
Demonstrator in Botany 1961 – 1962. J. Kalasala, Machilipatnam, Andhra University, Waltair.

Distinctions and Honors:

- Won several prizes in the School and in college.
- Merit scholarship during Masters program.
- Junior and Senior Research Fellowships during Ph.D. program.
- A Biographical sketch was published in Marquis Who's Who in the World for 1989/1990 and every year till to date "which is limited to those individuals who have demonstrated outstanding achievement in their fields of endeavor and who have, therefore, contributed significantly to the betterment of contemporary society".
- National awards for the organic fertilizer plant at Bodija Market, Ibadan, Nigeria (3 were awarded in 1997, 1998 to the organizations who used my expertise); there are now 7 of them in the country.
- 2 - Patents were obtained for Organic fertilizer from wastes and Household Biogas digester

International Experience:
Widely traveled and spent several weeks to one year in USA, Switzerland, Germany, Denmark, Sweden, Greece, Asia and Africa sponsored by various agencies; Participated in various International Conferences and workshops.
Significant Researches: Significant researches are carried out in the areas of water, wastes, soil, air, and food:
Published over 200 scientific papers in Journals and books; submitted several technical reports; obtained one patent and one pending; Trained over 180 Post Graduate students at Masters and Doctoral levels in Environmental Health Sciences. ? Water quality; water and wastewater treatment; river pollution monitoring; community involvement in water supply and quality improvement; field trials of some innovative technologies such as pot chlorination, solar disinfection, simple sand filters, nylon filters for water supplies; ? Eutrophication and aquatic weed control; industrial and domestic waste management

- Community involvement in drainage management, urban farming using community waste waters;
- Food safety and hygiene, Food additives and cholesterol homeostasis; control of parasitic infections
- Environmental contaminants and toxicology of Cd, Pb, Al, NO3, Cyanide, CO, dust / particulates;
- Initiated researches on lead and nitrates in urban environment and their impact on children;
- Hazardous waste management, phytoremediation of contaminated soils;
- Environmental Impact Assessment, and Environmental Audit for various industries and developmental projects; treatment of industrial waters and waste recycling to meet their specific needs;
- Environmental Epidemiology: of water, air and soil pollution; in industry and communities;
- Demonstration projects were commissioned in selected communities, markets and industries for waste management; e.g. composting plants, plastic/nylon recycling and metal scrap recycling using participatory stakeholder approach;
- Worked as Consultant on several occasions for UNICEF, UNDP, THE WORLD

Prof. Adeniyi Osuntogun

Professor Osuntogun holds a Doctorate Degree in Agricultural Economics from the University of Leeds, United Kingdom. He was Vice-Chancellor Obafemi Awolowo University, Ile-Ife, Nigeria and he is currently a member of the Governing Council of the Ajayi Crowther University, Oyo, Nigeria.

He is the Director Chief Executive Officer, Foundation For Environmental Development And Education In Nigeria (FEDEN). He is the Regional Programme Director Leadership For Environment and Development For Anglophone (LEAD) West Africa. He is the Founder and Chairman, Resource Integrated Development Foundation (RIDF).
At the Global level, Professor Osuntogun has served in the following capacities, among others:

- Chairman, NEPAD Session, 4th Global Multi-Stakeholder Forum at UNEP Governing Council Meeting, held in Nairobi, Kenya, January 31-February 4, 2003.
- Elected Chairman, African Consultative Meeting for 8th Global Civil Society Forum, UNEP, Nairobi, Kenya, October 26-27, 2006.
- Chairmen, Expert Group Meeting on the Status of Sustainable Development for Africa, Economic Commission for Africa (ECA) Addis Ababba, 2005.
- Member, African Steering Committee for Civil Society Group for the World Summit on Sustainable Development (WSSD) , JOBURG, South Africa, August, 2002.

Professor Osuntogun has carried out consultations in the area of Environment and Sustainable Development in Africa, some of these include:

1) Consultation for UNEP/FEPA as Environmental Economist on Nigeria Biodiversity Study, 1992 and 1997.
2) Consultation for UNIDO on Information Management System, Public Awareness, and Environmental Education Services on West African regional Project to Develop Appropriate Strategies for Identifying Sites Contaminated by Chemicals listed in Annexes A, B and/or C of the Stockholm Convention, 2006
3) Consultation for the Basel Convention Regional Coordinating Centre for Africa on:
   a. Fund Mobilization for Environmentally Sound Management (ESM) of Hazardous Waste Project in Africa, 2004.
   b. Developing Environmentally Sound Management (ESM) of Hazardous Waste Project Documents for Africa for Successful Grant Support and implementation, 2004.
4) Served as Lead Consultant to the World Bank on:
   a. The Development of Environmental Manual for the Lagos Metropolitan Area Transport Authority (LAMATA), 2002.
   b. The Development of Social Procedural Manual for the Lagos Metropolitan Area Transport Authority (LAMATA), 2002.
   c. The Project Applied Poverty-Environment Indicators – The Case of Nigeria, 2001
5) Consultation for Economic Commission for Africa on:
   a. Sustainable Agricultural Development in Africa, 2001
   b. Country report on the Status of Sustainable Development in Nigeria, 2005.

Professional Osuntogun has visited many countries on Environment and Sustainable Development assignments/activities, these include: South Africa, Ethiopia, Kenya, Botswana, Lesotho, Mozambique, Malawi, Mali, Senegal, Ghana, Cote d'Ivoire, Gambia, Tunisia, Thailand, Brazil, China, Japan, Jamaica, Cuba, Pakistan, Indian, Indonesia, Costa Rica, Mexico, Russia, Canada, the United Kingdom, (UK) and the United States of America (USA).

Prof. Babajide Alo

Prof. Babajide Alo was educated at the University of Ibadan where he obtained the Upper Second Class in B.Sc. Hons. Chemistry in 1974 and followed it up directly with a Ph.D in Chemistry in 1979. He spent an Intercalation Year on the Ph.D at the University Of Bristol School Of Chemistry. He undertook Postdoctoral work at the University of Waterloo, Canada, from 1983-1987. Through his interest in Organic Toxicants in the Environment he has become an Environment and Development Consultant. And has undergone training at the Economic Development Institute of the World Bank (now WBI), Washington on the Political Economy of the Environment from 1994-1995. Prof. Alo has taught and carried out extensive research in Heterocyclic Chemistry and the role of Organic Compounds in the Environment.

He is a Fellow of the Chemical Society of Nigeria (F.C.S.N)-1998, Fellow of the Institute of Public Analysts of Nigeria (F.I.P.A.N)-1999, and Fellow of the Nigerian Environmental Society, (F.N.E.S.)- 2000.

His work experience include the following -Professor of Chemistry, University of Lagos, 1993 to date

- CIDA-NSERC Postdoctoral Fellow, Guelph-Waterloo Centre for Graduate Work in Chemistry, University of Waterloo, Ontario, Canada 1983 - 1987
- Visiting Asst. Professor, University of Waterloo, Ontario, Canada, 1989
- Visiting Professor, Rhodes University, Grahamstown, South Africa, 1994
- Dean, School of Postgraduate Studies, University of Lagos, Nigeria 1999-2003
- Director, FMEH&UD-University of Lagos Linkage Centre for Environmental Human Resources Development 1995-date
- Head, Dept of Chemistry, University of Lagos 1998-1999; 2006 - date

Prof Alo has extensive research experience in Environmental Management issues including Road Transportation and Environmental Degradation with focus on Urban Highways Runoff Studies and served as Chairman, FMEnv Review Panel on the Environmental Impact Assessment of the World-Bank-assisted Lagos Metropolitan Urban Transport Project, (LAMATA Project) November 2002

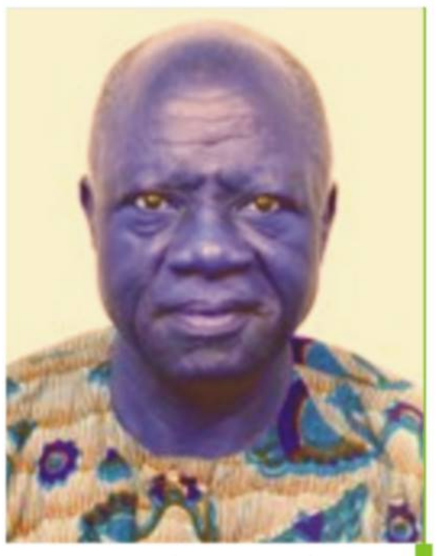
Professor Babajide Alo has served as

- Past National President, Nigerian Environmental Society (NES), 2001-2004
- Immediate Past Chairman, Chemical Society of Nigeria (CSN), Lagos State Chapter
- Member, (nominated) Lagos State Government Advisory Committee on Environment, 1994
- Member, Lagos State Government Sub-Committee (Technical) on Environmental Matters, Ministry of Environment and Physical Planning. 1994
- Chair, IFCS-WHO Forum V Adhoc WG on Heavy Metals, Budapest, Hungary, and Facilitator of the Global Sept 06 Budapest Statement on Heavy Metals 2006
- Member, Global Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) WG on Mercury, London, 2007-8
- Member, Governing Council, Inst of Public Analysts of Nigeria appointed by Federal Ministry of Health, 2000-2002
- Member, UNEP Regional Board on Cleaner Production in Africa, Nairobi, 2000
- Leader of the NES/NGO Coalition to World Summit on Sustainable Development, Johannesburg, 2003
- Chair, UNIDO Regional TDA Task team for the 16-nation African Gulf of Guinea (GCLME) Program
- Chair, FMEnv-UNDP Task Team for the Development of Environmental Sustainability Indicators for Nigeria, 2004
- Lead presenter and Resource person for the NORDIC Council Committee on Global Mercury Side-event at BASEL Convention COP-8, Nov 2006
- Technical Adviser, Nigerian Delegation to 24th UNEP GC - Feb 07
- Member, UNIDO/GCLME Delegation to 2nd Global Conference on the Large Marine Ecosystem Conference, Qingdao, China September, 2007

Prof Alo has served the nation as Leader of Delegation of Nigerian NGOs to the World Summit on Sustainable Development, Johannesburg (WSSD) 2002, presently Chair of the 16-country UNIDO African Regional Guinea Current LME TDA/SAP Working Group; Member (Technical Adviser) of several Federal Government delegations to international Meetings on Environmental Treaties and Conventions.

Prof. Alo has served as the Consultant to the UNIDO, IMO, UNDP Sustainable Development Programme, UNSO/UNDP-UN Sahelian Office etc. These are in addition to having been Project Leader on over thirty-six oil and gas industry environmental studies projects in Nigeria.

Prof. Alo is a recipient of several academic awards and has served as member of the Regional Coordinating Board of UNEP's Cleaner Production Roundtable for Africa (CPRA) and UNESCO's International Steering Committee for Chemistry in Africa (AUPAC), and has served on the Nairobi-based International Advisory Board for I.D.R.C.'s African Technology Policy Studies Network. He is a member of Nigeria's National Committees on the Implementation of EIA in Nigeria; Implementation of the Stockholm POPs Convention, SAICM, GHS Implementation of the Biodiversity Convention; Chemical Tracking and Toxic Dump-Watch Programme (Basel Convention Matters) and several other Committees of the Federal Ministry of Environment, Housing and Urban Development.



Kingsley Owoniyi Ologe

1. NAME: Kingsley Owoniyi Ologe
2. DATE OF BIRTH: 9th November 1943
3. PLACE OF BIRTH: Iyah-Gbede; Ijumu L.G.A., Kogi State
4. QUALIFICATIONS:

i) B.A. Hons. Geography; First Class (ABU), 1967.
ii) M.Sc (Physical Geography of the Tropics), (University of Liverpool) 1968.
iii) Ph. D. (University of Liverpool), 1971.

5. HONOURS AND DISTINCTIONS:

i) Fulbright-Hays Honorary Fellow in Geography, University of Wisconsin, Madison; Sept.- Dec. 1975
ii) Fellow of the Nigerian Geographical Association (FNGA), 1998.
iii) Officer of the Order of the Niger (OON), 2002.

6. WORKING EXPERIENCE:

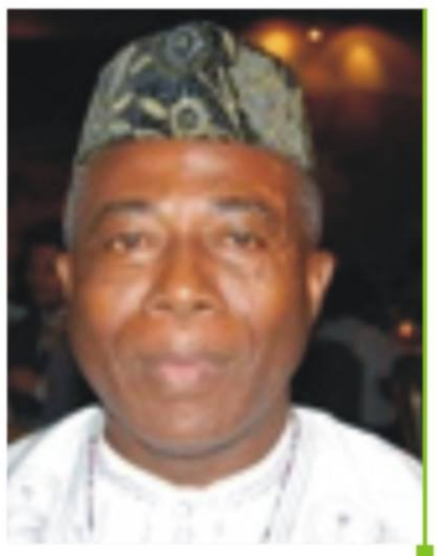
i) Appointed Lecturer in Geography at Ahmadu Bello University, Zaria, in February 1971.
ii) Promoted Professor of Geography in October 1981.
iii) Appointed Visiting Professor in the University of Jos, 1988 – 1989
iv) Appointed Professor of Geography, University of Abuja, Dec. 1990.
v) Retired voluntarily in August 2002.

Temi Emmanuel OLOGUNORISA

Temi Emmanuel OLOGUNORISA,
Professor and Director, Centre For Climate Change and Environmental Research,
Osun State University, Osogbo,Nigeria
Email: ologunorisatemi@yahoo.com
Tel.+234 (0) 8059986169

Prof. Ologunorisa is a Physical/Environmental geographer with research focus on climate change impact assessment, hydro climatology, climatic and environmental hazards, and disaster management. He is a full Professor of Climatology & Environmental Studies and Chair. Department of Geography and Resource Management, Osun State University, Osogbo, Nigeria. He also serves as the Director, Centre for Climate Change and Environmental Research in the same University. He attended the University of Ibadan where he obtained a B.Sc (Hons) degree in Geography, University of Jos where he received M.Sc degree in Hydrology and Water Resources, and University of Port Harcourt where he earned his Ph.D degree in Climatology. He has taught tropical climatology, applied climatology. hydrology and water resources, field and laboratory techniques, and environmental impact assessment for over one and a half decades in many Nigerian Universities.

Prof. Ologunorisa is a member of the American Association for the Advancement of Science (AAAS), Annals of the Association of American Geographers (AAAG), American Geophysical Union (AGU), Storm and Tornado Research Organization (TORRO) UK, International Association of Hydrological Sciences (IAHS), Association of Nigerian Geographers (ANG) and the Nigerian Meteorological Society among others. He is a member of the International Editorial Advisory Board of The International Journal of Meteorology. UK; a Reviewer for CATENA (a journal of hydrology, soil and geomorphology)Germany, International Journal of Biometeorology (The Netherlands), and Natural Hazards (the Journal of the Society for the Prevention and Mitigation of Natural Hazards) The Netherlands. He was an Associate Editor of the Nigerian Geographical Journal, and presently the Associate Editor of the Journal of Meterology and Climate Science. Prof. Ologunorisa was a Visiting Professor of Climatology to the Department of Geosciences, University of Missouri , Kansas City. Missouri. USA in Summer 2008, and he has over 60 scientific publications to his credit in reputable national and international journals.



Ajavon
Ayite-Lo Nohende

Family Name: AJAVON
Name: Ayite-Lo Nohende
Birth date: 1948, Cotonou (Benin)
Marital Status: Married
Nationality: Togolese
Gender: Male
DIPLOMA: PhD. 1984 Universite of Cote d'Ivoire
DOMAIN: Atmospheric Chemistry

PRIORITY AREAS OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT:

- UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE AND THE KYOTO PROTOCOL
- VIENNA CONVENTION AND ITS MONTREAL PROTOCOL

RESPONSIBILITIES IN GLOBAL CHANGE

During my career, I had the opportunity to serve in different positions both in international and national programmes: Director, Atmospheric Chemistry Laboratory, Former Senior Adviser of the Minister of Environment, Co-Chair Scientific Assessment Panel for the Montreal Protocol and the Vienna, Former Chair of the Consultative Group Expert (CGE) on Climate Change, Former Chair for the World Bank Carbon Finance Steering Committee, Member of the ICSU (International Council for Science) African Regional Committee, Member of IPCC, Chair of the GCLME pollution working group.

EMPLOYMENT

From 1974 – 2009, I served different positions as lecturer, researcher and consultant in several countries Benin, Gabon, Cote d'Ivoire, Germany, and Togo.

PROJECTS

I have actively participated in several projects with UNDP, UNEP, UNFCCC, ICSU, GCLME.

PUBLICATIONS

Sixty two (62) publications in atmospheric chemistry with more than forty (40) in climate change.

AWARD

I RECEIVED THE 2005 UNEP/WMO AWARD OF THE VIENNA CONVENTION FOR THE PROTECTION OF THE OZONE LAYER
RECOGNITION FOR CONTRIBUTION TO THE AWARD OF THE NOBEL PEACE PRICE FOR 2007 TO THE IPCC.

Nzegbule Emmanuel
Chukwunyere

Nzegbule Emmanuel Chukwunyere is my full name presently I am 43 years old and a Nigerian by birth. I hold a Ph.D with specialization in Plant Ecology. I have worked in the Ministry of Agriculture Plateau State as Agricultural Officer, Abia State University as Graduate Assistant; and currently a Senior lecturer at Michael Okpara University of Agriculture Umudike where I taught courses and conducted research in the field of Natural Resources Management, Environmental conservation and monitoring, biological productivity. I have had trainings and appreciation courses in leadership skills, computer software packages and keeping financial records. I have done some consultancy activities with International organizations, NGOs and Government ministries. Some of the consultancy activities were on Environmental Impact Assessment of various developmental resources.

There are a number of management administrative responsibilities I have been engaged being Acting Dean of a College in a University; a Program Coordinator of Women Children Development Action (WACDA) and Executive member of professional and Community- based groups. I have participated in some research activities on Climate Change and presented workshop papers on the subject also at local and international levels. There are a number of publications I have made which are outputs of my research activities. I belong to a number of professional organizations locally and internationally among them being NEST, American Society of Agronomy and LEAD International UK. Currently I am the Programme Director of the Nigerian Environmental Study/Action Team (NEST) an NGO involved in environmental issues. NEST is the local implementing partner for a nation-wide 4.5-year, donor-funded climate change project. I am the Project Coordinator of the Climate Change Project called Building Nigeria' Response to Climate Change.

Prof. Francis Bisong

Francis Bisong is Professor of Geography with specialization in Land Use Systems for Natural Resource Conservation and Management. He has about twenty years of University teaching and research experience at both graduate and undergraduate levels. He is currently the Deputy Dean of the School of Graduate Studies, University of Calabar. Professor Bisong has varied experience in field research and consultancy with numerous government and non-governmental agencies at local, national and international levels. Some of these include the World Bank, Ford Foundation, UK (DFID), CIDA, African Academy of Sciences, International Food Policy Research Institute (IFPRI), Cross River State Forestry Commission, etc.

He has undertaken numerous studies, with the application of participatory and conventional research methodologies, on the adaptation of forestry and agricultural land use systems to human and environmental changes; forestry and watershed assessments; biodiversity threat status of commercially exploited trees; and the application of biogeography to nature conservation planning. He holds numerous international fellowships and awards, namely: The Robert S. McNamara Fellowship of the World Bank, Capacity Building in Forestry Research (CBFR) Fellowship of the African Academy of Science, and the Salzburg Fellow on Sustainable Rural Community Development in Salzburg, Austria.

He is a council member of the Association of Nigerian Geographers (ANG), a member of the Common Wealth Forestry Association, the African Academy of Science, and the New York Academy of Science.

Prof. D.O. Adefolalu

Prof. D.O. Adefolalu obtained Ph.D (meteorology) at florida State University, Tallahassece- florida USA in 1974. Become Head of Research Nigerian Meteorologcal Services in 1975, Principal Research and Trainnig Institute of the Department in 1977. Initiated the West African Monsoon Experiment (WAMEX) of the WMO/FGGE in 1977-78 and was appointed senior lectuer Applied meteorology University of Calabar, Calabar in 1974.

Consultant/ WAMEX Activities in 1978-87.

Became Professor and Head of Department of Geography Fedral University of Technology Minna 1986. Dean Post-Graduate School 1990-97.

Director, Centre for Climate Change 1995-2007.

Chiarman, University Board of Research 1998-2003.

Scientic Advicer, Core Technical team for the President of Nigerian and Chiarman G77+China 2000- 2003 for UNFCCC. Consultant to UNDP,WMO,FAO and ADB.

Have superviced 20 Doctoral Students with six already of Professional rank in and outside Nigeria,

Prof. em.
Dr. Ernst Schrimpff

Prof. em. Dr. Ernst Schrimpff
born in 1939, Bogotá / Colombia, married, two children

1959- 65	Student at the University of Hannover (Landscape Arquitecture, Ecology)
1966- 72	Professional activities in Bogotá, Sta. Marta, Bucaramanga, Palmira and Cali Colombia (National Park planning, Regional planning, Integrated watershed management)
1973- 75	Postgraduate Student at the University of Cologne, Institute of Geography, Dr.-Thesis in Hydrology (Dr. rer. nat.) and Research Assistant / Instructor
1976- 84	Assistant professor at the Universities of Cologne and Bayreuth, Germany (Geoecology and Hydrology))
1985- 05	Full-time Professor at the University of Applied Sciences of Weihenstephan, Faculty of Landscape Architecture, Germany Teaching matters: Geology, Pedology, Hydrology, Renewable Energies
since 1989	Promoting member, secretary, chairman of the non-profit association „Sonnenkraft Freising e.V.“, Freising, Germany
since 1995	Vice-chairman of the „E.F.-Schumacher-Association for political Ecology e.V.“, Munch, Germany
since 1996	President of the Union of more than 100 Bavarian Solar Associations („Arbeitsgemeinschaft Bayerischer Solar-Initiativen“
since 2001	Promoting member and president of the German Federation of Pure Plant Oil („Bundesverbandes Pflanzenöle e.V.“ - BVP), Söhrewald, Germany

Prof. Olusegun
Adegbulugbe

Prof. Olusegun Adegbulugbe, a Professor of Energy and Environment System obtained a First Class Bachelor of Science in Electronics and Electrical engineering in 1976 from the Obafemi Awolowo University, Ile-Ife Nigeria and a Doctor of Science degree in Nuclear Material Engineering with a minor in Energy Planning and Management from Massachussetts Institute of Technology, Cambridge, Mass, USA. In both institutions he won several academic awards including Faculty of Technology, Obafemi Awolowo University prize with a GPA of 5.0 on a scale of 5.0, best American Nuclear Society (ANS) student paper in 1980 and 1981etc

Prof. Adegbulugbe was in 1977 a pioneering staff of the Centre for Energy Research and Development situated at Obafemi Awolowo University and rose to the post of research professor and director in 1992. He was appointed the Special Adviser on Energy Matters to the President from 2005 to 2007.

Prof. Adegbulugbe has been involved with energy and climate change issues for about three decades now. He has held many international positions including being a member of the United Nations Framework for Climate Change Convention (UNFCCC) Expert Group on Technology Transfer (EGTT) and lead author and Coordinating Lead Author of many Intergovernmental Panel on Climate Change (IPCC) reports. He contributed as a Coordinating Lead Author to the Fourth Assessment report which won the for the IPCC the 2007 Nobel Peace Prize.

Koehler Karl-Heinz

Family name	Koehler
First names	Karl-Heinz
Date and place of birth	15 August 1943; Meiningen, Germany
Religion	Christian
Civil status	Married, four children (born 1975, 1979, 1985 and 1987)
Nationality	German

Educational background

1971 – 1974	Postgraduate study, Ludwig-Maximilians University Munich (Germany)
Degree:	PHD
Thesis:	"Literary Language and Language Awareness at the turn of the Century (1900)"

1965 – 1971	Studies at Universities of Erlangen, Goettingen and Munich/Germany: German Language and Literature, History, Sociology, Politics and Pedagogy
Degree:	Staatsexamen (equivalent to MA)

Key qualification

More than 30 years' working experience in schools, scientific institutes, international organisations and at university focusing on educational concepts and their implementation, Education for Sustainable Development, Intercultural Learning, school development, evaluation, pre-service and in-service training of teachers

Lectures and presentations delivered by Karl-Heinz Koehler concerning the topic Education for Sustainable Development:

- Auckland, New Zealand 2003
- Abu Dhabi, UAE 2003
- Baku, Azerbaijan 2004
- Budapest, Hungary 2004
- Bonn, Germany 2005
- Paris, France 2006
- Vilm, Germany (International Academy for Nature Conservation) 2007
- Amman, Jordan 2008
- Feldafing, Germany 2008
- Barka, Oman 2008

Professional experience record

08/2008 up to now
Consultant; lectures/chairing workshops in Germany and Oman

02/2003 – 07/2008
UNESCO ASPnet National Coordinator Germany
Main area of responsibility: Planning and implementation of the network's policy, development of educational concepts, their implementation and evaluation, admission of schools into the network and their evaluation, planning of in-service training for the network's teachers, organizing awareness raising campaigns, e.g. for Education for Sustainable Development

10/2002 – 01/2003
Lecturer at the Ludwig-Maximilians University in Munich,
Educational Theory and Didactics

9/1991 – 1/2003
Head of Section at the Teachers' Training College Oskar von Miller in Munich
Responsibilities: training and assessment of young teachers

09/1985 – 08/1991
Teacher at the German School Brussels (Belgium) and Head of Department German as a Foreign Language on behalf of the Goethe-Institut (1987 – 1991)

08/1982 – 08/1985
Teacher trainer at the Teachers' Training College Max Planck Munich and teacher at the Grammar School Max-Planck-Gymnasium Munich

09/1978 – 07/1982
Head of Department (Social Studies) at the State Institute for School Quality and Educational Research in Munich

Responsibilities:
Planning and development of curricula, educational concepts and educational material; planning of in-service training in Bavaria

09/1976 – 08/1978
Teacher at the Grammar School Max-Planck-Gymnasium Munich

09/1974 – 08/1976
Training and teacher qualification at the Willstaetter Teachers' Training College in Nuremberg (Germany)

Language skills
German - native speaker
English - fluent in speaking and writing French - fluent in speaking and writing

Publications concerning Education for Sustainable Development
Koehler, K.-H. UNESCO ASPnet Schools and Internet. In: forum, 2003, No 3-4, pp 72-74 (in German)

Koehler, K.-H. Mass Media and the Focus of UNESCO ASPnet. In: forum, 2004, No 1, pp 4-12 (in German)

Koehler, K.-H. Learning Sustainability. In: forum, 2005, No 1, pp 5-7 (in German)

Koehler, K.-H. (ed.) Objective: Forward Compatibility – Contributions to the UN Decade Education for Sustainable Development, forum, 2005, No 3-4 (thematic issue, including articles with the topic climate change; in German) Koehler, K.-H. Sports – inspired by the ideas of UNESCO. In: forum, 2006, No 1-2, pp 7-9 (in German)

Koehler, K.-H. UNESCO ASPnet and the Challenge of Migration. In: German Commission for UNESCO (ed.): Migration as a Challenge, Bonn 2007, pp 12-21 (in German)

Koehler, K.-H. "… it is in the minds of men that the defences of peace must be constructed". The tasks of the UNESCO ASPnet. In: International Peace School Cologne (ed.): Peace Education, Cologne 2007, pp 263-268 (in German)
Koehler, K.-H. UNESCO ASPnet – Education for Living in a World Community in the Framework of a worldwide Network.
In: German Teachers abroad, 2008, No 2, pp 145-147
(partly as an interview; in German)

PLENARY SESSION 1

Climate Change and Africa: Challenges and Prospects

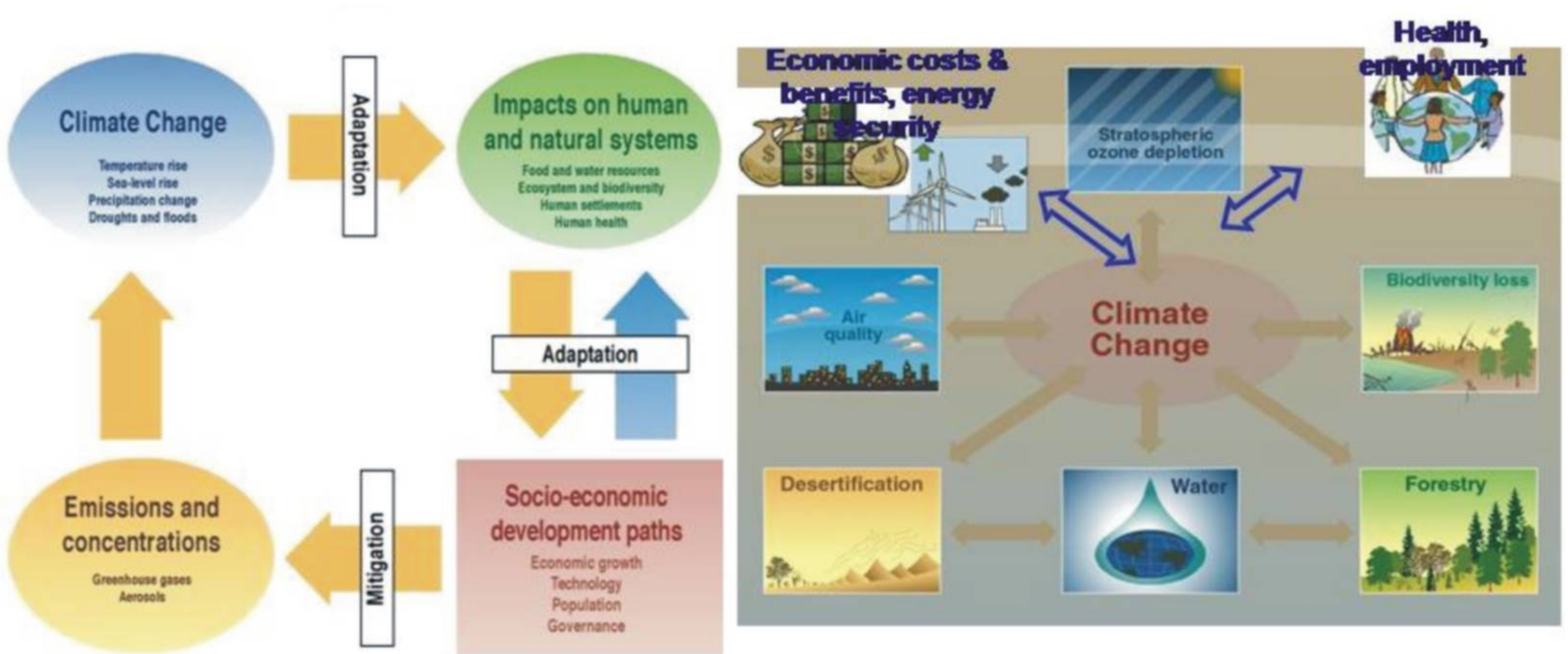
Prof Ogunlade R Davidson
Dean, Post-graduate Studies, University of Sierra Leone
Vice-chair, Intergovernmental Panel on Climate Change

Reclaiming the Environment: Challenges and Consequences of Climate Change
Lagos State Maiden Summit on Climate Change
Lagos, Nigeria
24 March, 2008

Contents of Presentation

- Introduction
- IPCC AR4 findings
- Climate Change and Africa
- Climate Change Opportunities for Africa
- Conclusions

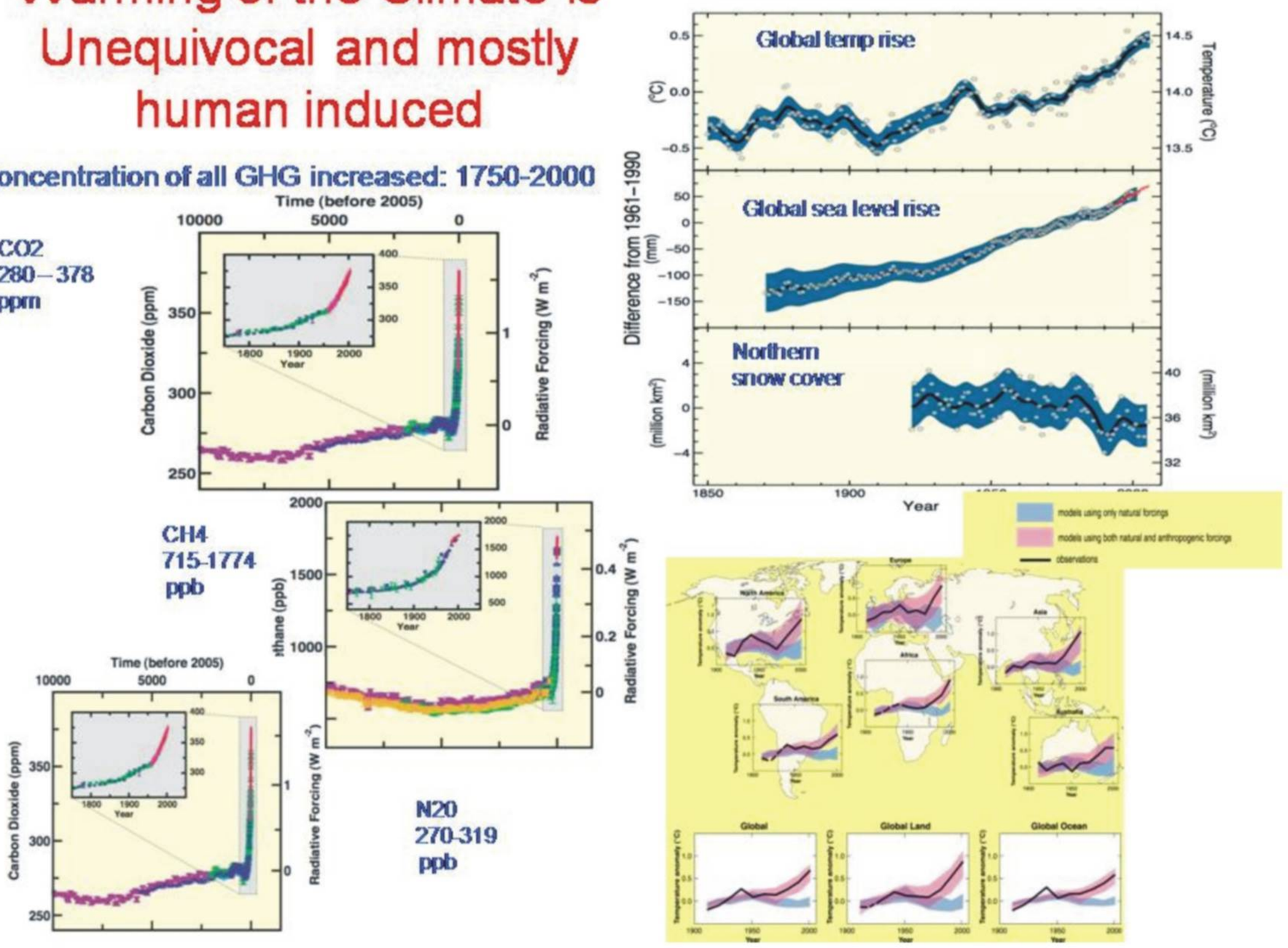
Climate Change for vulnerable countries is more a developmental and Poverty Reduction than an environmental Problem



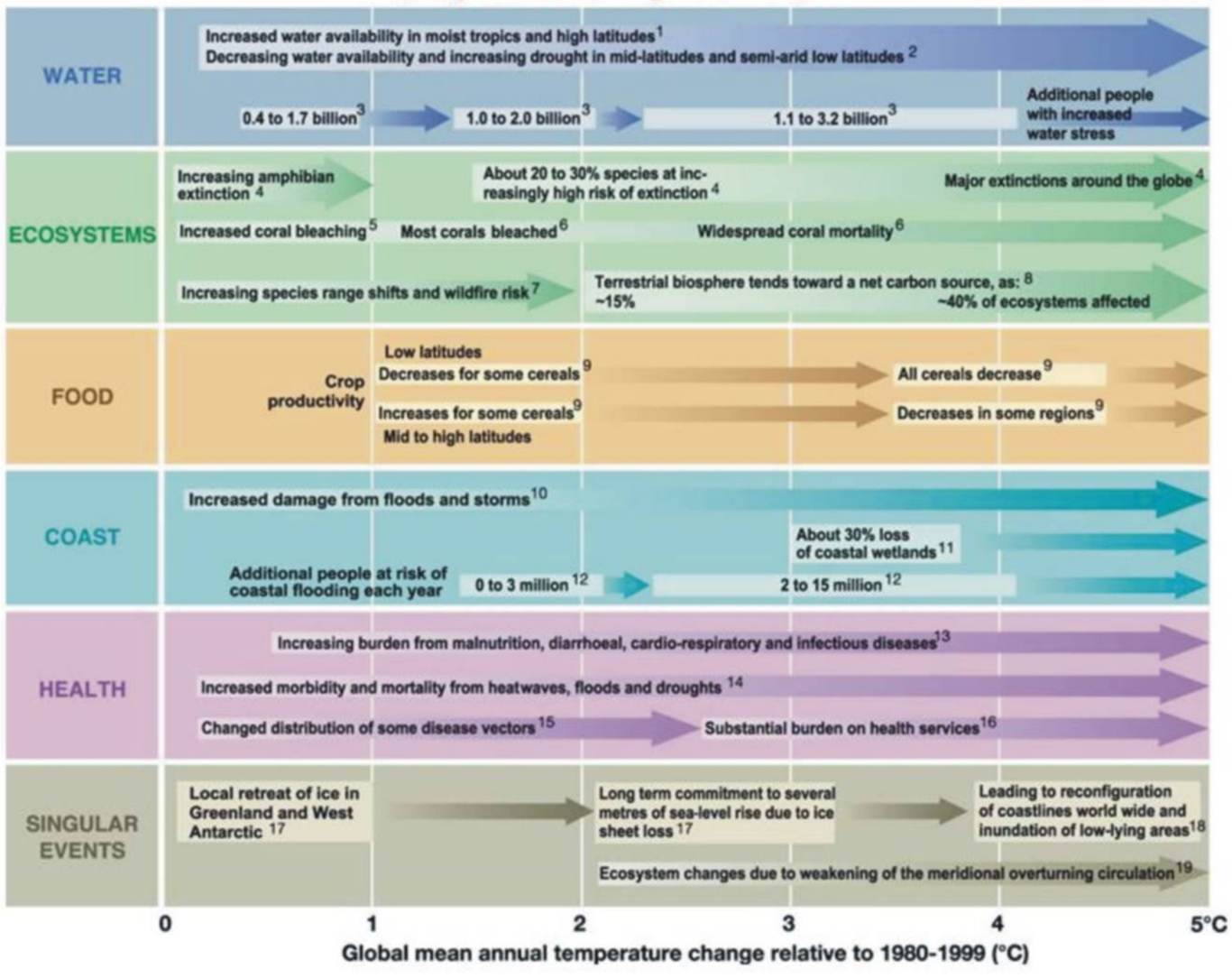
- **Overall Ultimate Objective of UNFCCC**
  - Stabilise atmospheric GHG concentration to prevent dangerous levels
  - Enable economic development to progress in a sustainable manner and ensuring that food production is not threatened

African Countries only emit less than 3% GHG but will suffer the most from climate change impacts

Warming of the Climate is Unequivocal and mostly human induced

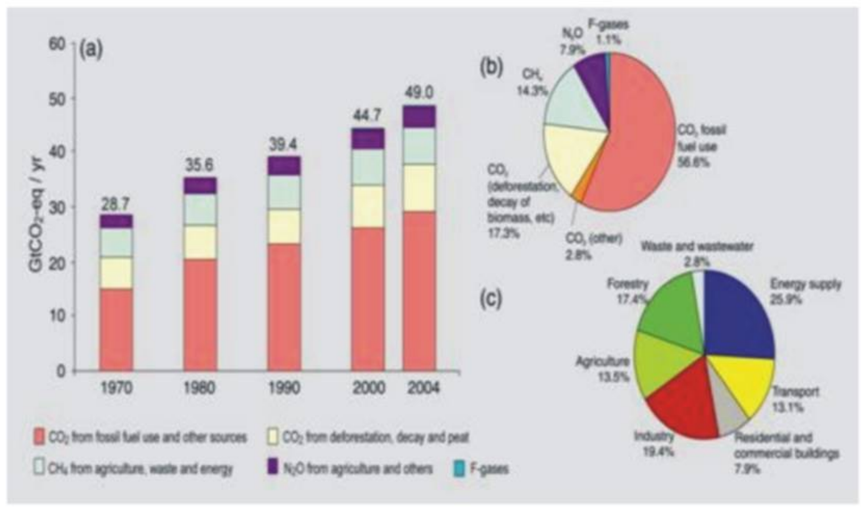


Impacts by sector

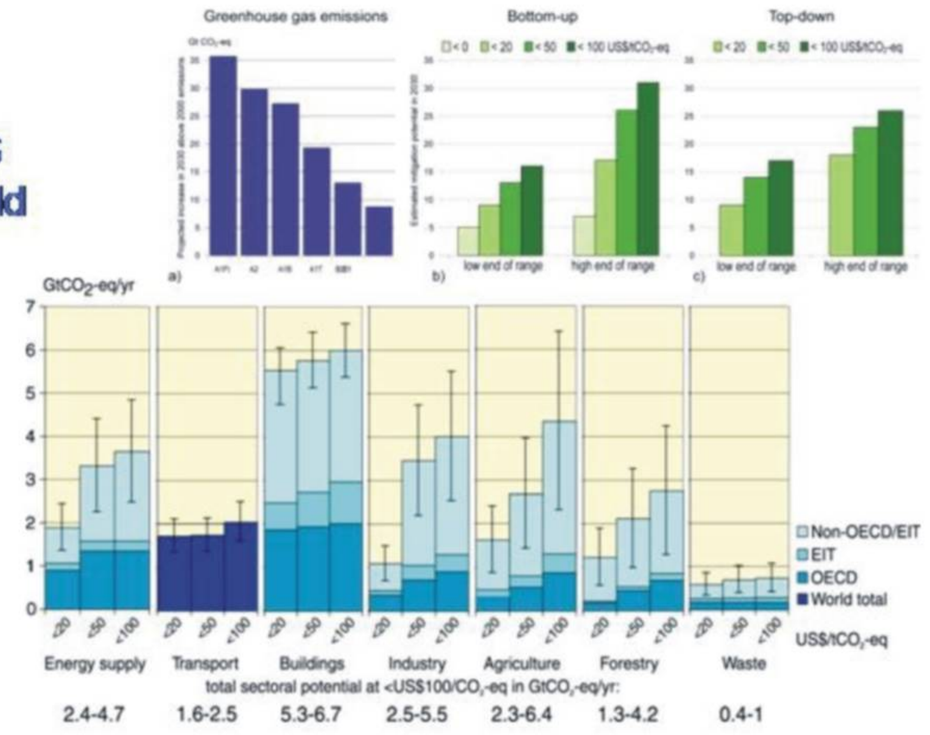


Mitigation Potential Exist

Between 1970 and 2004 GHG emissions have Increased by 70%



Projected GHG emissions using SRES Will increase between 25-90% but could Be offset by mitigation potential



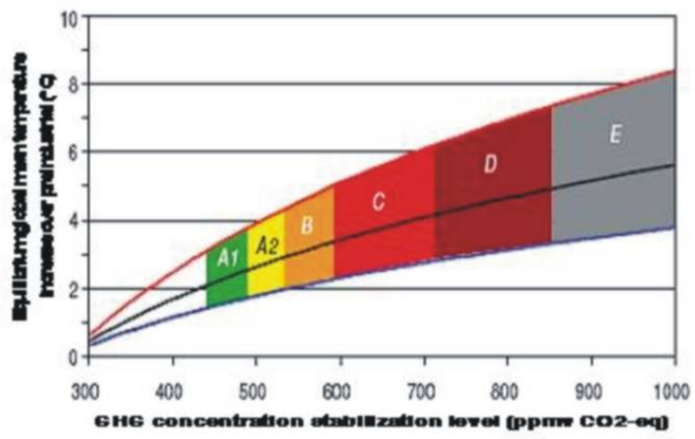
All sectors can contribute but differ in shares and among sectors

GHG Stabilisation in the Short Term is desirable

Suggested Reduction Targets for Annex 1 & non-Annex 1 Countries

Scenario category	Region	2020	2050
A-450 ppm CO_2-eq	Annex I	–25% to –40%	–80% to –95%
	Non-Annex I	Substantial deviation from baseline in Latin America, Middle East, East Asia and Centrally-Planned Asia	Substantial deviation from baseline in all regions
B-550 ppm CO_2-eq	Annex I	–10% to –30%	–40% to –90%
	Non-Annex I	Deviation from baseline in Latin America and Middle East, East Asia	Deviation from baseline in most regions, especially in Latin America and Middle East
C-650 ppm CO_2-eq	Annex I	0% to –25%	–30% to –80%
	Non-Annex I	Baseline	Deviation from baseline in Latin America, Middle East, and East Asia

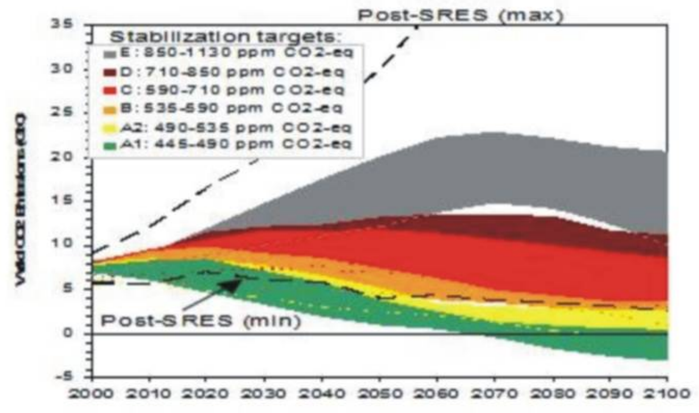
The lower the stabilisation level, the earlier global GHG will go down



Estimated global average macro-economic costs by top-down models represent a low share of GDP

(co-benefits & avoided CC damages not included)

Stabilization levels (ppm CO_2-eq)	Median GDP reduction (%)	Range of GDP reduction (%)	Reduction of average annual GDP growth rates %
590-710	0.2	-0.6 – 1.2	< 0.06
535-590	0.6	0.2 – 2.5	<0.1
445-535	Not available	< 3	< 0.12

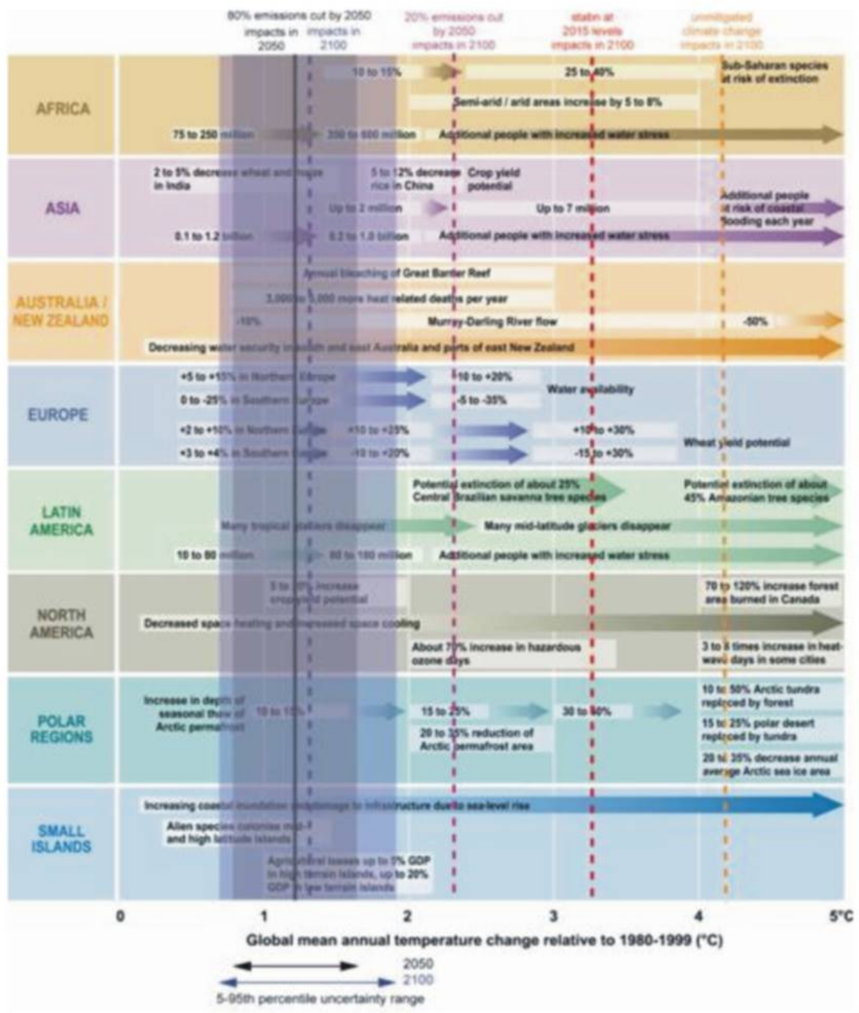


Climate Change Policy alone will not solve the Climate Change problem

- Significant number of **mitigation and adaptation technologies** are available to solve the climate change problem
- Major **policies and measures** by **government** are required:
  - *RD&D efforts*
  - *Investments* in new technologies
  - Tax credits
  - Standard setting
  - Technology development and transfer
  - Market creation and development
- An effective **carbon-price** signal could realize significant mitigation potential
- Linking **sustainable development** with **climate change policies** provide governments the opportunity to avert the possible climate threats
- An effective **climate change strategy** will require the integration of **development, equity and sustainability**
- *Macro-economic policy*: taxes, subsidies, other fiscal policies, structural adjustment
- *Trade policy*: "embodied carbon", removing barriers for low-carbon products, domestic energy sources
- *Energy security policy* : efficient energy use, domestic energy sources (low-high carbon)
- *Access to modern energy*: bio-energy, poverty tariffs
- *Air quality policy*: clean fuel
- *Bank lending policies*: lending for efficiency/ renewable energy, avoid lock-in into old technologies in developing countries
- *Insurance policy*: Differentiated premiums, liability insurance exclusion, improved conditions for green products

Current committed warming makes adaptation unavoidable, worse for vulnerable countries

- G8 Summit call for 50% GHG reduction by 2050 below 1990
- EU target of 2 C above 1990
- Bali road map: Some call for 50% reduction, others 80% below 1990
- IPCC-AR4:
  - 50% reduction will not avoid major impacts and stabilisation of 450-550 ppm: EU target - 2 C above pre-industrial or 1.6 C above 1990). Serious water stress
  - 80% reduction will lead to 400-470 ppm. Will not exceed 2 C in 2050. Reduce water stress



The Changing Climate of Africa

- The receding glaciers and snow caps of Mount Kenya and Mount Kilimanjaro causing water runoffs. In Mount Kilimanjaro, the glaciers have shrunk by 25% since 2006 and if continued at this rate may disappear by 2015.
- The Gum Arabic belt in the Sudan, an economically important crop has shifted southwards and June–August rains now occur a month later so affecting agricultural practices in the region.
- A 25% decrease in average rainfall over the Sahel region in the past 30 years
- Precipitation has fallen by up to 2.4% per decade in tropical rainforests since the mid 1970s.
- Lake Chad which was Africa's third largest fresh water basin has reduced from 25,000 sq.km to 500 sq.km.
- The repeated droughts and floods in eastern Africa resulting in major economic losses as was the case of Ethiopia and Mozambique. The Mozambique floods in 2000 that affected 4.5 million people, caused 700 deaths and economic losses estimated at $US 500 million with a decline in GDP growth rate from 10% to 2%. Similar situation occurred with repeated droughts in 1968, 1994 and 2005 in Ethiopia.
- Deforestation in many parts of the continent. A forest loss of about 5m hectares per year has been estimated.

Climate Extremes projected to worsen

Drought in East Africa

Floods in Mozambique

Climate Change Refugees will increase

- Projected sea level rise would increase flooding, particularly on the coasts of eastern Africa;
- Sea level rise will likely increase the high socioeconomic and physical vulnerability of coastal cities.
- The cost of adaptation to sea level rise could amount to at least 5-10% of GDP.
- Climate change and climate variability will only add stress to existing stresses in the continent

Vulnerability of Africa

- Africa is one of the most vulnerable to both climate change and climate variability – aggravated by the interaction of multiple stresses
- Major economic sectors are vulnerable to climate sensitivity with huge impacts –exacerbated by current developmental challenges (poverty, institutional and infrastructure weakness, poor access to capital, ecosystem degradation) leading to weak adaptive capacity.
- Projected Climate Change by 2020:
  - 75-250 million will be exposed to water stress
  - Yields from rain-fed agriculture could reduced by up to 50%
  - Access to food will be strained for many countries
  - Impact on fisheries will be severe, 14 out of 2o most vulnerable countries are in Africa
- By 2080, an increase of 5-8% of arid and semi-arid land
  - 3 to 4 deg C rise using 1980 as baseline, 1.5 times global average
- Towards end of 21st century
  - Sea-level rise affecting low-lying coastal areas with large populations
  - Cost of adaptation could amount to at least 5-10% of GDP
  - Fish stock may reduce especially for inland countries

The Changing Face of Africa

African economies, both oil producing and oil importing doing well since 2000, due to improved macro-economic stability and commodity prices

Conflicts have declined significantly

Proportion of population living on less than $1/day is declining so as the population growth rate in most countries

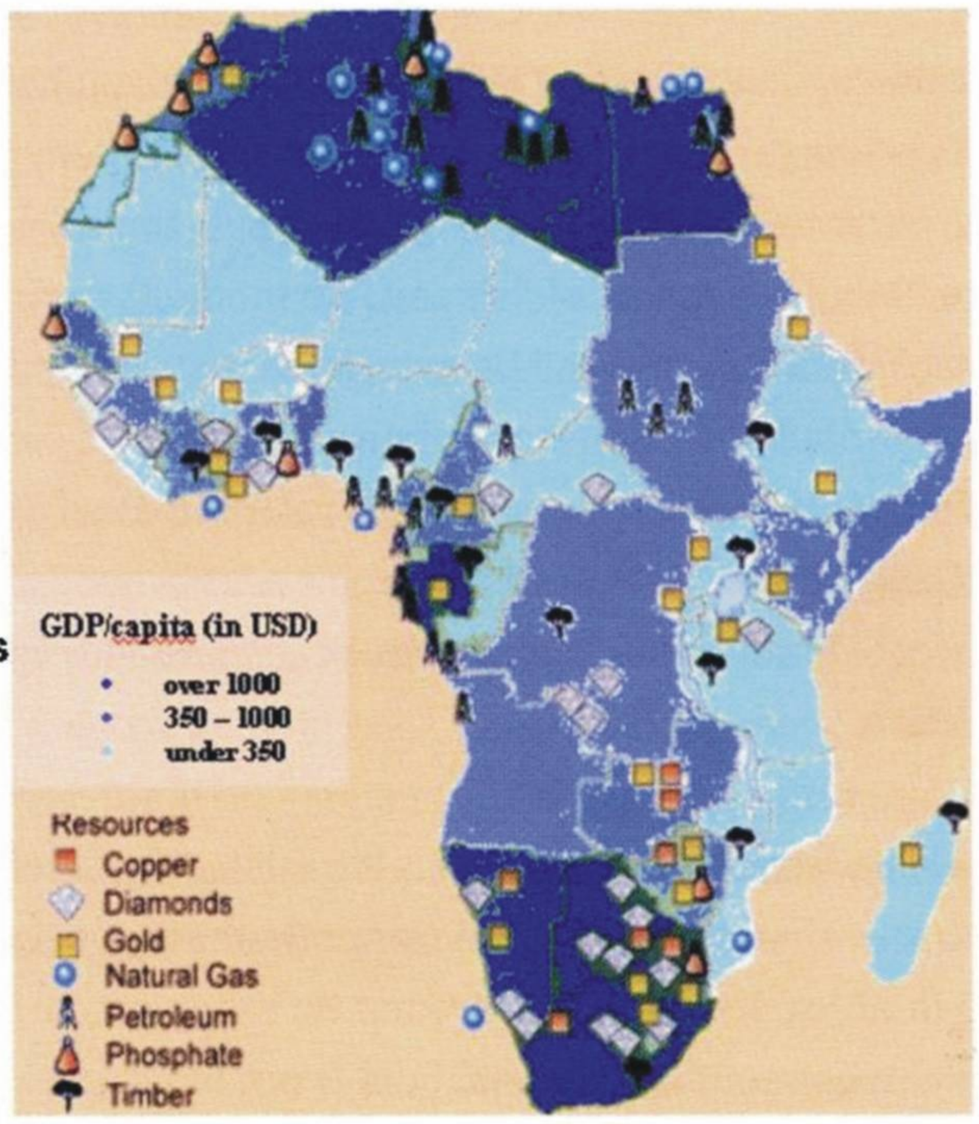
School enrolment increasing substantially

CLIMATE CHANGE OPPORTUNITY

Africa is resource rich

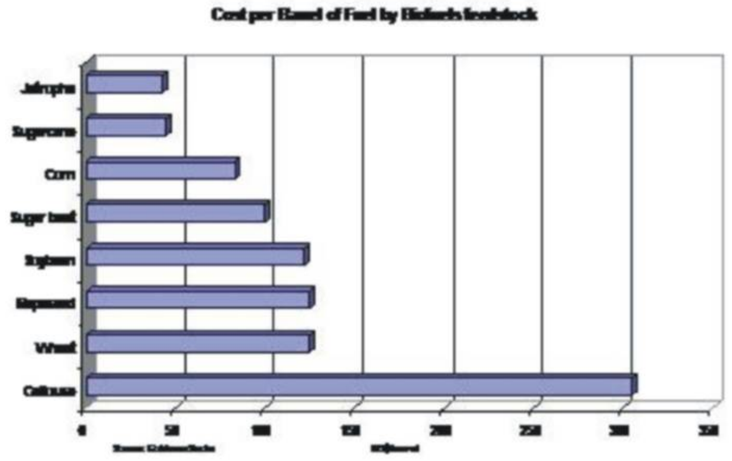
Africa needs export diversification

Development of these huge resources using well known Sustainable and less carbon intensive approaches will be a Better strategy for African countries



Energy Growth Options for CC, SD & MDGs – Biofuels

- Bio-fuels have a future for Africa if based on using agricultural and forest wastes, urban waste, and non-food crops.
- With adequate finance, capacities and adequate technology transfer, Africa can produce bio-fuels for both consumption and exports, however the following are needed:
  - Integrate and better coordinate policy on bio-fuels
  - Undertake a proper assessment of benefits of trade, use and production of bio-fuels with suitable monitoring mechanism
  - Creation of a system of benefits for role of carbon management from bio-fuels
  - Use modern information instruments to build consensus in bio-fuels
  - Increase support including investments in R&D,D
  - Build capacity to manage issues relating to the production of bio-fuels (water, land, other inputs)
  - Improve understanding of inter-linkages between bio-fuels and climate change



Agricultural and wood waste

Energy Growth Options for CC, SD & MDGs – Renewable Energy

- Renewable energy systems can be used as stand alone or mini-grid based on
  - Needs assessment
  - Provision of wide technology choice
  - Facilitation of technical back-up
  - Provision of subsidised financial system
  - Support existing cooperatives or promote new ones

Courtesy of The National Renewable Energy Laboratory (NREL)

CLIMATE CHANGE OPPORTUNITY: REDUCING GAS FLARING

Gas flaring in Nigeria, Angola and other African Countries exceeds 60-70%

Legislation are in place for reducing gas flaring to 10% by 2009/2010 in Nigeria

Reduction of gas flaring from associated gas from Oil Fields can provide up to large quantities of electricity used in the continent

This provide a CDM opportunity

Adaptation Options

- Building adaptation Capacity
  - Organisational capacity and institutional building
  - Maximising existing knowledge and experiences
  - Promote regional, sub-regional and national networks
  - Developing baseline assessments
- Adaptation Actions/Projects
  - Awareness raising of stakeholders
  - Research to support actions
  - Develop early warning systems
  - Mainstreaming adaptation into development planning (climate proofing)
- Synergies with other issues
  - Synergies with biodiversity and forests
  - Synergies with desertification and land degradation
  - Links to humanitarian crises
  - Links with disaster management

Financing and Technology Options

- New Approaches to technology acquisition
- Development of National System of Innovation (NSI)
- Technology and market assessment
- Equipment supply focus and application, value added and user focus
- Economic viability and policy, financial and institutional needs and solutions
- Technical demonstration and business demonstrations, financial and institutional models
- Donor grants and risk and costs sharing with donors

Financing Opportunities for Climate Change

- **Mobilising local Financing**
  - Local Bond market, insurance funds, shares
- **Aid and Grants**
  - More rationalised & coordinated use
  - Use of Aid and Grants as Leverage funds
- **Foreign Direct Investments**
  - Redirect to priorities
  - Develop the demand
- **UNFCCC Process**
  - CDM funds
  - Special climate Change Funds: US$90 m pledged, US$ 36 m allocated
  - Least developed Countries Fund: US$ 180 m pledged, US$ 14 m allocated. Limited support for NAPAs.
  - Strategic Priority "Piloting an Operational Approach to Adaptation" under GEF Trust fund: US$ 50 m
  - Small grants programme under GEF Trust fund
  - Adaptation Fund under KP: 2% levy on CDM. Projections- US$ 80-300 m/yr
- **Bilateral Donors and Foundations**
  - French Global Environment facility
  - Canadian and UK cooperation for Climate Change adaptation in Africa (CCAA)
  - USA collaboration on technology with South Africa
  - G8 pledged US$ 1.5 Bn
  - Rockefeller foundation on climate change adaptation
- **Disasters Risk reduction funds**
  - Global Facility for disaster reduction and recovery

Conclusions

- National and regional coordination mechanisms are crucial for the mobilisation of external funding
- Development of technological policies that do not only develop and promote technologies but also for innovation
- Well structural markets that attract investments, especially for infrastructural development with indigenous efforts are needed
- Experiences of local entrepreneurs must be enhanced to be fully involved in climate change mitigation and adaptation
- Institutional and human development capacities, especially in market development is very important
- Development of research and development capacity in climate change
- Sustainable Development policies will promote climate change concerns
- Support local initiatives in financing, technology development and institutional strengthening

GLOBAL CLIMATE CHANGE CHALLENGE AND PROSPECTS: CAPTURING THE OPPORTUNITIES

Emmanuel Oladipo

IEM Nigeria Niger Project, Niamey

Scale of the challenge

- **climate change-induced extreme weather events could reach 0.5-1% of GDP by the middle of this century;**
- **a 2 to 3 degree Celsius rise in temperature could reduce global output by 3%;**
- **5 degrees rise - up to 10% of global output could be lost;**
- **would cost 1% of GDP to stabilize emissions at manageable levels;**
- **climate change also affects every other environmental issue - deforestation, pollution, energy production, drought and desertification, etc.**

Prospects

- **If climate change a main challenge to our development, it also presents the opportunity for our generation.**

Example:

- Adoption of efficient electricity production in developing countries could lead to higher employment and income generation.

Key message:

- Good investment opportunities exist in global climate change solutions for our business and private sector operators.

Why the concern?

- **Significant social, cultural, economic and ecological disruption from climate-related extremes, especially floods and droughts.**
- **Infrastructure damage from extreme weather – Niger Delta and coastal areas, including Lagos State, likely lead to be vulnerable.**
- **Loss of biodiversity – from ecosystems to species level – which would vary from region to region.**
- **Diseases such as malaria are likely to have wider ranges, impacting more poor people that are already most affected by such diseases.**

Why the concern?

- **Changing rainfall patterns could devastate the rain-fed agriculture and lead to diminished food security.**
- **Sea level rise would lead to increasing coastal inundation and flooding of low-lying areas of Lagos and other urban coastal areas.**
- **The very poor and those who are socially and economically disadvantaged in the country would be disproportionately vulnerable.**
- **Vulnerability will depend on the effectiveness of adaptation and the distribution of coping capacity in the country, which will vary from region to region.**

Responding to the change

Three main options.

- **Remain skeptical and do nothing;**
- **Undertake *mitigation measures* (such as reductions in emissions of greenhouse gases and black soot) to prevent the degree of climate change from becoming unmanageable;**
- **Develop *adaptation measures* (such as building irrigation systems and adjusting agricultural practices) to reduce the harm from climate change that proves unavoidable.**

Adaptation

- **Effective national adaptation strategies must be implemented through a holistic approach incorporating bottom-up and top-down levels. They may include:**
  - measures to enhance the scientific basis for decision making;
  - methods and tools for the assessment of adaptation;
  - education, training and public awareness on adaptation, including for young people;
  - promoting individual and institutional capacity-building;
  - technology development and transfer;
  - promotion of local coping strategies; and
  - legislation and regulatory frameworks, which promote adaptive-friendly action.

Mitigation

Agricultural Sector

- ***Reducing emissions*** through efficient management of agricultural ecosystems – e.g. through managing livestock to make more efficient use of feed;
- ***Enhancing removals (of carbon dioxide):*** through afforestation and reforestation
- ***Avoiding (or displacing) emissions:*** crops and residues from agricultural lands can be used as a source of fuel, either directly or after conversion to fuels such as ethanol or diesel.

Mitigation

Other sectors

- promotion of increased use of renewable energy sources such as wind, solar, geothermal etc.
- development of energy efficient buildings; and
- promotion of energy-saving transportation systems.

Sustainable approach to climate change

The most effective way to address climate change is to adopt a sustainable development pathway that shifts our development process to environmentally sustainable technologies and promotes energy efficiency, renewable energy, biodiversity, particularly forest, conservation, reforestation, water conservation, etc.

The role of business

Business should be:

- **Ready to adapt to the physical risks presented by climate change and ensure that they have the systems in place in order to minimize potential disruptions.**
- **Ready to utilize the opportunities that may emerge from changing socioeconomic and market conditions that could result from global and national responses to climate change – e.g. providing goods and services needed to aid adaptation across society or to deliver services or expertise to help different populations to deal with climate change.**
- **Willing to play an active role in the implementation of comprehensive "Green growth" approach that is being promoted globally – e.g. alternative energy businesses and green building practices**

The role of business

- Existing clean technologies need to be rapidly picked up by the private sector and deployed widely through technological cooperation between industrialized and developing countries.
- Business will have to seek partnership with Government.
- Governments can use a wide range of policies and measures that address climate change and promote win-win socio-economic benefits.

Example of Business Growth Opportunities for Climate Friendly Technologies

Technology Type	Illustration of size and type of opportunities	Relevance to Niger
Efficient buildings	Billions of efficient appliances, millions of high efficiency heating and ventilation systems, advanced systems controls, etc	Great opportunities for investors in Nigeria as nearly all our public and private buildings are extremely energy inefficient.

Example of Business Growth Opportunities for Climate Friendly Technologies

Technology Type	Illustration of size and type of opportunities	Relevance to Niger
Biofuels	Billions of tons of crop yields, major markets for advanced seed stocks and crop inputs, revenue from millions of acres of now-marginal land, thousands biofuel plants, millions of "flex-fuel" vehicles, etc	Degraded lands can be rehabilitated with biofuel or energy crops such as *sweet sorghum, rapeseed and jatropha curcas*

Conclusion

- Skillful planning and implementation required to reduce GHGs and adapt to climate change.
- Part of this strategy is for us in Nigeria to recognize the increasing role of business as a source of solutions to global climate change.
- There is a wide range of activities that businesses can undertake to reduce their contribution to climate change - implement green power programs and cogeneration projects; develop energy-saving processes and products, clean fuels, biomass energy, clean-burning vehicle engines and much more.
- With assistance from governments, they can play an important role in the climate effort through partnerships.

Conclusion (cont.)

- Both research partnerships and partnerships in the development of climate policy, can help ensure a factual basis about what can be achieved, how to achieve it and when.
- Governments need to provide business with certainty of direction.
- The challenge is to continue to create the frameworks and partnerships that will allow business to play its essential role in protecting the climate.
- Lagos State as the economic hub of the country stands to gain maximally from partnering with the business community to tackle the problem of climate change

Thank you for listening

PLENARY SESSION 2

Governance, Environmental Sustainability and Climate Change

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A Presentation at the Lagos State Maiden Summit on Climate Change

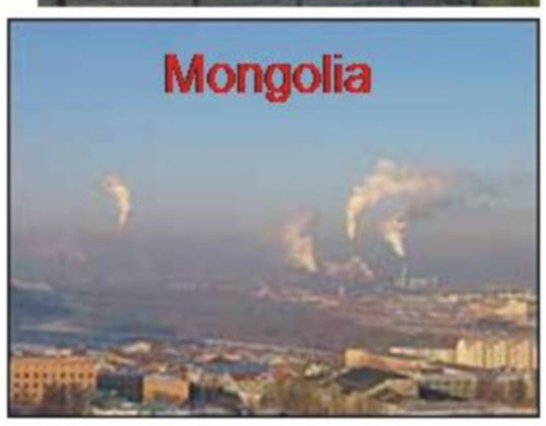
24-26 March 2009
Lagos, Nigeria

What is environmental sustainability?

- Let me first start with environmental sustainability.
- What is environmental sustainability?
- What make our environment unsustainable?

Unsustainable development: Emission of greenhouse gases (GHGs), which cause global warming and induce climate change. Climate change, in turn, has profound impact on socio-economic development.

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxides (N_2O)
- HFC, PFCs, SF_6
- CFCs, HCFCs,

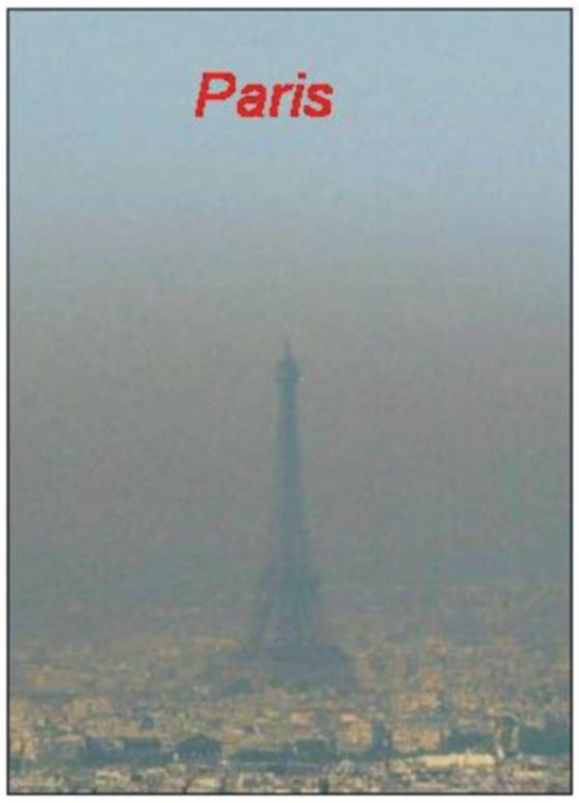


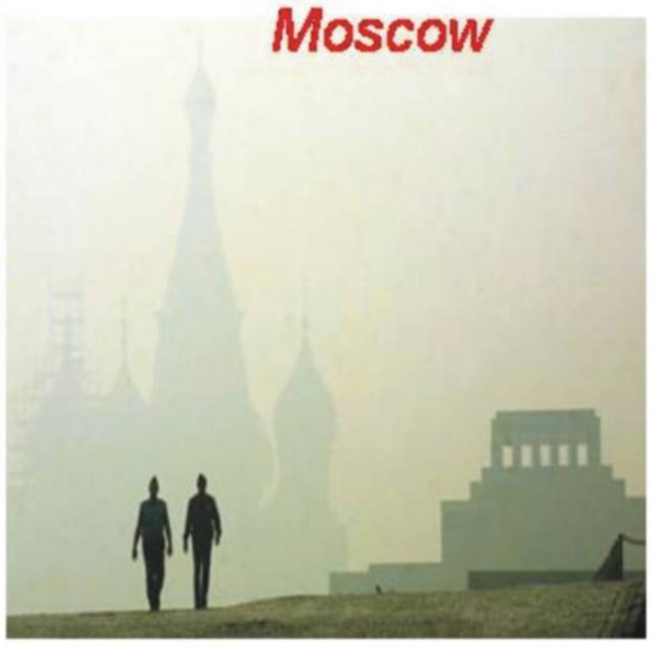
Unsustainable transport contributes to GHG emissions, poor air quality and congestion time and significantly affects public health, productivity and economy

More efficient use of motorbikes but unsafe in Hanoi (Vietnam) which currently has 1.5 million motorbikes

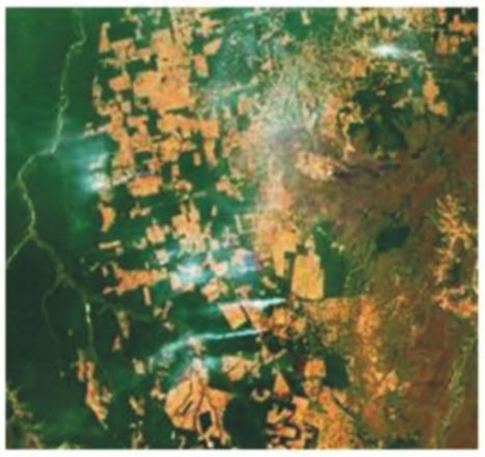
When our atmosphere has reached its "*carrying capacity*" (or *sustainability*), it will be choked with polluted air….

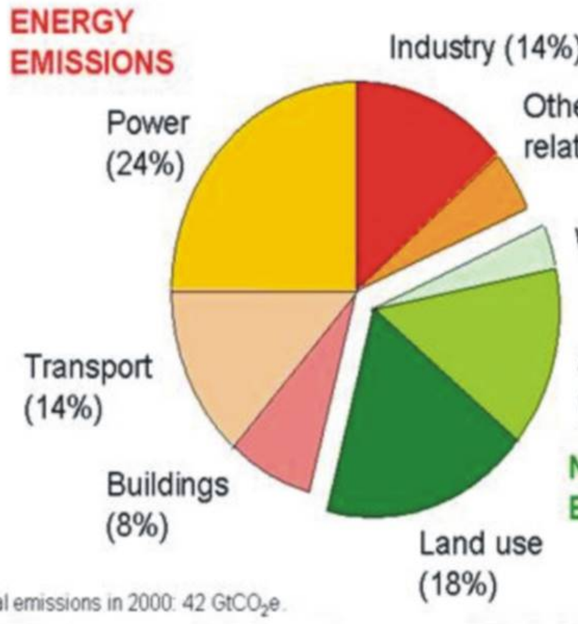
Poor air quality is an indicator of environmental unsustainability that has significant socio-economic implications





Deforestation



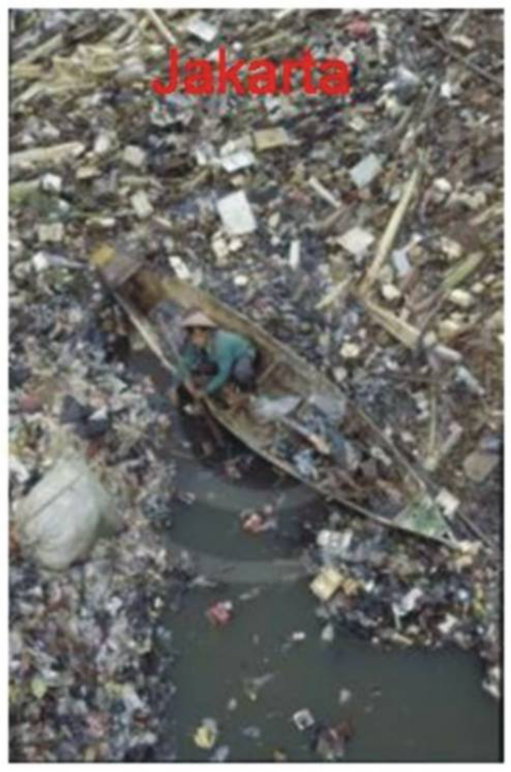


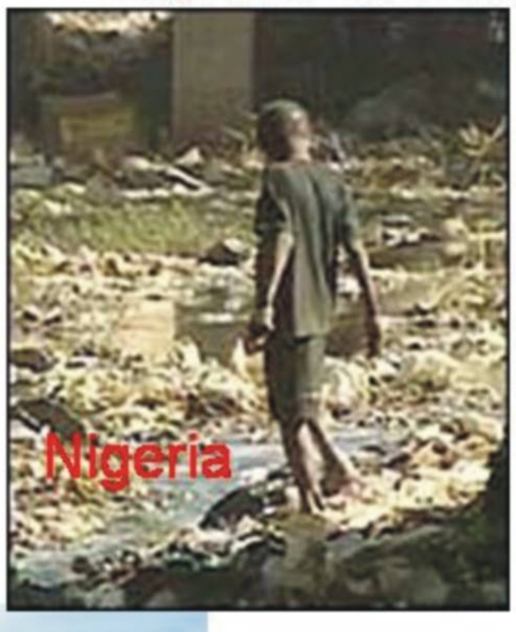
(Stern Review, 2007)

- Curbing deforestation is highly cost-effective, and significant
- There should be strong international support for action to avoid deforestation – e.g. a fund for 5 years of $10-15 billion per year could cut deforestation in half.

Forest fires-induced haze from slash and burn practice in Indonesia affected Malaysia, August 2005

Water Pollution – another indicator of environmental unsustainability that has significant socio-economic implications

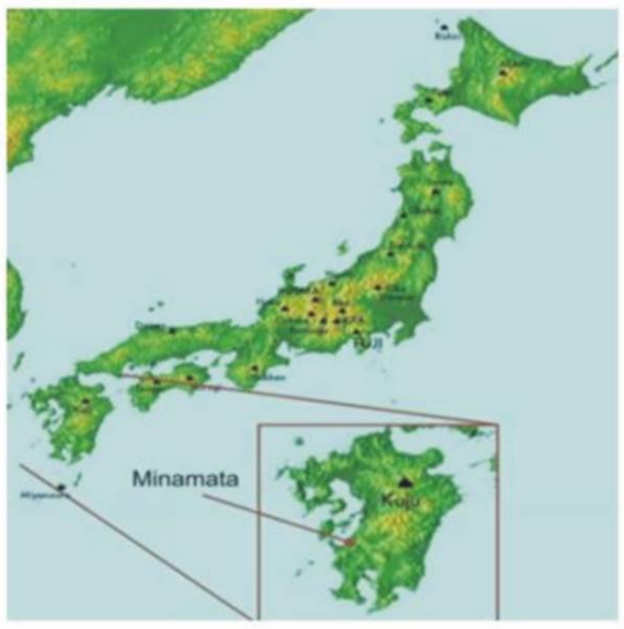


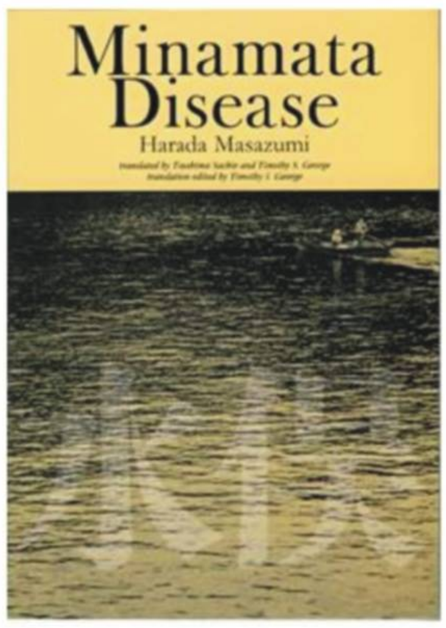


Water Pollution – another indicator of environmental unsustainability that has significant socio-economic implications

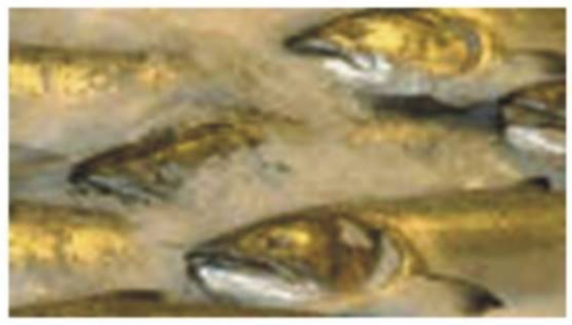
Developed countries are no exception

Minamata disease caused by methyl mercury pollution from industry



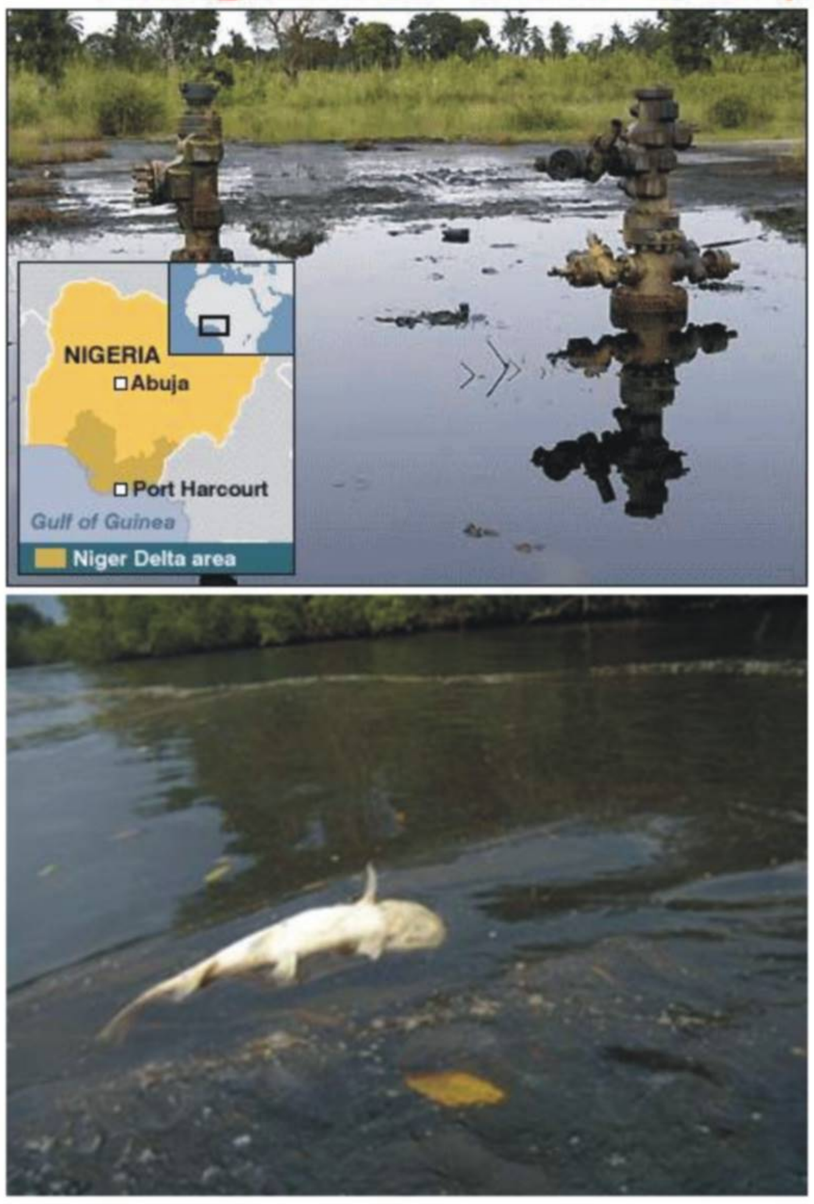


- First discovered in Minamata city in Kumamoto prefecture, Japan in 1956, though the pollution continued from 1932 to 1968.



Arsenic poisoning because of ground water pollution, Bangladesh. This woman's hardened, yellowed, blistered hands are typical symptoms (Photographs by Brent Stirton)

Oil Pollution in Wetlands. Sea-level rise and storm surges will make the pollution more widespread

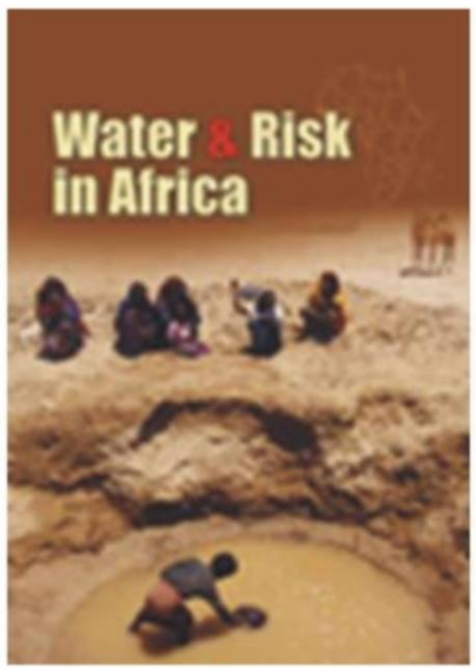


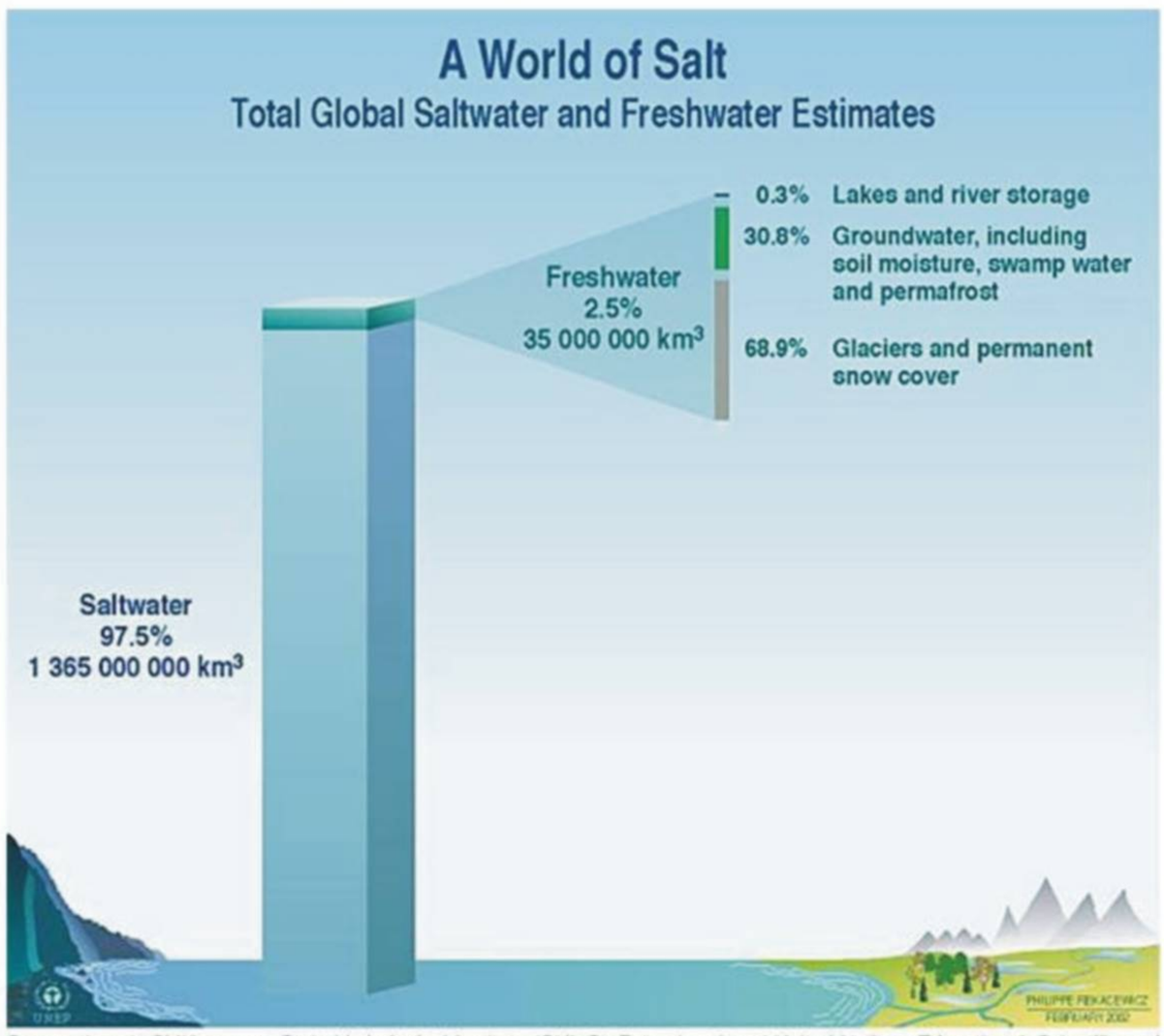
Marine Pollution

In UAE, oil polluters could face death penalty!

Marine pollution could destroy coral and other marine species and micro-organisms

Water pollution could reduce fresh water availability (e.g., Lake Victoria), hence affect environmental, social and economic sustainability



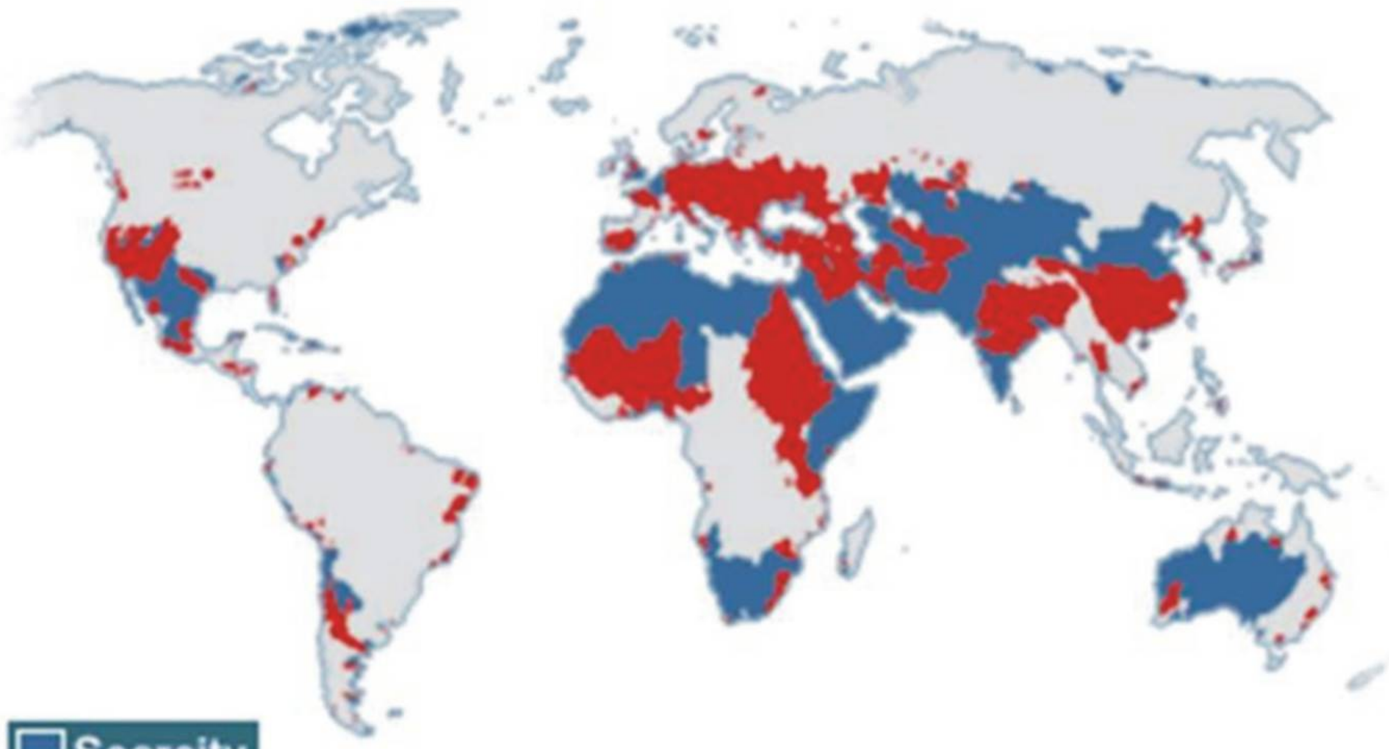


Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999.

- Climate change and variability will likely impose additional pressures on water availability, water accessibility and water demand in Africa along with population growth and land-use changes. A 3°C temperature increase could lead to 0.4 –1.8 billion more people at risk of water stress (IPCC, 2007)

Water conflicts have already led to wars in some parts of the world!

Predicted water scarcity and stress in 2025



SOURCE: UNEP

- An estimated one-third of the world's population currently lives in water-stressed countries. This is set to increase to two-thirds within 25 years.
- Africa and Asia are already hard-hit by water stress.
- Increasing populations will create more pressure in the coming decades.

Projected precipitation increases *very likely* (>90%) in high latitudes, and decreases *likely* (>66%) in most subtropical land regions, continuing the broad pattern of precipitation changes already observed.

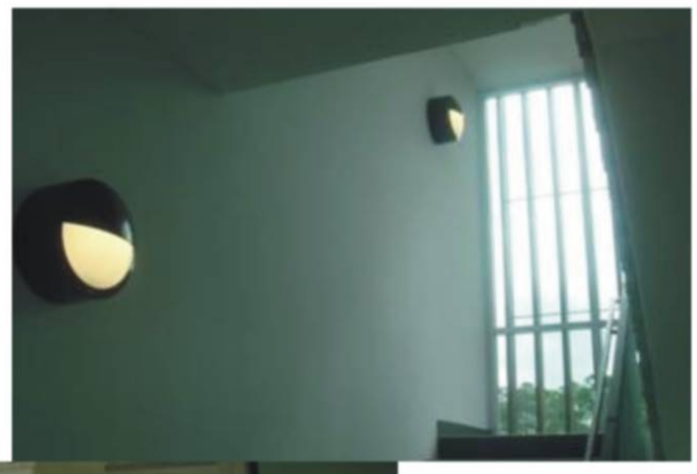
Unsustainable consumption - Wastes Generation

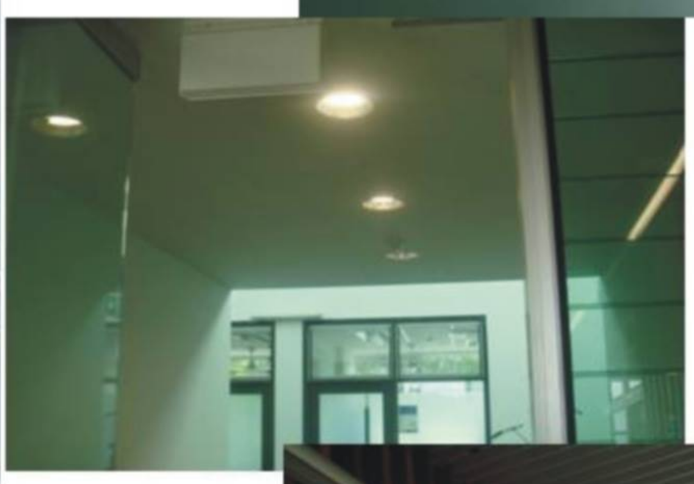
"Waste" may be reused, recycled and recovered or even turned into energy (e,g,, CDM projects)!

Kepong area, Malaysia

- To be sustainable, our society should practise "*waste minimization*" or "*zero waste generation*" rather than "*waste management*"
- Once wastes are generated, the "*management*" will never end!

Energy sustainability is an important element for environmental sustainability

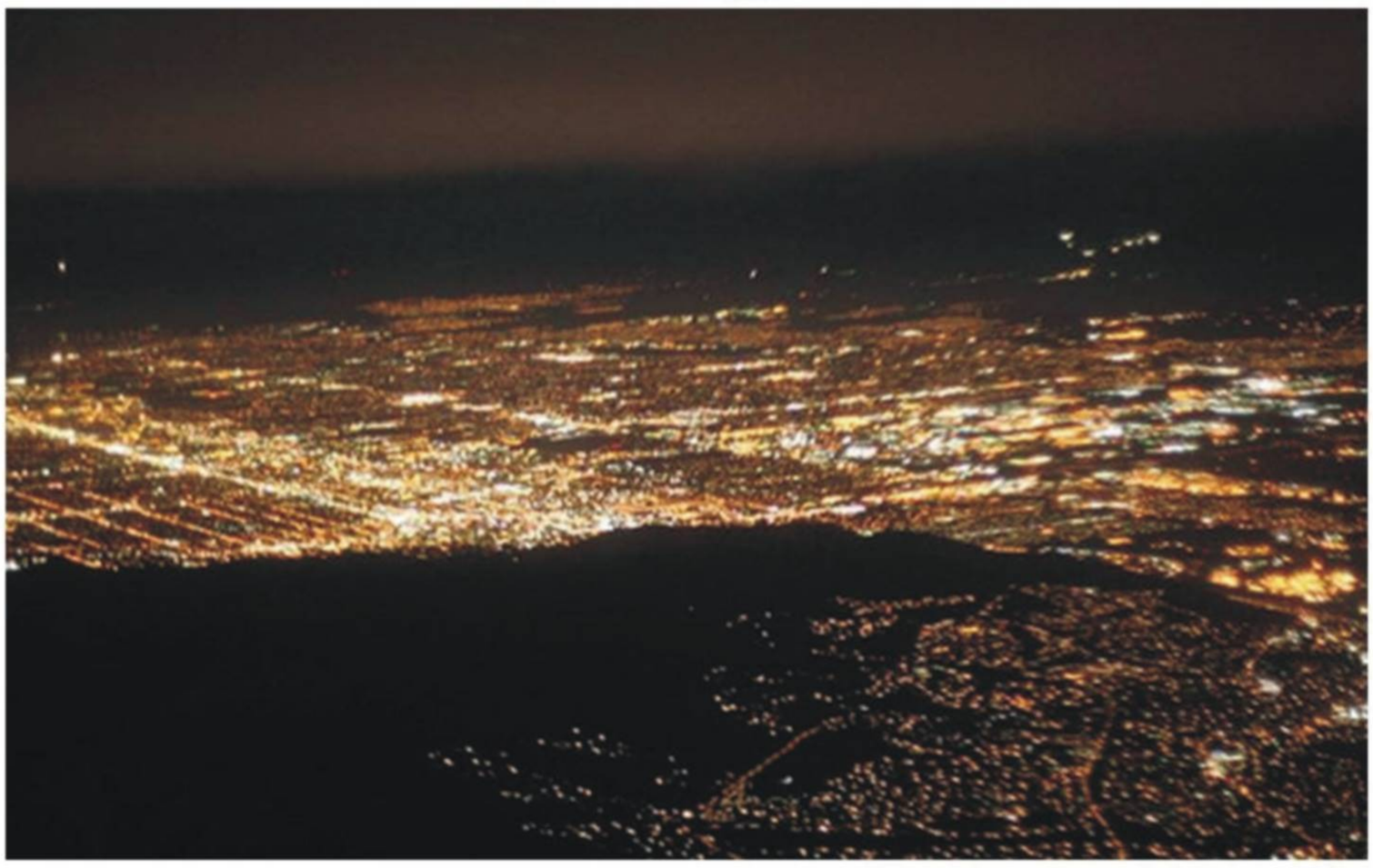




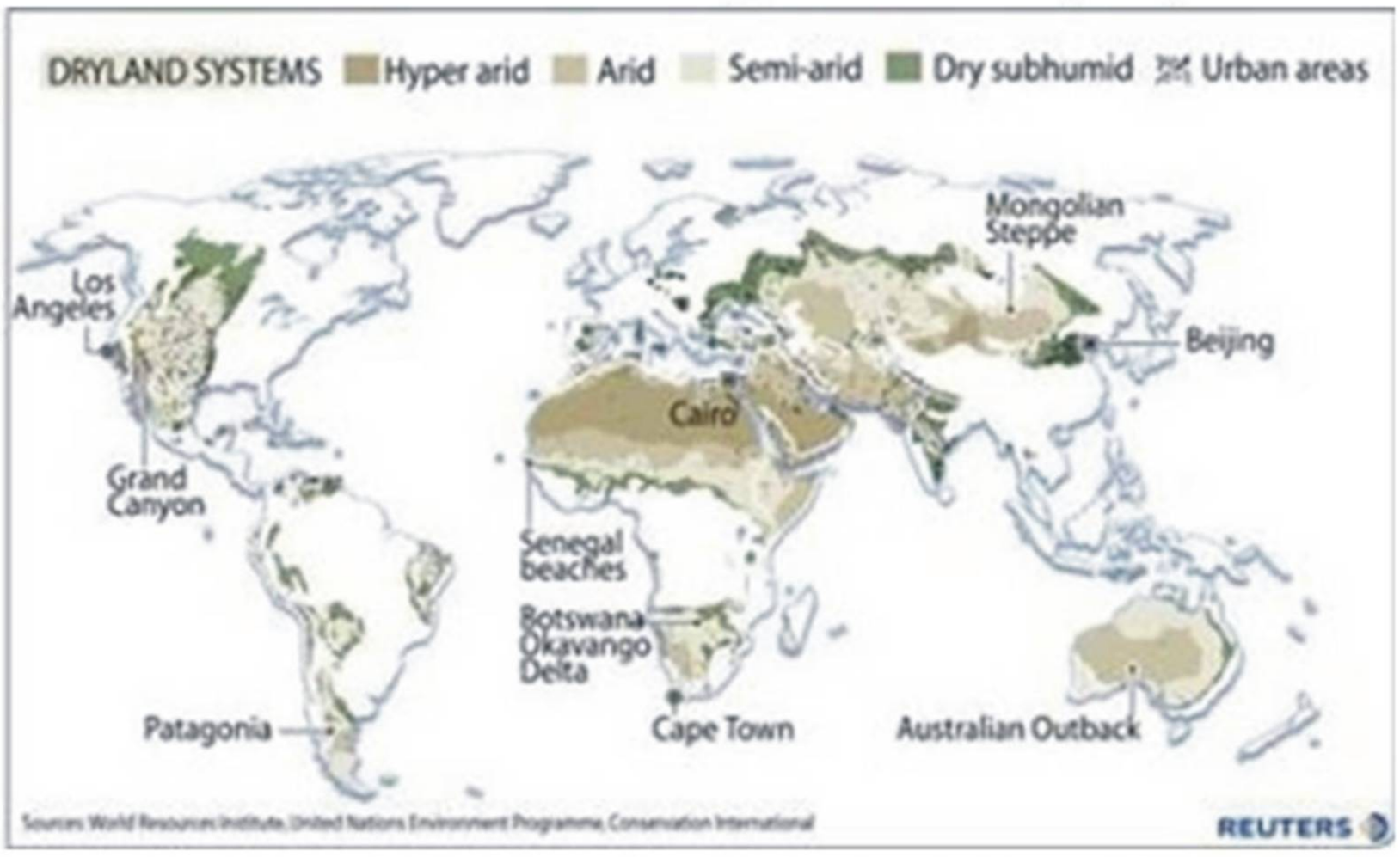
Chancellor Apartments, Varsity Lakes, Gold Coast, Australia, during day time

Street light with movement sensor in Funafuti, Tuvalu

Light Pollution that the astronomers are complaining about

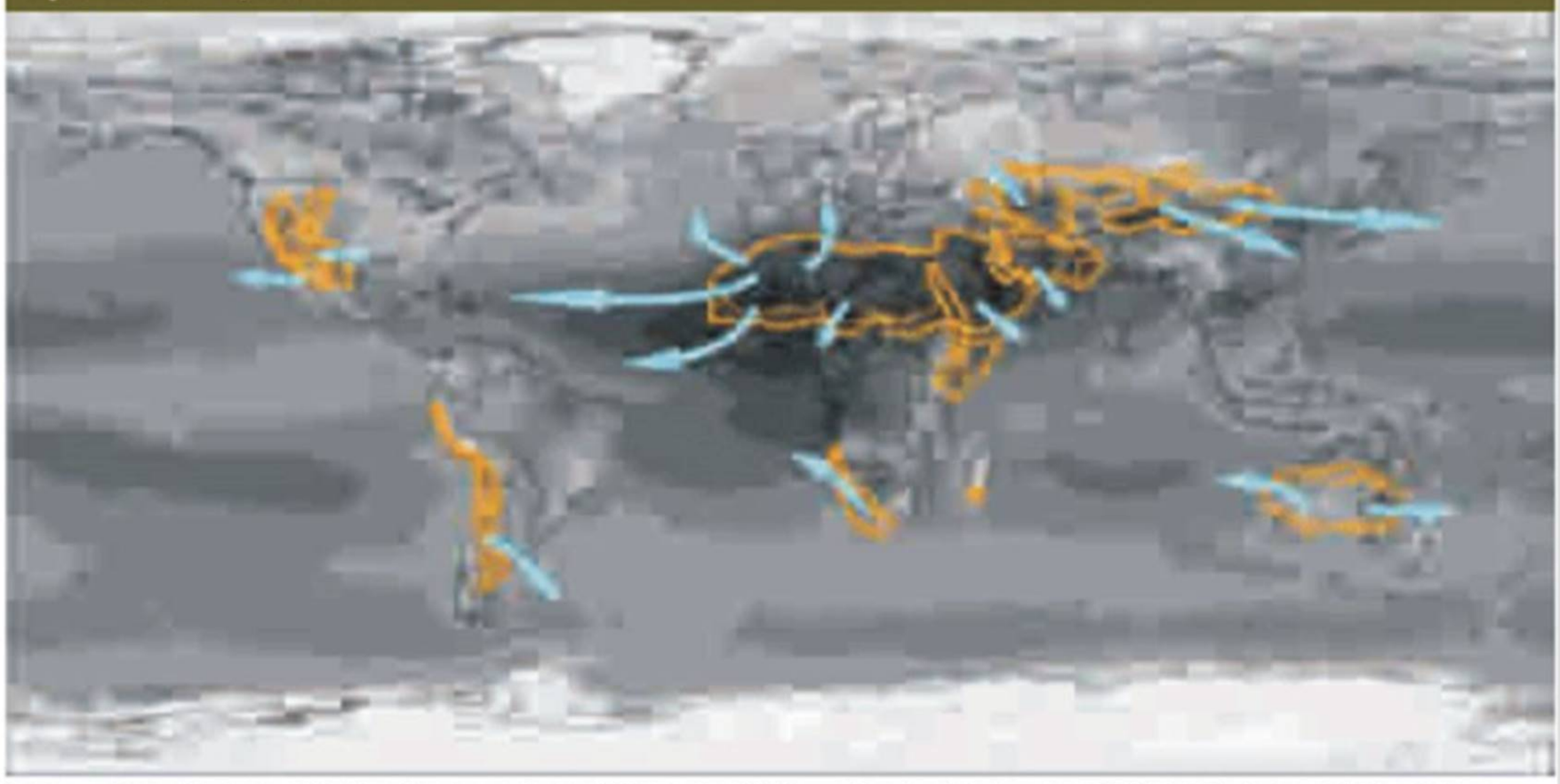


Climate change and desertification are linked through feedbacks between land degradation and precipitation



"Drought and desertification threaten the livelihood of over 1 billion people in more than 110 countries around the world." (Kofi Annan)

Figure 3.1: Atmospheric dust

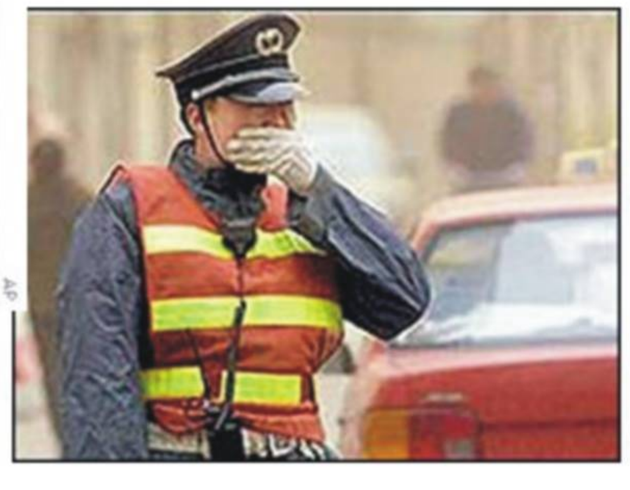


Twelve-year annual average of the Absorbing Aerosol Index (AAI) from the Total Ozone Mapping Spectrometer (TOMS) satellite instrument. The shading provides a qualitative measure of the atmospheric dust content: dark shade – high aerosol concentration. The TOMS AAI is an indicator of the load of absorbing aerosols in the atmosphere, which are mostly dust particles with some contribution of smoke particles. The desert areas are marked by contours, main transport pathways of dust out of the deserts are marked by arrows.

Source: NASA's "Blue Marble" website

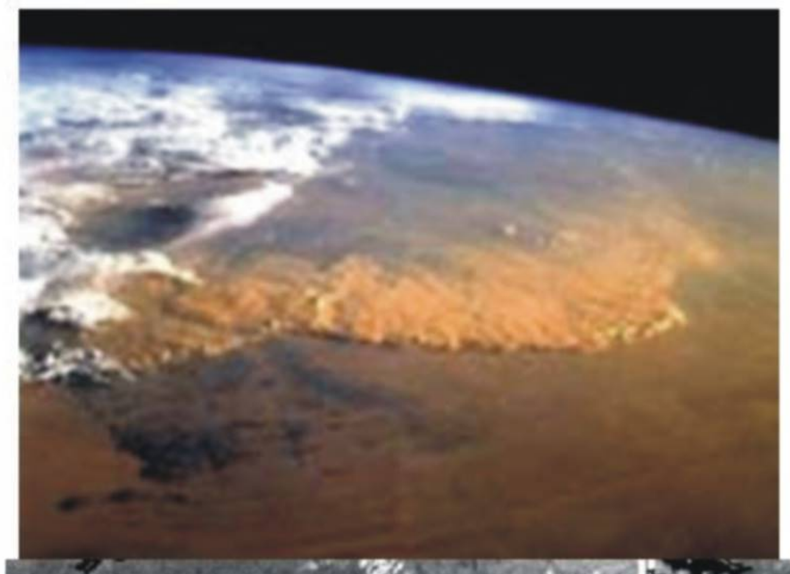
Dust and Sandstorms that Hit Beijing

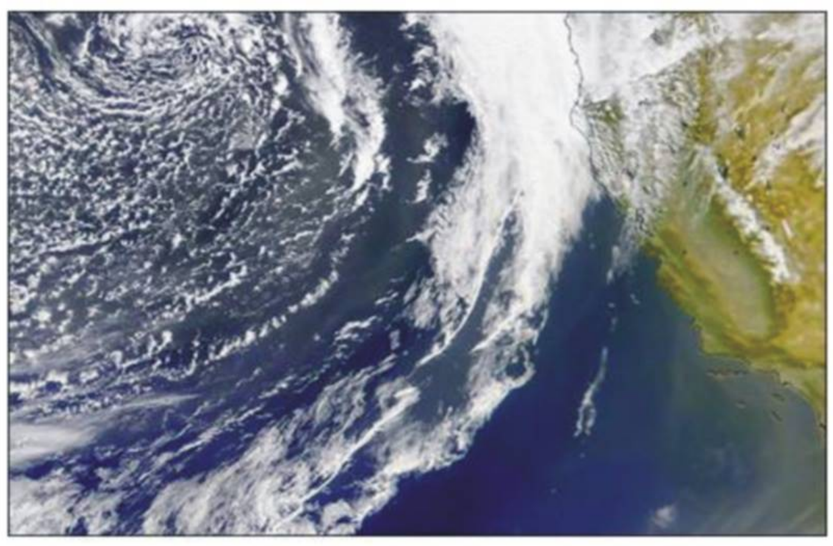
AP

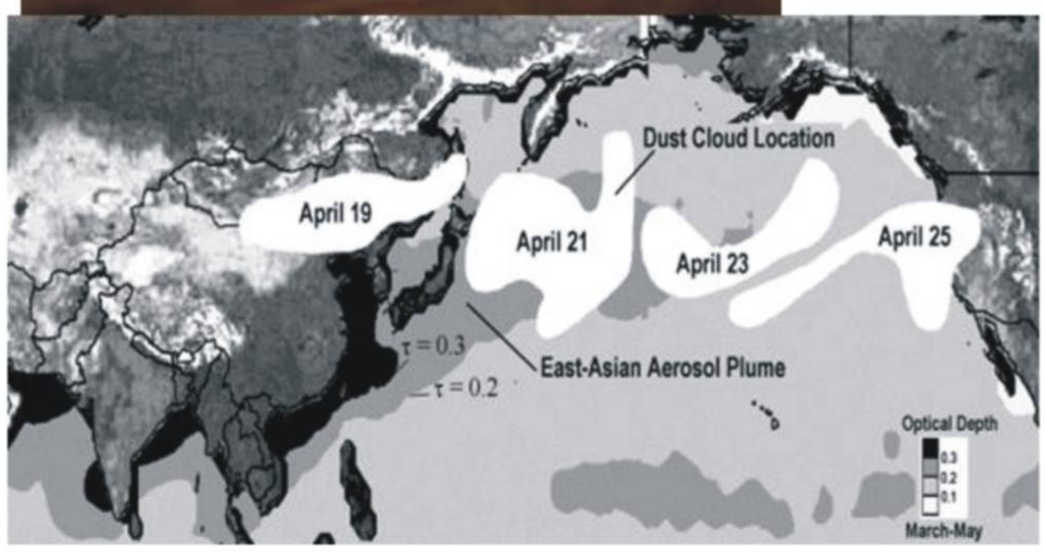


AP

Trans-boundary dust and sandstorms (top left). Asian dust arrives over California (top right). Dust and sands are the largest "export" from Asia to the U.S.





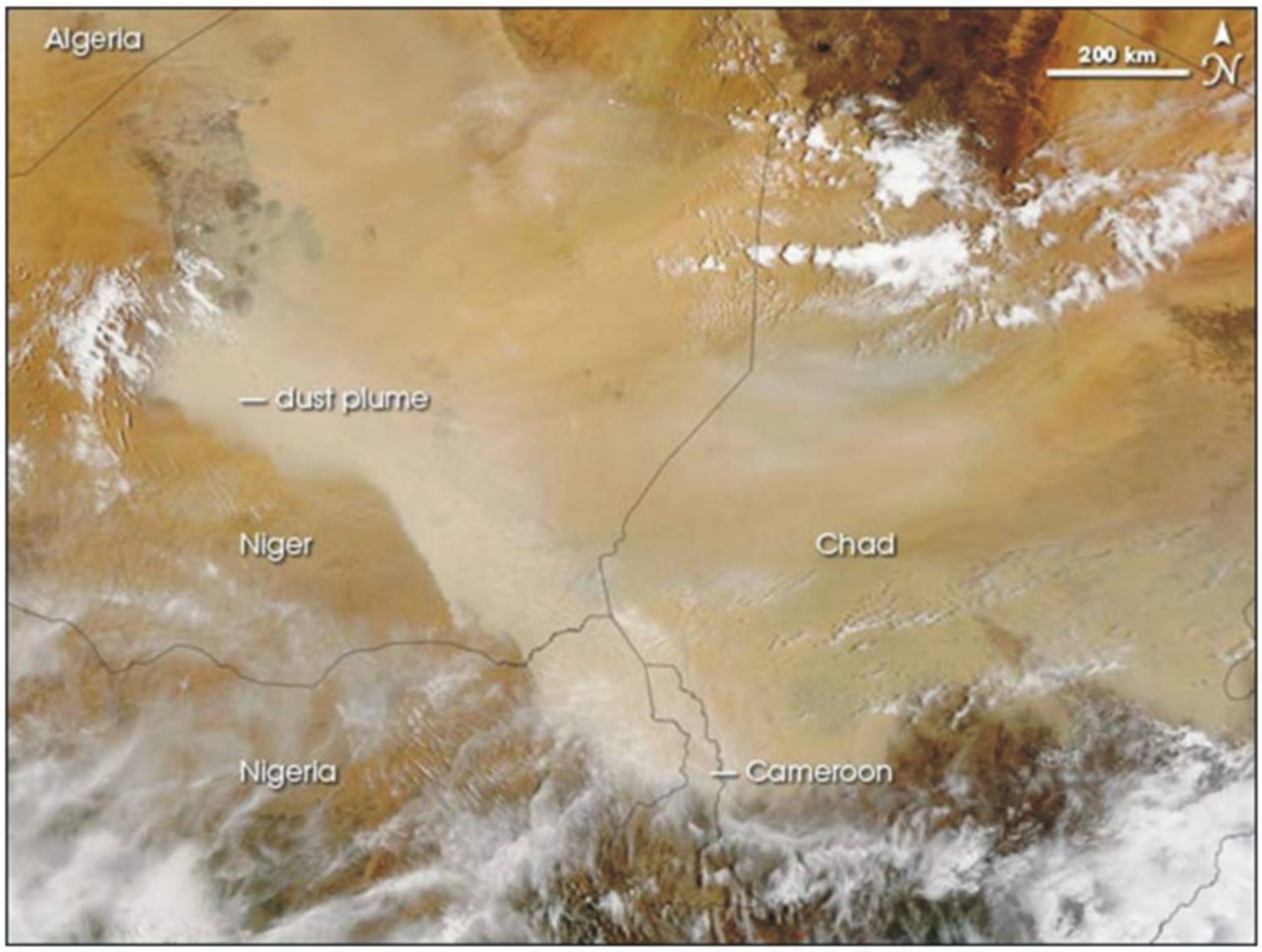


Approximate location of the 19 April 1998 dust cloud over the Pacific Ocean between 21-25 April 1998.

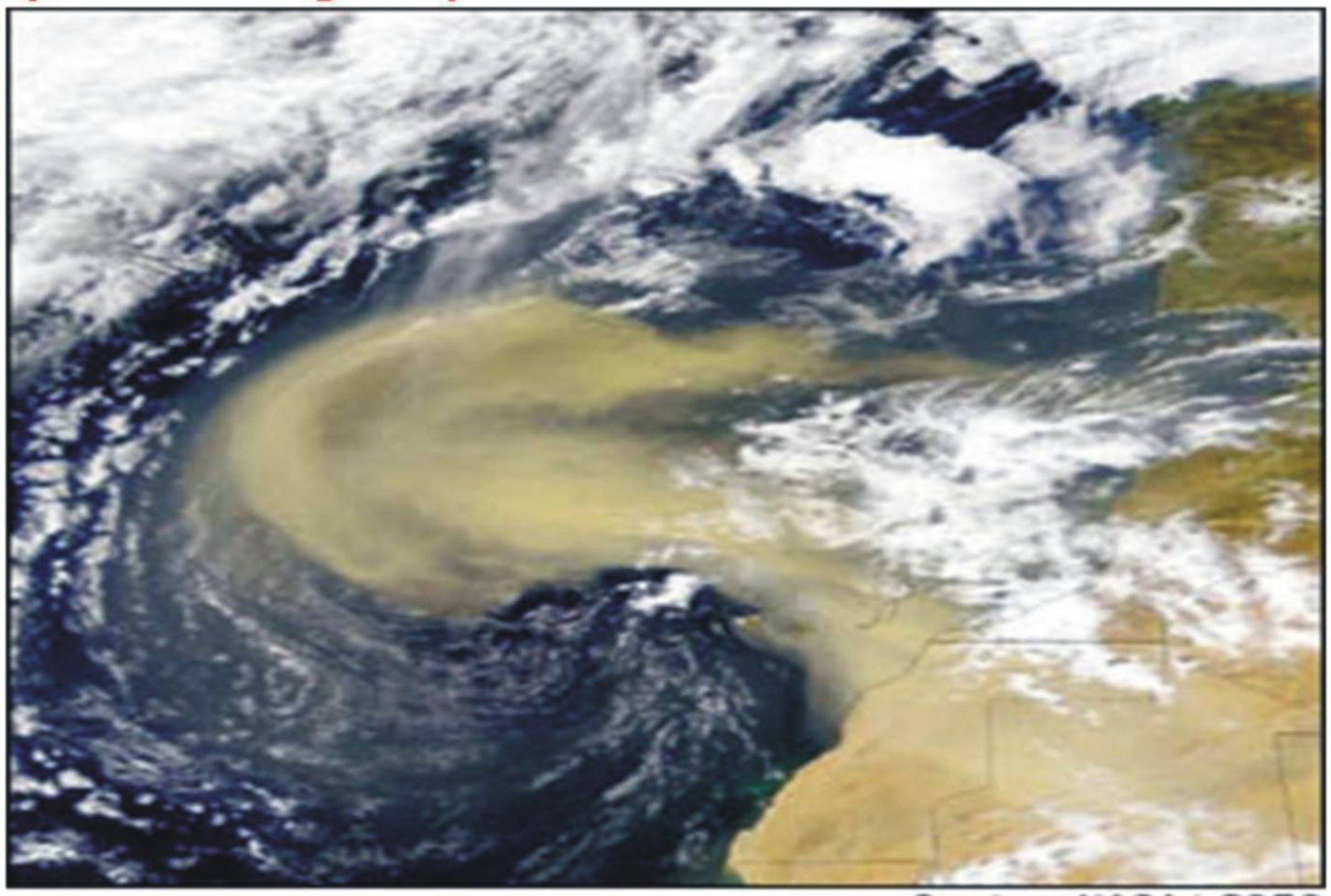
Al Udeid AB Qatar on
15 February 2004

26 April 2005, Al Asad, IRAQ. It's a wall of sands travelling at 60 mph

A dust storm swept across the Sahara Desert on 10 May 2006, moving dust across Niger, Nigeria, Cameroon, and Chad.



A dust storm swirls off the northwestern coast of Africa on 26 Feb. 2000. Researchers are investigating the possible correlation between these storms and the demise of coral in the Caribbean. The dust air mass contains living microorganisms, heavy metals and persistent organic pollutants.



Courtesy NASA / GSFC

This large star coral, photographed in 1988 (top) and 1998 (bottom) at Grecian Rocks, Florida, was ravaged by "black band" disease caused by tissue-killing bacterial slime

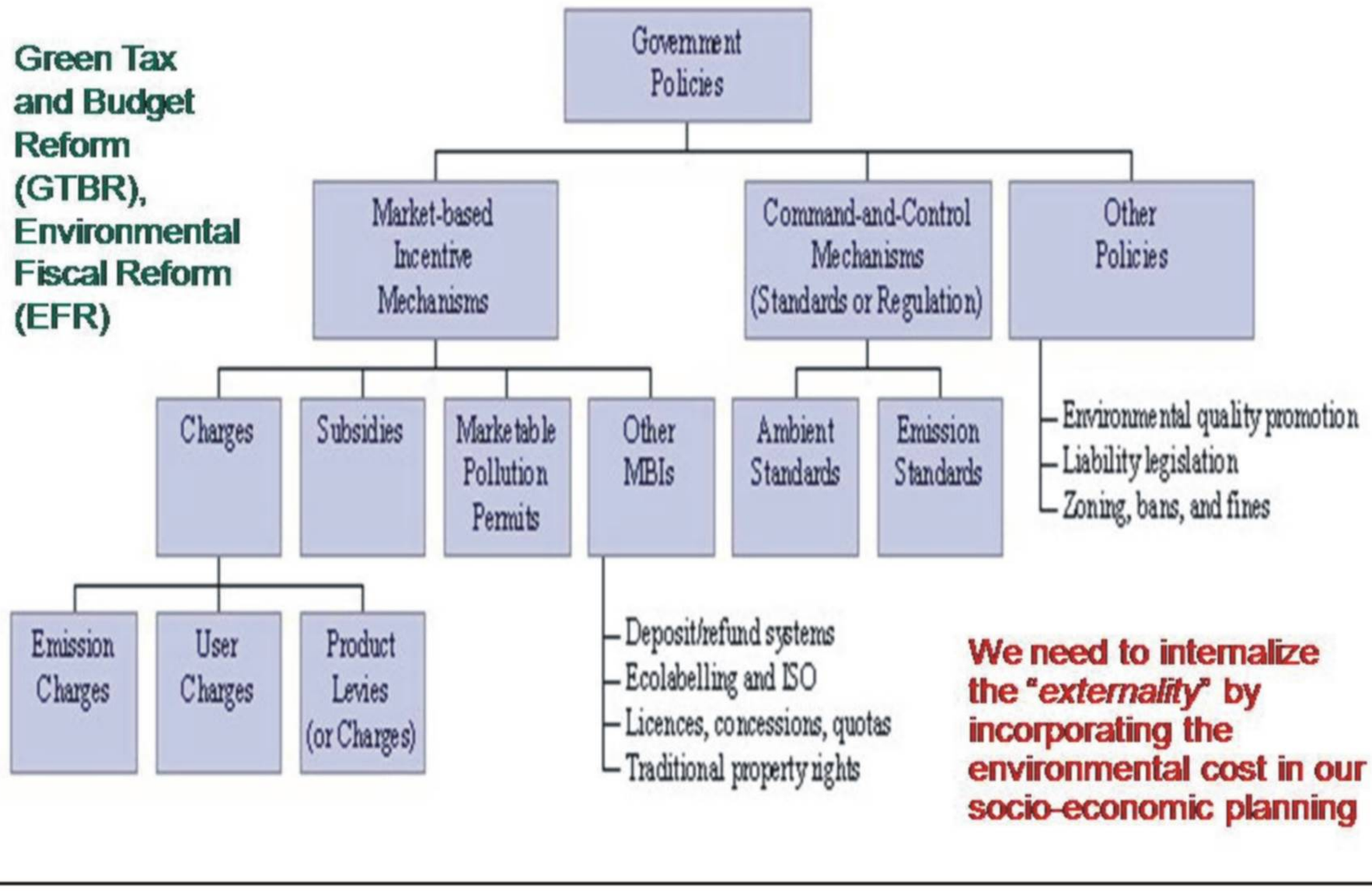
Courtesy USGS

A clear choice for development

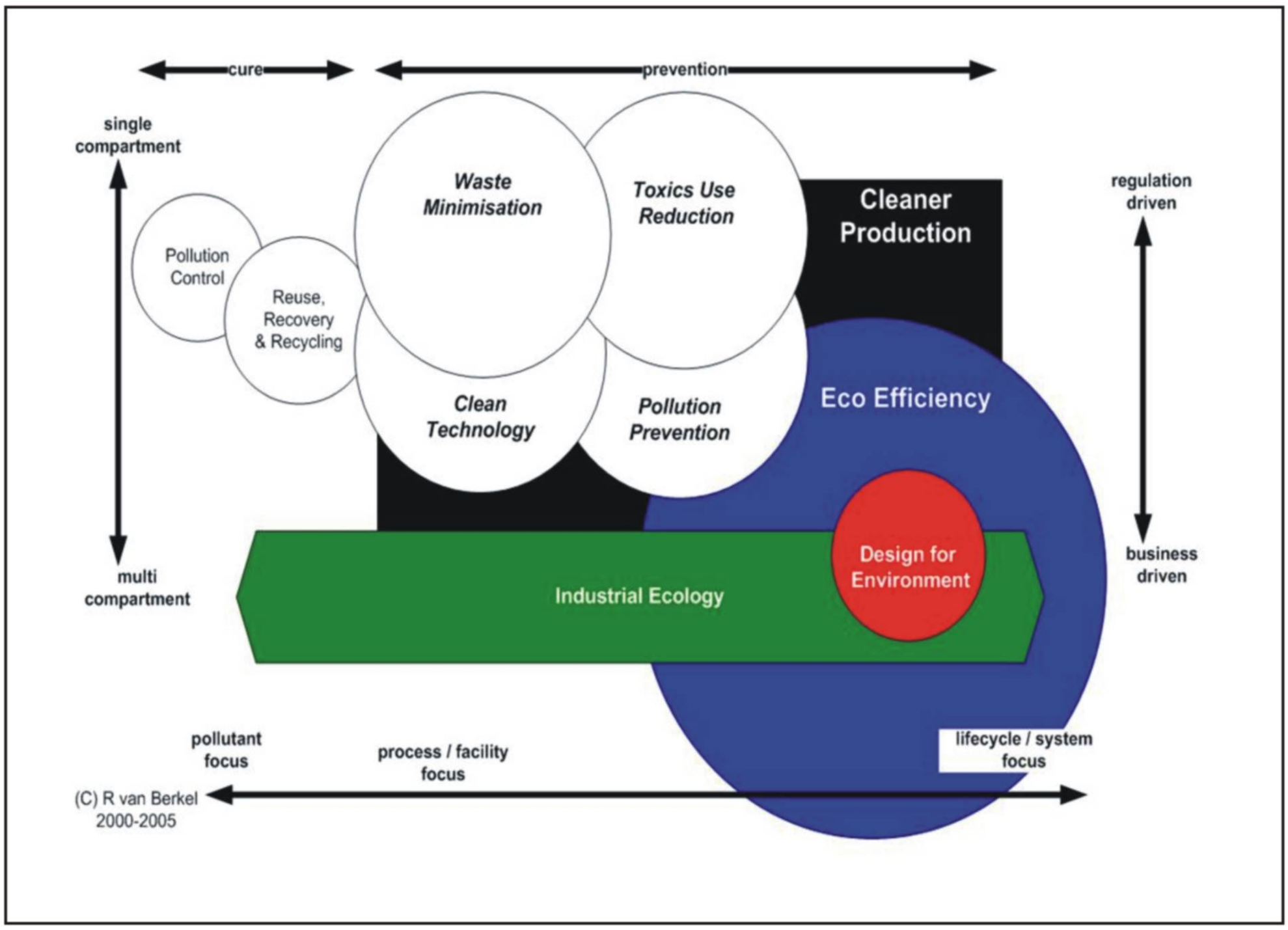
- Smart growth vs dumb growth?
- Good development vs bad development?
- Develop first, clean up later? (It is more costly!)
- Short-sighted "profits" *vs* long-term benefits?
- Green growth: environmentally sustainable economic growth

Both legal and economic instruments are important measures for improving environmental performance and enhancing environmental sustainability

Green Tax and Budget Reform (GTBR), Environmental Fiscal Reform (EFR)



We need to internalize the "*externality*" by incorporating the environmental cost in our socio-economic planning



Eco-Efficiency

Economic

Ecological (Environment)

An important tool to achieve sustainable development

$$\text{Eco-Efficiency} = \frac{\text{Product or Service value}}{\text{Environmental influence}}$$

Product or Service value: Quantity of goods or services produced or provided to customers; Net sales

Environmental influence: Energy consumption; Materials consumption; Water consumption; Greenhouse gas emissions (CO_2…); Ozone depletion substance emissions; ……

(After Culaba et al., 2005)

WBSCD, 1992

Environmental Performance

Two technical options for enhancing environmental performance:

1. Install pollution control equipment, which could be costly; or
2. Redesign the industrial process to minimize pollution – a more eco-efficient and cost-effective option

Design for Environment (DFE)

- The most common DFE practices used include:
  - –design for recycling;
  - –design for disassembly;
  - –design for energy efficiency;
  - –design for remanufacture;
  - –design for disposability;
  - –hazardous material minimization

But our consumer products have not yet been designed for "*zero waste generation*"!
What is the cost of waste and waste disposal after a A$10 dinner at the Brisbane Airport?

The ice cream cone can be eaten after ice cream is finished.
No waste! Very eco-effective!

Nature's design: An eco-effective and sustainable design

- Can we design a mineral water bottle that can also be eaten or biodegradable when the water is finished?
- How about inventing a coconut bottle?

Innovative designs

- The Dutch people have designed houses that can float on the water to mitigate sea-level rise under climate change
- Can we design a house that will generate energy rather than consuming energy? For example, the roof or the top part can be rotated so as to catch the wind or solar energy from any direction?
- Recently in China, a building has been designed to rotate according to the direction of sunlight!
- Can we design a factory that produces zero waste and pollution (e.g., using a close loop system), and hence there is no need for waste management, pollution control and regulations, which can be seen as signals of design failure)?
- Can we manufacture products that, when their useful life is over, do not become useless waste, but can be tossed on the ground to decompose and become nutrients?

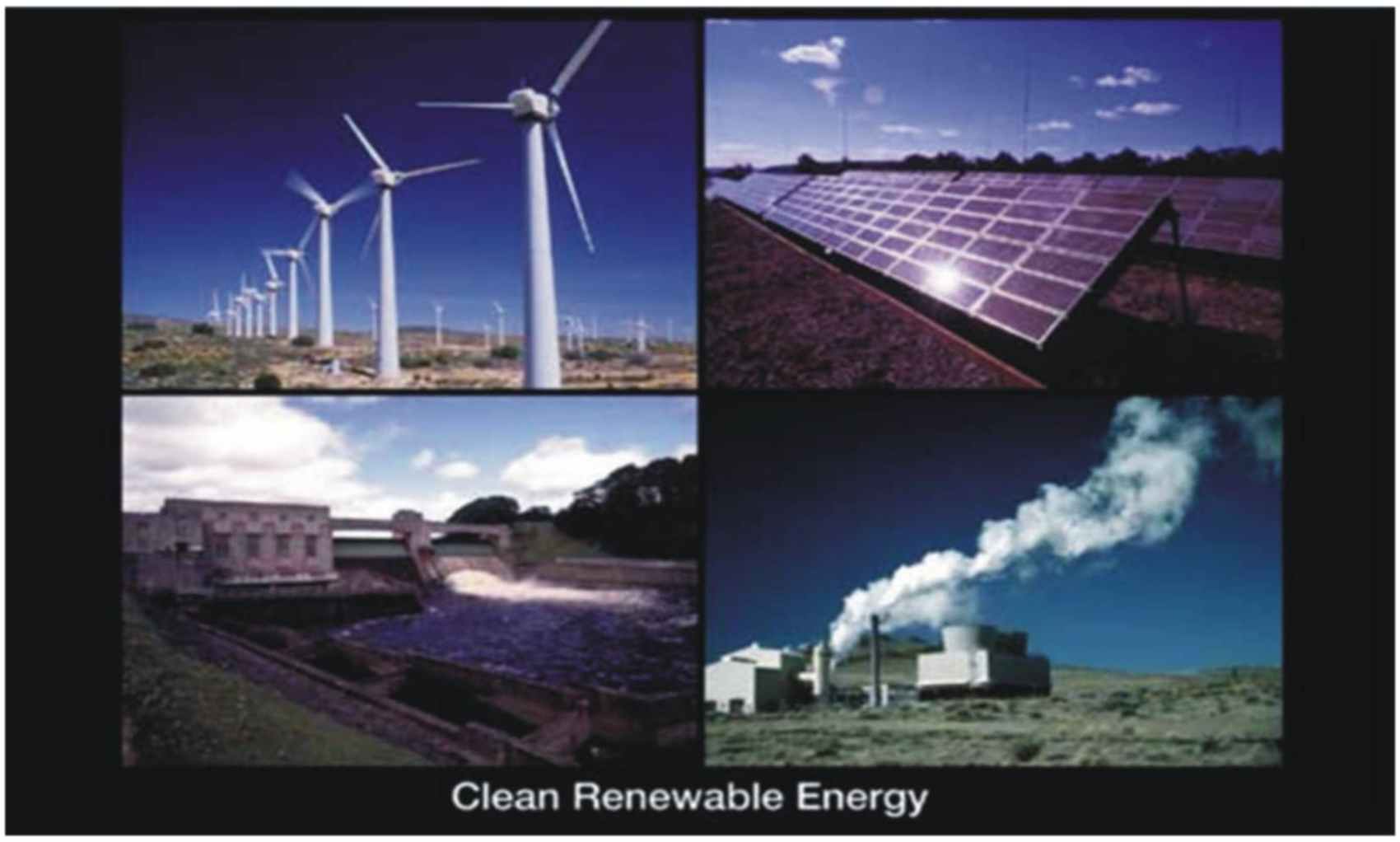
Innovative Ideas

- Two Chinese high school students from a science camp held in Muar, Malaysia, that I attended about two years ago have suggested the following very innovative ideas:
- 1. Design a system to tap the energy generated by moving vehicles on the road, so that the energy can be used for at least street lightings
- 2. Design a system to tap the energy generated by the movement of pedestrians

Good Governance Facilitates Sustainable Development Policy

- Need to have good governance for *developing sustainable development policy* in all environmental, social and economic sectors and *effectively implement* these policies to improve the quality of life:
  - Energy (sustainable energy development and use; energy conservation and efficiency – it is cheaper to save one kWh of electricity than to supply the same kWh of electricity!)
  - Industry (sustainable industry)
  - Land (sustainable land management)
  - Water (sustainable water resources management)
  - Forestry (sustainable forestry management)
  - Agriculture (sustainable agriculture)
  - Mining (least-impact option)
  - Transport (sustainable transportation)
  - Technologies (promotion of environmentally sound technologies; cleaner production)
  - Human health
  - Social services, including environmental justice and environmental rights

Clean renewable energy from wind, solar, small hydropower and geothermal resources would ensure environmental, social and economic sustainability, and mitigate climate change and its adverse effects



To reduce vulnerability and risk

Hazard x **Vulnerability** = **Risk**

(natural or human-induced climate change)

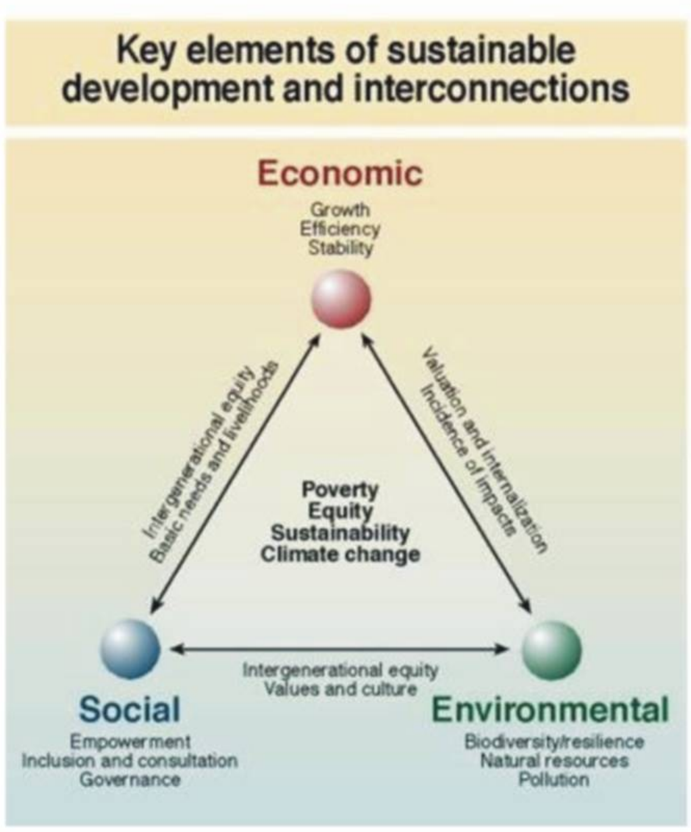
(social, economic, environmental & even political factors)

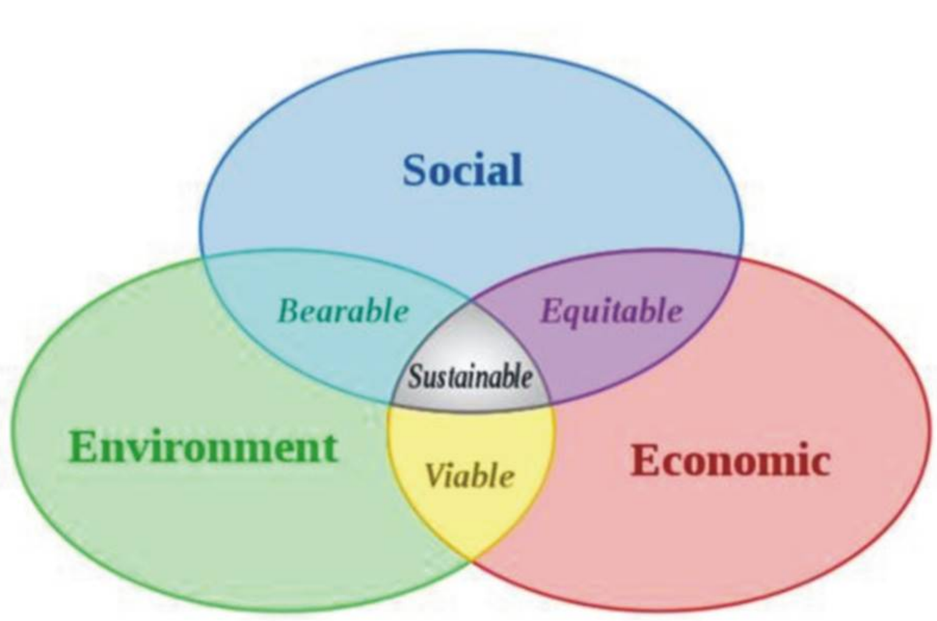
Climatology, Probabilities, Forecasts

Population growth and shifts
Urbanization
Technology (EWS; Water conservation technologies)
Land use practices
Env. degradation
Water use trends
Government policies
Env. Awareness
Capacity (technical & institutional)

What we need is not the "balancing" or "trade-offs) of the three pillars of sustainability but to integrate them into one entity and create synergies

FIGURE 8.3





Sustainability

A sustainable society reflects the following three interdependent principles:

- The planet has a limited carrying capacity and we are all dependent on a healthy, functioning biosphere (***environmental sustainability***)
- Individuals can best meet their needs in caring and vibrant communities (***social sustainability***).
- A just economy is dependent on an equitable society and a healthy planet (***economic sustainability***).

Three nested spheres of sustainability — interdependent and integrated into coherent decision-making, planning and implementation processes at all levels of governance

Environmental Friendly Society: Lessons from China

- Chinese used to be very proud to publish similar pictures shown here as a sign of rapid development.

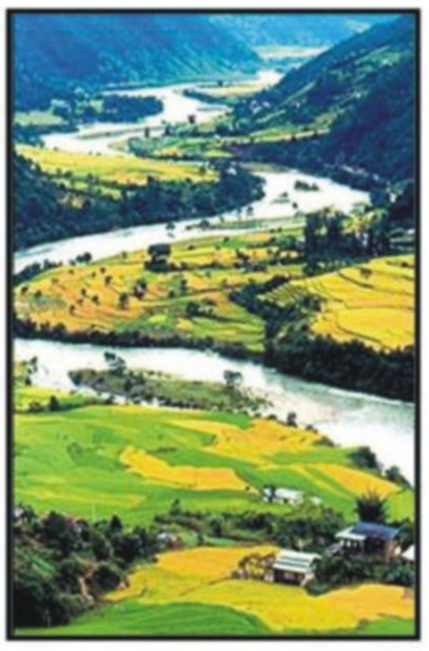
  But not any more!

- The Government now greatly emphasizes *environmental protection, efficient use of resources and minimize emissions* for "*building a harmonious and environmentally friendly society*"

Economic loss caused by environmental pollution: 511.8 billion yuan (or 3.05% of national GDP in 2004), mostly by water and air pollution.

Bhutan's Four Pillars to Gross National Happiness (GNH)

- Bhutan's former King has put Bhutan on the path of a unique process of development based on the belief that the primary purpose of development is to achieve Gross National Happiness, which comprises the following four pillars:
  1. Sustainable and equitable socio-economic development;
  2. Conservation of our fragile environment;
  3. Preservation and promotion of culture;
  4. Good governance
- Bhutanese believe that true development can only be pursued through a judicious balance between spiritual and material advancement.



William McDonough's city hall roof garden in Chicago

"The Stone Age did not end because humans ran out of stones. It ended because it was time for a re-think about how we live."

- His ideas for the *Next City* are about to be played out in China where his company has been charged with building seven entirely new cities.
- His book has been adopted as government policy in China, which needs to house 400 million more people in the next 12 years.

Urban forest reduces the need to travel to forests in rural areas

Thanks for your kind attention!

(Source: Dr Nguyen Huu Ninh)

GOVERNANCE, ENVIRONMENTAL SUSTAINABILITY AND CLIMATE CHANGE

By

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Being a paper presented at the

LAGOS STATE MAIDEN INTERNATIONAL SUMMIT ON CLIMATE CHANGE

Tuesday, 24th March 2009

OUTLINE OF PRESENTATION

1.0 INTRODUCTION
2.0 WHAT IS SUSTAINABILITY
3.0 CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT
4.0 EFFECTS OF CLIMATE CHANGE
5.0 CLIMATE CHANGE AND DEVELOPING COUNTRIES
6.0 ECONOMIC ANALYSIS OF CLIMATE CHANGE
7.0 GOVERNANCE AND POLICY RESPONSES
7.1 The idea and the key concepts of global governance
8.0 POLICY RESPONSES TO CLIMATE CHANGE FOR ADAPTATION AND MITIGATION
8.1 Policy and Governance for Mitigation strategies
8.2 Policy and Governance for Adaptation
8.3 Governance thru' Cooperation with International Initiatives
9.0 CONCLUSIONS.

INTRODUCTION

- It is now commonly acknowledged that if poverty is to be reduced and the standard of living of the average citizen improved, then economic growth must remain a legitimate objective of all governments and the citizens.
- It is now also to be understood, although sometimes painfully, that pursuing economic growth without paying adequate attention to the environment is not likely to be sustainable-it cannot last.
- Hence the global approach now is not whether to grow, but how to grow within sustainable development.

WHAT IS SUSTAINABILITY

- Sustainable development is about enhancing human well-being that is not time-bound.
- What constitutes a good life or human well being is highly subjective, and the relative importance accorded to different aspects of well-being varies for individuals, societies, and generations.
- But most people could probably agree that having the ability and opportunity to shape one's life towards increases in better health, education, and material comfort-is certainly an index of progress.

Definition of Sustainability

- It is now well acknowledged that for any given known resources base, or technology, there are some utilization rates that cannot be sustained.
- Drawing attention to these unsustainable rates is critical to informing decision-makers and changing the development course toward sustainability.
- This will often require altering the pattern of preferences, the resource intensity or technologies, or the relevant time horizon for different decisions.

- The most commonly used definition is the one provided by the World Commission on Environment and Development (Brundtland Commission 1987): "***progress that meets the need of the present without compromising the ability of future generations to meet their own needs.***"
- Recent definitions have therefore focused more explicitly on **the three pillars of sustainability: social, environmental and economic.** Sustainable development can be defined as an approach to development that balances economic, social and environmental dimensions.

- While the Brundtland definition highlights the need to balance the interests of current and future generations, it does not define the concept of needs or its implications.

- **One concrete approach to thinking about sustainability and intergenerational well-being is to ensure that the flow of consumption does not decline over time.**
- **But what is needed for this?** The academic literature shows that a country's ability to sustain a flow of consumption (and utility) depends on the change in its stock of assets or wealth.
- Intergenerational well-being will rise only if wealth (measured in shadow prices and excluding capital gains) increases over time-that is, only if a country's adjusted net savings of assets are positive.

CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

- It is generally agreed that there are some global issues or problems which are beyond the grasp of any one nation.

- One such problem is the possibility of global climate change due to human activities.

- WMO, 1993 had affirmed that many human activities both agricultural and industrial are causing the emission of increasing quantities of polyatomic molecules into the atmosphere.
- Scientists have recently brought to focus their concerns about aspects of human activities primarily related to energy production and consumption, which are contributing to increasing varieties and concentrations of the so-called **green-house gases** in the atmosphere (causative agents of climate change) at a pace which is in excess of the natural rate of absorption.

The active polyatomic molecules- **green-house gases (GHGs)** include:

- carbon dioxide CO_2,
- chlorofluorocarbons (CFCs),
- hydrocarbons like Methane CH_4,
- oxides of nitrogen, NOx,
- oxides of sulphur, SOx
- ozone,
- water vapour etc.

- These gases cause an abnormal increase in temperature which scientists worldwide have now a consensus (after a series of research studies and modelling) that this temperature increase may be attributed to increases in concentra-tion and variety of these GHGs penetrating the atmosphere as a result of varied human activities.

- As there is a strong link between climate change and increasing GHGs, sustainable development options, and our development decisions with respect to climate change responses should focus on increasing capacities to adapt and reduce GHG emissions even at the level of local governments

- Working toward resilient and sustainable communities will require promoting climate change responses within sustainable development strategies and actions.
- Hence, a universal concern has grown leading to intensification of international cooperation for the development of strategies of the threats of CC
- However, we need to note that even if we achieve low GHG emissions globally, we will still experience changes in climate due to the presence of historical emissions, therefore, actions that help us adapt to climate change are necessary.

4.0 EFFECTS OF CLIMATE CHANGE

- Understanding the impact /effects of climate change is an essential starting point for discussions on the Governance and the Environmental Sustainability of Climate Change (CC)
- Below is a boad overview of the effects

- Scientifically, Climate change (CC) threatens the basic elements of life for people around the world including Africa.
- It threatens access to water, food, health the ecology, land use and the environment.
- All indices of sustainable development (Alo, et. al. 2004) are threatened by climate change.
- The increase in global temperature by 2-3^{o}C leads to many severe impacts or effects including:

- Melting glaciers –
- Poor food security-
- Ocean acidification-
- Rising sea-levels -
- Increased deaths from heat stress and malnutrition -
- Ecosystem Vulnerability-
- Induction of extreme weather events and adverse sudden shifts in regional weather patterns -

5.0 CLIMATE CHANGE AND DEVELOPING COUNTRIES

- CC poses more threat to the developing countries.
- While all regions will invariably get the effects of CC, developing countries will however have a disproportionately higher effect.
- developing countries are especially vulnerable to climate change because of "their geographical locations, low incomes and greater reliance on climate-sensitive sectors such as agriculture and health".

- Direct roles of forests in household livelihood strategies in poor communities will be wiped off by CC. Examples include anticipated fall in incomes from agriculture, fishing etc; loss of current subsistence support; loss of poverty-reduction use from non-timber forest products etc all leading to increased poverty.
- Hence, millions will be at more risk from malnutrition and hydrological variability will lead to more water-related and vector-borne diseases.

- Increased drought conditions will increase drylands (the Sahelian), while rising sea levels will increase "oceanification"- shoreline erosion and submergence leading to more large scale migration and human displacements and worsen poverty.
- Such climate-driven shocks to the ecology and environment could easily spark conflicts and violence in some developing countries like in West Africa where there is high water interdependence.

- The weak and poor urban infrastructure of most developing countries will be at more threat from ravaging floods and extreme weather events.
- **More than 50% of Lagos State could be under water with a 1metre rise in sea-level, and if nothing is done, this may happen by 2099!**
- All developing countries efforts to meet the Millennium Development Goals for 2015 signed by 189 countries in Sept 2000 will be thwarted if strategies for its reversal through policy action and governance instruments are not in place soonest.

6.0 ECONOMIC ANALYSIS OF CLIMATE CHANGE

- The climate is a public good: those who fail to pay for it cannot be excluded from enjoying its benefits and one person's enjoyment of the climate must not diminish the capacity of others to enjoy it too.
- Climate change therefore is a result of the externality associated with greenhouse-gas emissions - it entails costs that are not paid for by those who create the emissions (Stern, N.2007).
- The science described in the previous paragraph drives the economics that is required for the analysis of policy.

It has a number of features that together distinguish it from other externalities:

- It is global in its causes and consequences;
- The impacts of climate change are long-term and persistent;
- Uncertainties and risks in the economic impacts are pervasive.
- There is a serious risk of major, irreversible change with non-marginal economic effects.

- The impacts of climate change are very broad ranging and interact with other market failures and economic dynamics, giving rise to many complex policy problems.
- Ideas and techniques from most of the important areas of economics, including many recent advances, have to be deployed to analyse them.

- Most of these perspectives imply that the outcomes of climate-change policy are to be understood in terms of impacts on consumption, health, education and the environment over time but different ethical perspectives may point to different policy recommendations.

- With respect to sustainability, questions of intra- and inter-generational equity are central.
- Climate change will have serious impacts within the lifetime of most of those alive today.
- Future generations will be even more strongly affected, yet they lack representation in present-day decisions.
- Therefore the planning of today must take cognizance of taking care of tomorrow.

- Indeed, the effects of climate change are global, inter-temporal and highly inequitable.
- Generally, poor countries, and poor people in any given country, suffer the most, notwithstanding that the rich countries are responsible for the bulk of past emis-sions.
- These features of climate change, together with the fact that they have an impact on many dimensions of human well-being, force us to look carefully at the underlying ethical judgements and presumptions which underpin, often implicitly, the standard framework of policy analysis.

7.0 GOVERNANCE & POLICY RESPONSES

- Climate change has now been considered as a serious and urgent issue requiring policy responses and strategies to tackle the issue.
- The vast majority of research concerning the governance of climate change has focused on the development of the international climate change regime, its constituent agreements, the UNFCCC and the Kyoto Protocol, and their implementation.
- The negotiated articles of the UNFCC clearly provide an international governance framework to achieve stabilization of GHG concentrations at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system. Article 2 ESPECIALLY of the UNFCC is clearly a rule to achieve sustainability.
- This paper will avoid a full review of the international governance structures

7.1 The idea and key concepts of global governance

- Governance has been defined as 'the processes that create the conditions for ordered rule and collective action within the political realm' (Stoker, 2004).
- The term has also been described as the establishment and operation of a set of rules of conduct that define practices, assign roles, and guide interactions so as to grapple with collective problems.
- A more elaborate definition is offered by The Commission on Global Governance.
- The Commission conceives global governance as: the sum of the many ways individuals and institutions, public and private, manage their common affairs.
- It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken.

- Governance is a key element in ecosystem management and encompasses the formal and informal arrangements, institutions and more that determine how resources and the environment are utilized.
- It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest.

- Given the variance in the nature of the problems of CC in different regions of the world and varying governance structures across the globe, one wishes to postulate that rather than adhere ONLY to the international framework for CC, there is a need to devise a series of detailed policies and procedures that will be fully adapted to regional or local conditions.
- The UNFCC recognizes this and suggests it.

- Hence rather than focus solely on international climate change institutions, such as the UNFCCC and the related Kyoto Protocol, a governance approach would 'refer to all purposeful mechanisms and measures aimed at steering social systems towards preventing, mitigating, or adapting to the risks posed by climate change'.
- In this manner, rather than allow international climate politics to derail local efforts, a distinction is drawn between the domestic and the international arena, in policy formulation and implementation

- In addressing the issue of CC governance at local level, it is necessary to take into account local governance structures, cultural and socioeconomic conditions if needed change or improved reversal of CC effects and sustainability are to be achieved.
- The how, when and who does things on the issue are better decided regionally, nationally or locally.
- What is important is that what needs to be done are done effectively.
- Operationally, in developing a Climate Change governance structure, there is a need for Nigeria or any other country for that matter to develop:

- an understanding of what functions must be fulfilled to actualize a working governance system for CC management with basic principles
- determine the current baseline or existing governance map that indicates who does what, who is responsible for what, how responsibilities are perceived and what role is played by Government and non-governmental actors in the existing system
- an examination of how the existing system and pattern of governance may be reconciled with the needs that must be met for sustainable development in the face of CC. In particular, it will be necessary to identify inadequacies, voids and gaps in the essential elements of the existing environmental management systems

- an examination of the degree of scientific capability and the ability to incorporate science into the policy process
- existing levels of economic development for handling/absorbing CC measures
- existing relationships with neighbouring states
- recommending a workable governance structure based on the assessments above and indicating how adaptive and mitigative measures for CC will be implemented

POLICY RESPONSES TO CC FOR ADAPTATION & MITIGATION

- It is important to understand that we will need both science and economics to inform policies aimed at slowing and eventually bringing a stop to human-induced climate change.
- It is also understood that reducing the expected impacts of CC is both desirable and feasible.
- Hence, there have been two main responses to climate change: mitigation and adaptation.
- In the context of climate change, mitigation is defined as "implementing policies to reduce greenhouse gas (GHG) emissions and enhance sinks", while adaptation to climate change is defined as, "[an] adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC 2007).

- There is increasing recognition that the world's current progress on reducing greenhouse gas emissions is not occurring rapidly enough to avoid impacts from climate change in the coming century.
- Because of this, the world is "committed" to a certain level of global warming and therefore, subject to a degree of impacts that will require mitigatadaptive responses by nations and communities.

8.1 Policy & Governance for Miigation Strategies

- The externalities posed by GHG emission and CC is a complicated negative externality than for example pollution from effluent or smog emission. This is because it affects everywhere not only the point of emission, its impacts are not immediately tangible, etc. Hence the policy response must be special and the global response mechanisms include:

- **Agreeing to a quantitative global stabilization target range for the stock of GHG in the atmosphere.**
  - This is an efficient way of controlling the risk of catastrophic CC in the long term while short term policies are designed to achieve emissions reductions consistent with the long term goal.
- **Using price driven instruments (through taxes or trading).**

  -In this governance instrument, a tax can be introduced so that emitters pay the full social cost of their emissions i.e. a Carbon Price can be established that reflects the damage caused by emissions. Such will allow flexibility among nations in how, where and when emissions reductions can be made and providing opportunities and incentives in mitigation measures. Such taxes raise public revenues

Provision of

- high quality climate information;
- enforcing strict land use planning and high performance standards;
- long term policies for climate-sensitive goods e.g natural resources or coastal protection
- financial security for the poor in the society through flexible insurance policies

- The developing world on the other hand, have the countries with the least resources, most fragile ecosystem and environment and also likely to bear the greatest burden of CC negative effects.
- Hence adaptation to reduce the impacts is a *sine qua non.*
- However, poverty reduces the capacity to adapt.
- And poor CC adaptation leads on to increased poverty.

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- Hence adaptation to reduce the impacts is a *sine qua non.*
- However, poverty reduces the capacity to adapt.
- And poor CC adaptation leads on to increased poverty.

- Development itself is key to adaptation. Much adaptation can be achieved from good development practices
- And this is expected to also reduce vulnerability.
- The following typical development strategies are the well-known sustainable development paradigms and will create the desired adaptation to potential negative Climate changes.

Examples are

- by promoting growth and diversification of the economy
- investing in health and education
- enhancing ability to handle disasters and emergencies
- promoting social and financial security mechanisms

- Governments in this setting have a full role to play to in ensuring that these sustainable development paradigms are integrated into development policies and planning at every level.
- The Governments will also have to establish the policy framework and instruments to foster adaptation by the private sector and the civil society.
- This is key to reducing the vulnerability and raising the capacity to adapt and cope with CC induced effects.

- Appropriate governance is so important in the developing world as there are good prospects for adaptation as individuals, private sector and civil society will respond to a changing climate as far as there knowledge and resources allow them.
- They will therefore require empowerment and support from governments to overcome the barriers and increase their adaptive capacity.
- Much of what the government will be doing are what they should ordinarily be doing with respect to sustainable development.

Key policy issues /areas for development action that will help to reduce vulnerability to CC effects include:

- Promoting income and food security and overcoming the structural causes of famine /insecurity
- Building robust education and health infrastructure including strategies for eradicating malaria , waterborne diseases
- Better urban planning and provision of good public services and infrastructure
- Better gender equality
- Improving disaster preparedness and emergency response

Beyond investing in measures and policy instruments that reduce vulnerability which are ordinarily part of government developmental priorities, for climate change specifically, some of the policy changes by government that this author will recommend include:

- raising awareness of civil society but individuals and the private sector. Such awareness raising shall include the how and why the climate is changing, the why and how they should adapt painlessly. But **Governments** have an important role to play as the nation will not be able to adapt autonomously without reliable information and projections.

- Establishing strong institutions and governance arrangements to empower the poor such as social networks, big financial security assistance mechanisms- as traditional asset pooling structures may not be able to assist in the event of the unforeseen that may disrupt all households in an entire region!
- addressing specific market failures identified as contributors to CC eg allowing used automobiles with worn out combustion engines into Nigeria and other African countries.
- Encouraging newer technology transfer and supporting generation and flow of knowledge.

- Ensuring the construction of only long-term and climate–resilient infrastructure through building codes and regulations; best-practice land use planning/zoning; river basin and floodplain and ocean shoreline setbacks management; etc. Increased maintenance of basic infrastructure; Additional investments in protective measures-flood barriers and seawalls;
- Establishing concrete strategies to protect the natural resources/capital and make them more resilient to support the livelihoods of the poor eg planting mangrove belts to protect the shoreline from potential sea-level rise.

- Integrating climate change vulnerability issues into national/state planning and policies. While most Poverty Reduction Strategy Papers (PRSPs) and Country Assistance Strategies (CAS) mention CC and its risks and potential impacts to economic productivity and poverty reduction, actual implementation is lacking. This may not be unrelated to the common development challenges of the developing world viz: competing demands on scarce public funds. The Fed Min of Environment that anchors the issue does not have the full teeth on finance, hence a need to involve National Planning or Budget Office as it's a cross cutting issue. Secondly the lack of technical capacity even to prepare the National Adaptation Plans of Action (NAPA). But the recent GEF Funding for NAPA preparation in Least Developed countries may assist.

8.3 Governance thru' Cooperation with international initiatives

Climate change continues to attract concerted international interest and action.

Governance to install mitigation and adaptive strategies through international collective actions in many ways exist. Examples include:

- Multilateral frameworks such as the UNFCC and Kyoto Protocol provide an essential foundation for different countries to build on for further cooperation.
- Partnerships, networks and international organizations such as the International Energy Agency facilitate coordinated international action

- International support for collective action by donors and international private financing.

A range of fund streams are available. For example from

-GEF and associated funds including the Least Developed Country Fund (LDCF); Special Climate Change Fund (SCCF); Adaptation Fund

-International private sector financing through FDIs, Global Index Insurance Facilities (GIIF) etc

9.0 CONCLUSIONS

- Governance to ensure CC reversals and sustainable devt globally is best achieved thru governments and its structures
- It is important that our country and Lagos State in particular take issues related to vulnerabilities and the negative effects of climate change seriously.
- In a low income economy such as ours, Mitigative, Adaptive or reversal strategies can only be established and made to work by Government.
- From a practical point of view, designing local responses that simultaneously address the issues of climate change and sustainability is a challenging task.

- Working toward resilient and sustainable communities in a developing country like Nigeria will require promoting climate change responses within sustainable development strategies and actions.
- And this is achievable with the right governance strategies led by an understanding and committed government like we have in Lagos State today.
- It is proposed that the on-going excellent intervention actions for mitigation and adaptation by the Lagos State Government through its indefatigable Min of Environment should be increased. It is now clear that the Ministry's Climate Change Unit needs to be further empowered and its capacity be expanded to the level of a Department to provide the desirable governance structure and Lagos State will again be blazing the trail as the 1st Government in Nigeria to so do. CC issues even locally is that important!

- Meanwhile we are aware of a proposal in the National Assembly from the Federal Ministry of Environment for the promulgation of an Act to establish an institution to manage CC in Nigeria named "Draft Bill To Establish A National Climate Change Commission for Nigeria"
- Based on the enormity of the CC challenge for present and future generations of Nigerians, we support this proposal to provide an articulated and knowledgeable governance structure for this issue.

Thank you for your attention

Contacts: balo@unilag.edu.ng or
profjidealo@yahoo.com

Governance, Environmental Sustainability and Climate Change

Paul Kirai
Executive Director
ECM Centre, Nairobi.

Presented at the Lagos Maiden Summit on Climate Change – 23-26 March 2009

Governance

- The process of decision-making and the course by which decisions are implemented or not implemented. This includes policies, processes, systems, and controls that are used to safeguard and grow assets.

- **Participation**
- **Rule of law**
- **Transparency**
- **Responsiveness**
- **Consensus orientation**
- **Equity**
- **Effectiveness and efficiency**
- **Accountability**
- **Strategic vision**

Global Environmental Governance

- Immense growth of global institutions
- Since Stockholm in 1972 – over 500 agreements (and counting)
- 20 yrs later, Rio gave rise to UNCSD, CBD, CCD, and other new institutions with secretariats spread across – the globe – Bonn, Montreal etc (UNFCCC, CBD, Ozone ..)
- Later Kyoto Protocol, CDM and Joint implementation Mechanisms
- "Own success" has also made the system unwieldy and increasingly incoherent.
- Poor understanding of environmental sustainability

Challenges in Environmental Governance

- Proliferation of MEAs and Fragmentation of institutions
- Lack of Cooperation and Coordination
- Lack of Implementation, Compliance, Enforcement and Effectiveness
- Inefficient Use of Resources
- Environmental Governance issues outside the Environmental Arena – e.g. Trade, investments, Security
- Non-state Actors in a State-centric System... Role of civil society, private sector not fully recognized

Environmental Governance

- No doubt there is great awareness of environmental threats and numerous global efforts have emerged to address them.
- Much has been achieved by the way of new treaties, more money and a global network of environmental institutions ,
- But still, environmental degradation continues!
- The same rules for good governance should apply to the environment...i.e. involvement, transparency, accountability, equity etc.
- Recognition of non-state actors and players outside the environment sectors

Strengthening Environmental Governance

- Leadership – support from highest political leaders
- Knowledge – as a basis for sound policy..empower people with knowledge and awareness,
- Coherence – Cooperation, Coordination, shared direction and communication
- Performance – Well managed institutions and adequate resources
- Mainstreaming – Environmental concerns incorporated into other areas of policy and development

Environmental Sustainability

- Utopian or Practical Goal?
  - Even for a local community, defining environmental sustainability can be controversial
  - This gets more complicated up the ladder and at international level, there is acrimony
- Environmental sustainability is not mere integration of social, economic and environmental issues...this often results in imbalances on one domain
  - Fish landing sites, Beaches (tourists hotels vs turtle breeding, Roads vs wetlands, etc)
- Need to be **specific** in order to get focused and identify **practical actions** towards Environmental Sustainability

ENVIRONMENTAL Sustainability

As defined by one community

- Living within ecological limits
- Protecting natural resources
- Responsible consumption patterns: re-use, recycling, conservation
- Have measurable goals and carrying capacity indicators: e.g. water
- Have quality indicators, air quality, species diversity, etc.

Governance and Environmental Sustainability

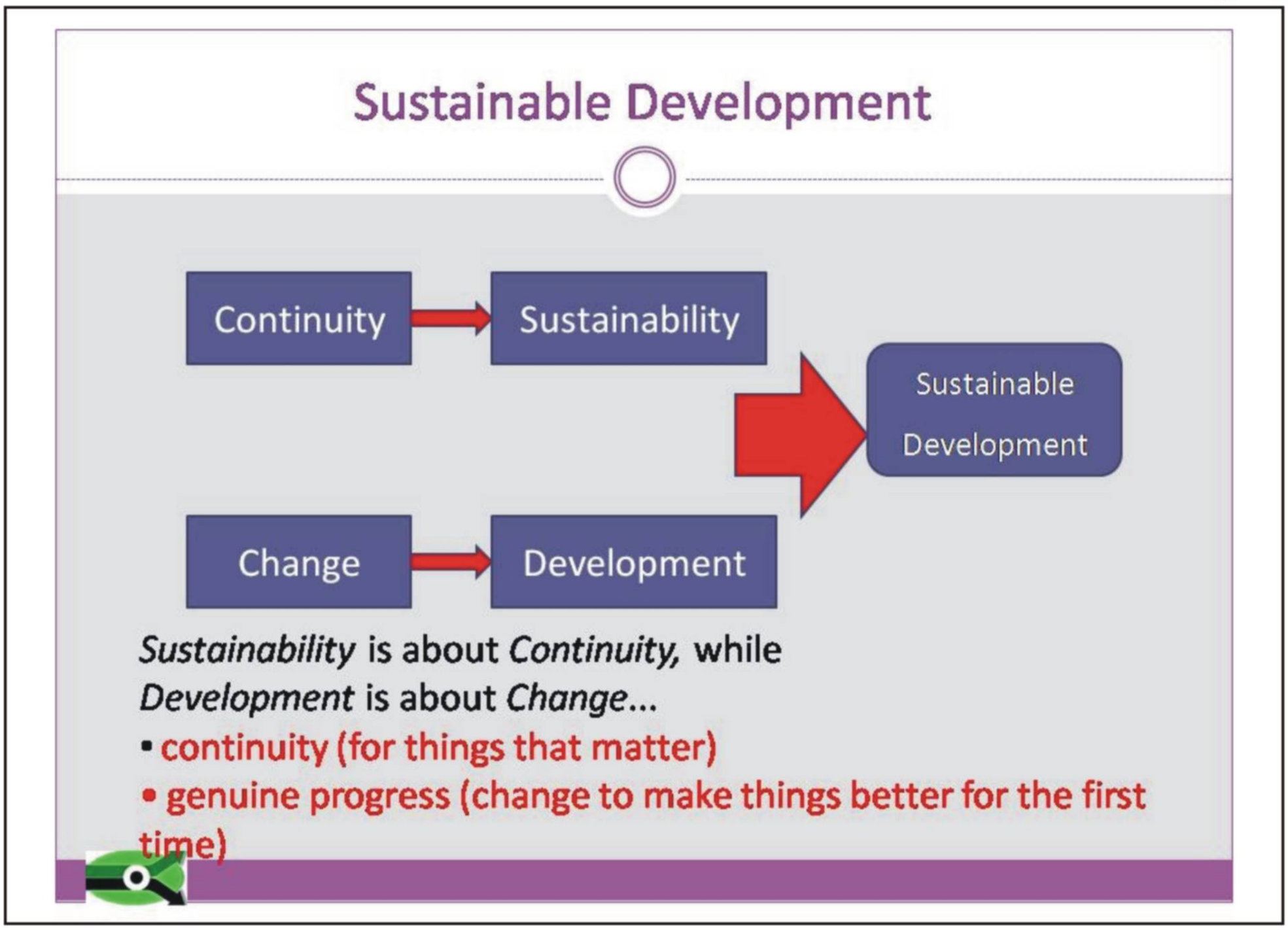
The same community identified DEMOCRATIC PARTICIPATION as key to environmental sustainability

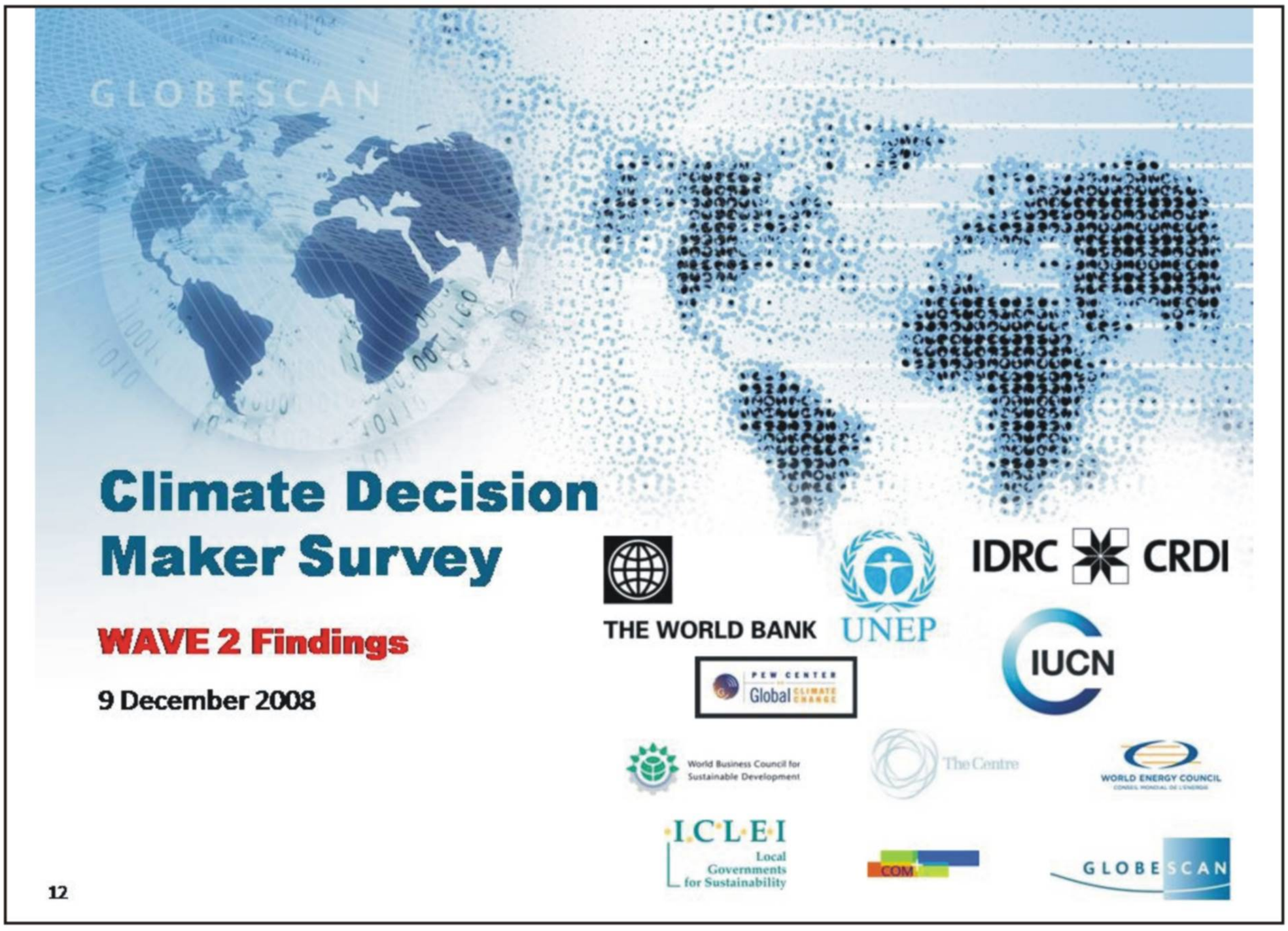
- Power from within the community
- All stakeholders represented and involved
- Accountability
- Responsibility
- Belief in the possibility of change
- Communication, education, information and collaboration

Above has application at local, national, regional and international levels

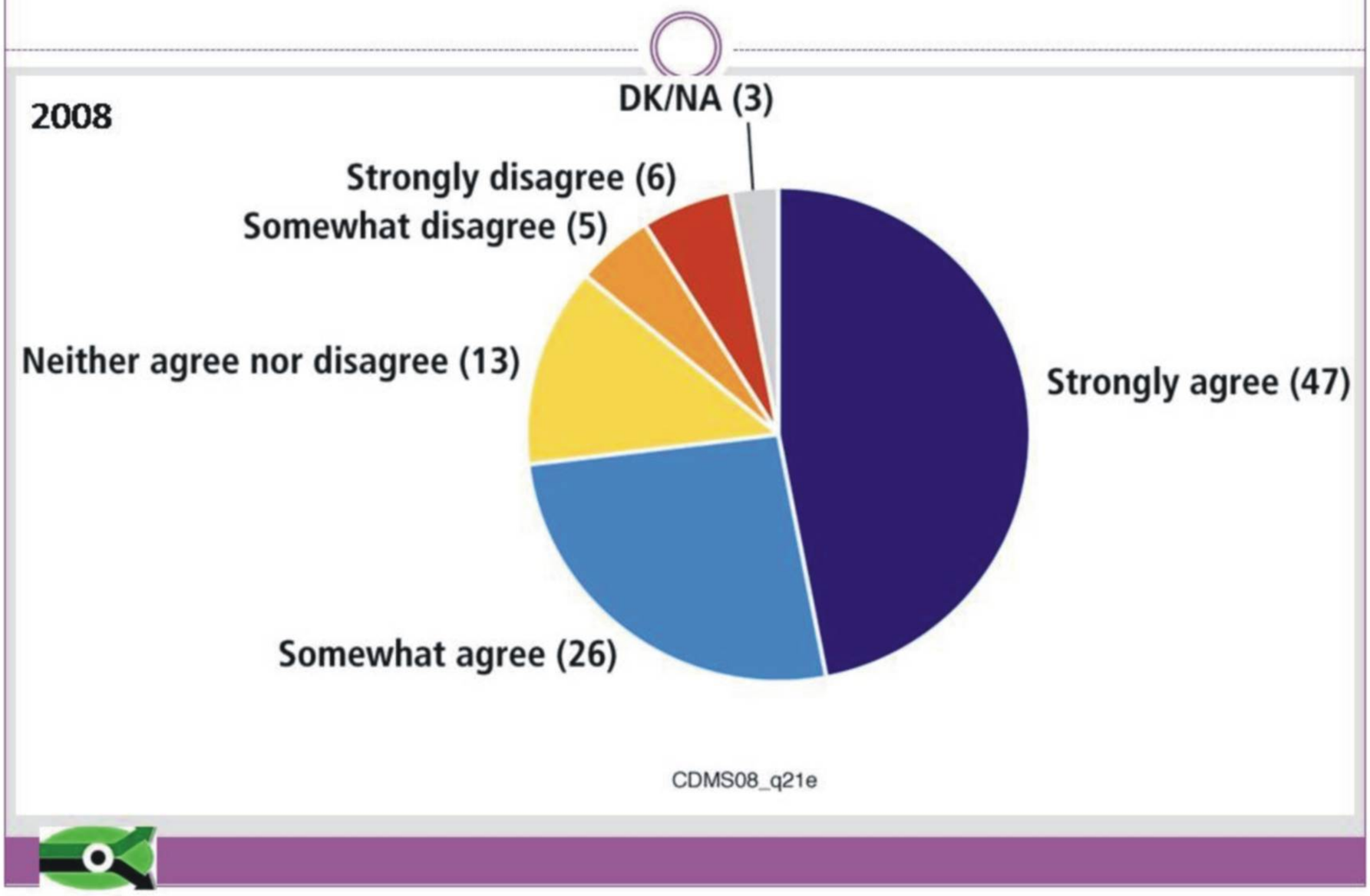
Climate Change

- A global phenomena and a consequence of poor environmental governance and unsustainable development
- Disproportionately impacts the poor and those dependent on natural environment in developing countries
- Solution lies in …."Daring to think of the welfare of the whole human race *as a practical objective"*
- ***Raises more Governance issues***
  - Requires Strong Leadership
  - More communication amongst all sectors
  - Clarity of purpose, Goals
  - Identify practical actions at all levels that can be taken
  - Increased participation and involvement

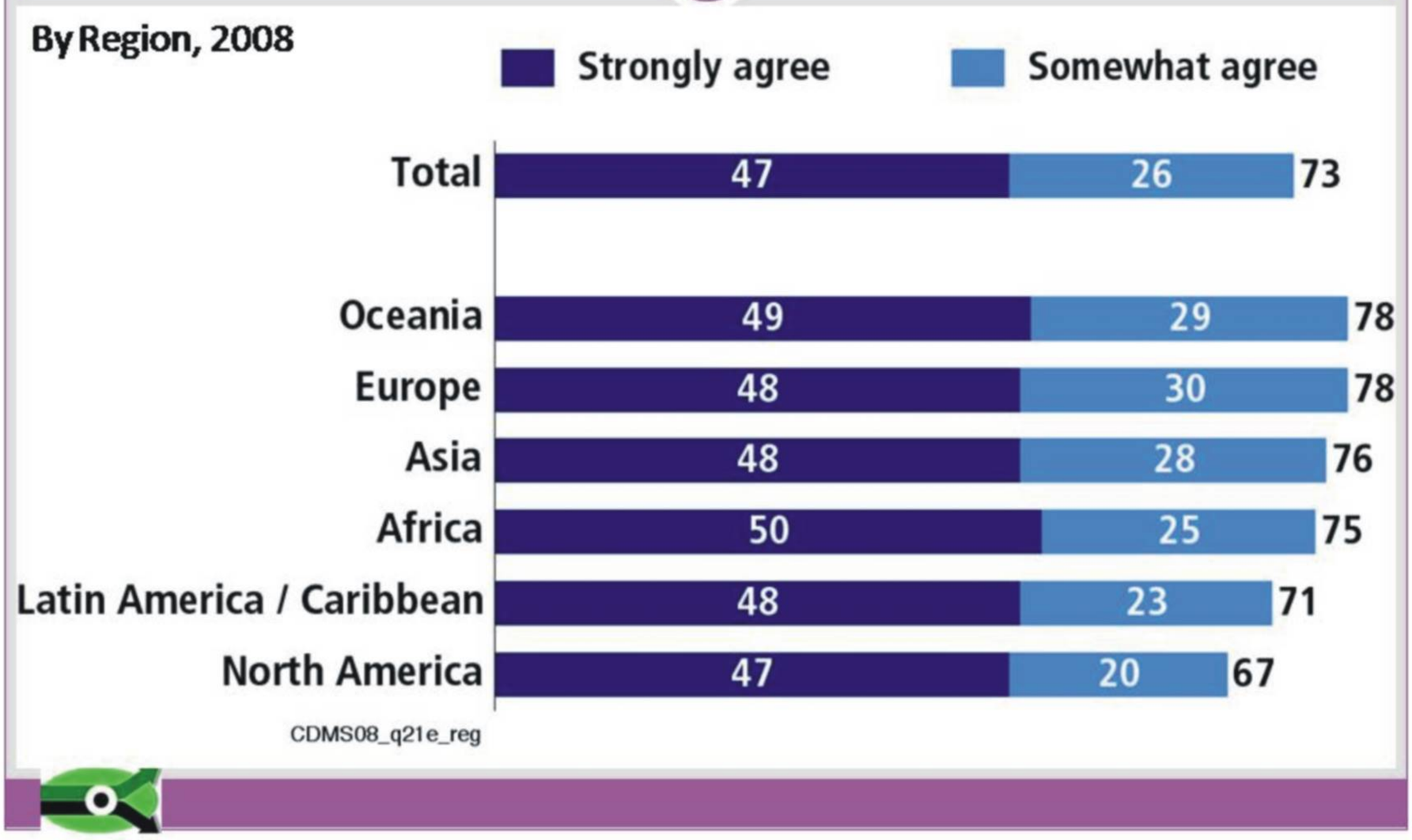

Sustainable Development
Continuity
Sustainability
Sustainable Development
Change
Development
Sustainability is about Continuity, while Development is about Change...
• continuity (for things that matter)
• genuine progress (change to make things better for the first time)


GLOBESCAN
Climate Decision Maker Survey
WAVE 2 Findings
9 December 2008
THE WORLD BANK
UNEP
IDRC CRDI
IUCN
PEW CENTER Global CLIMATE CHANGE
World Business Council for Sustainable Development
The Centre
WORLD ENERGY COUNCIL
ICLEI Local Governments for Sustainability
COM
GLOBESCAN
12

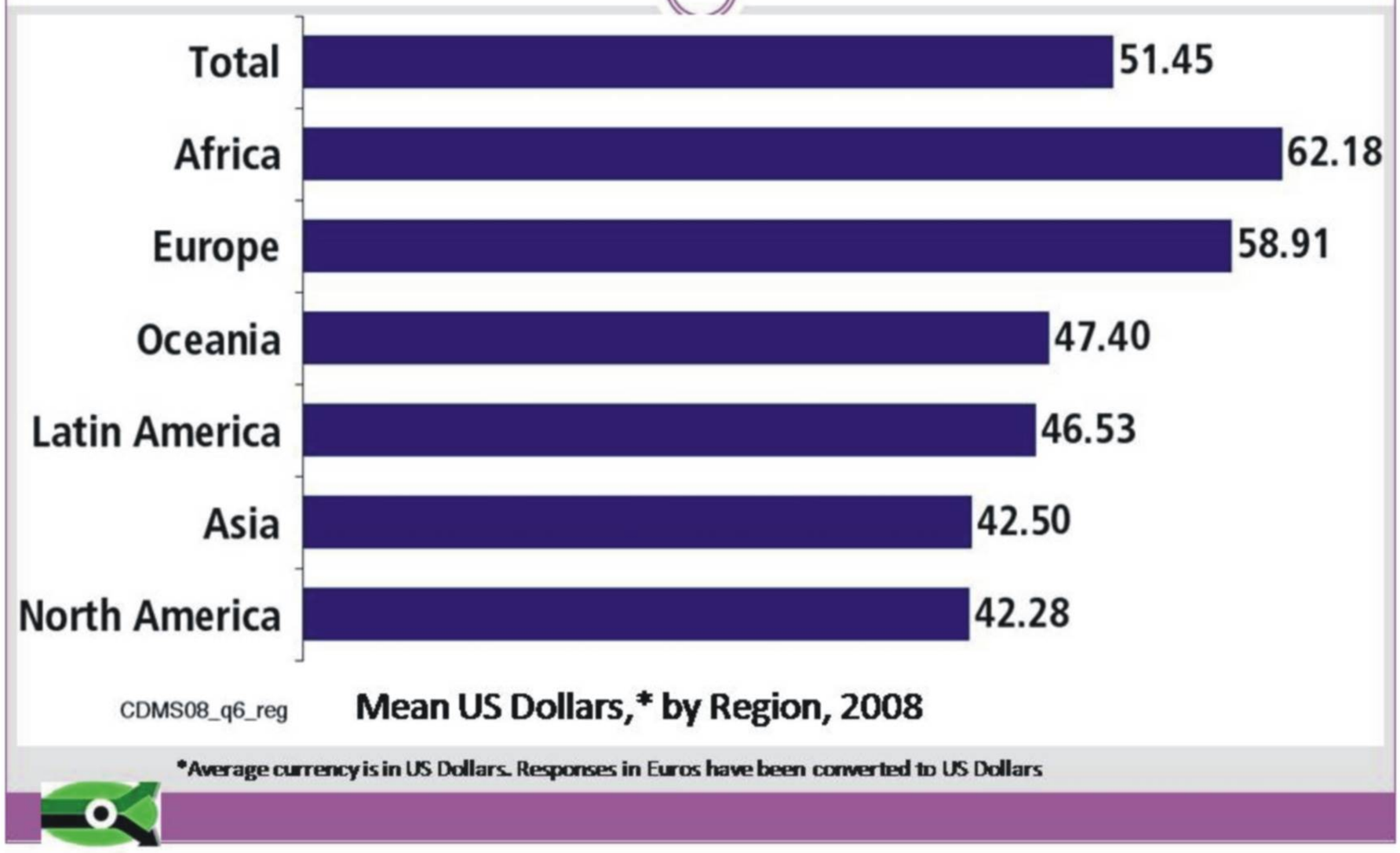
Equitable Economic Development and Significant Progress in Combating Climate Change Can Be Achieved Simultaneously



Equitable Economic Development and Significant Progress in Combating Climate Change Can Be Achieved Simultaneously



Price of Carbon at Which Majority of Decisions within Organization Will Become Climate-Friendly



Governance, Environmental Sustainability and Climate Change

1. Good governance that it is inclusive, responsive, accountable, transparent and strategic (with a vision)
2. Having clear goals and practical actions that can be taken towards achieving them.. *Natural resource management, energy efficiency, etc*
3. Information, Knowledge and communication. Empowering people to understand and make informed choices.. Investment in education, research, communication, awareness

Thank You

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PLENARY SESSION 3

Public health and climate change

Dr Jacob Kumaresan
Director

World Health Organization
Centre for Health Development

Outline of Presentation

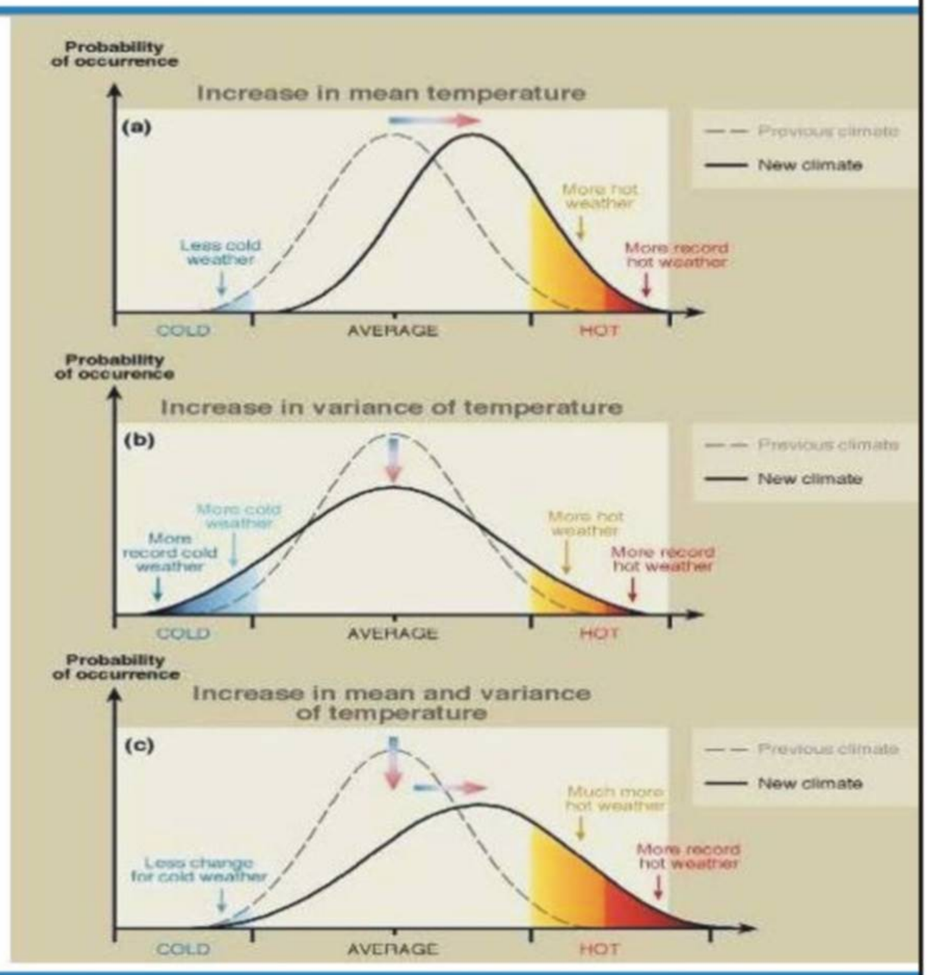
What are the risks?

Who are at risk?

What can we do at the city level?

Key Messages of IPCC

- Climate change is now.
- Health impacts are occurring.
- Impacts will continue for decades after successful control of GHG emissions.
- Extent of health impacts will depend on our ability to design and implement effective adaptation and mitigation measures.



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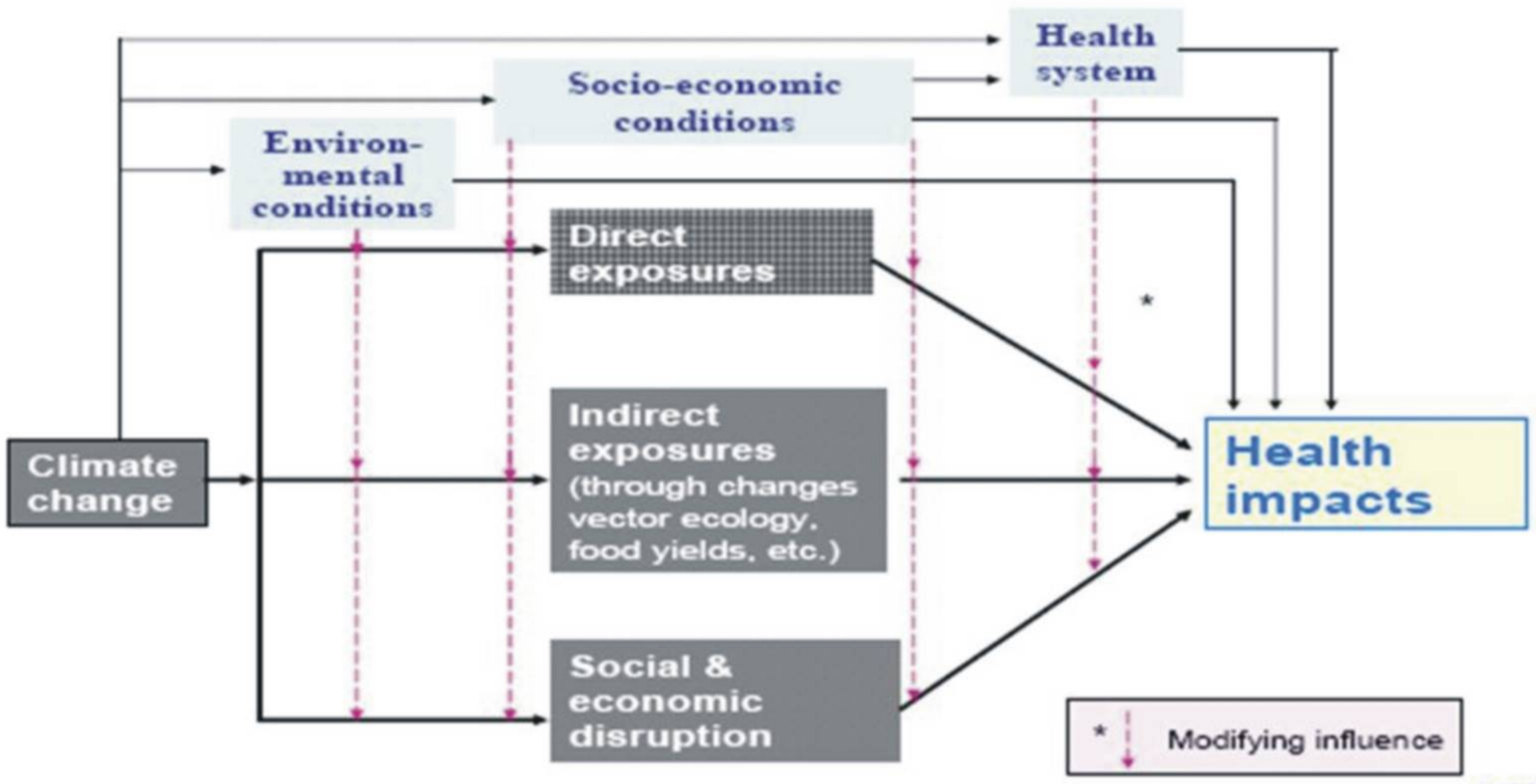
Climate change and health impacts



IPCC, 2007

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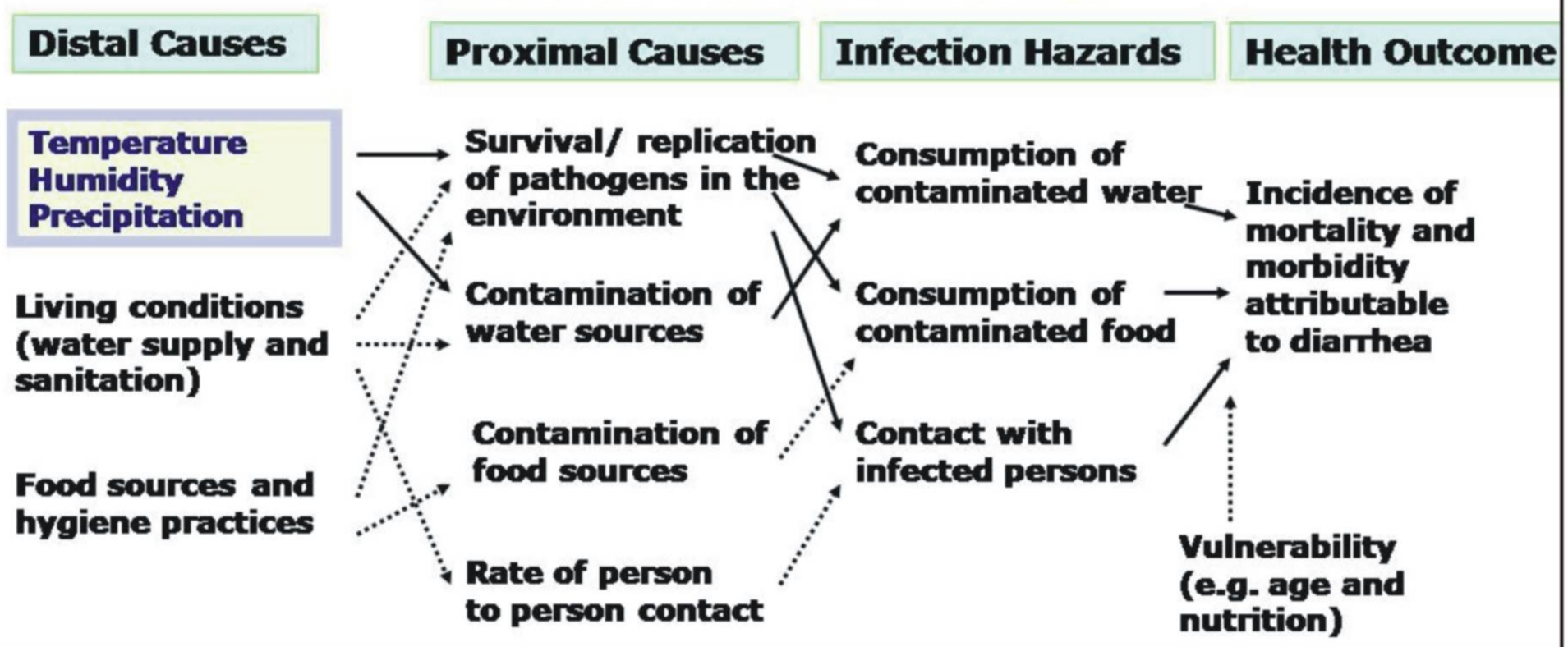
Climate change increases health vulnerability

Example: Diarrheal Disease



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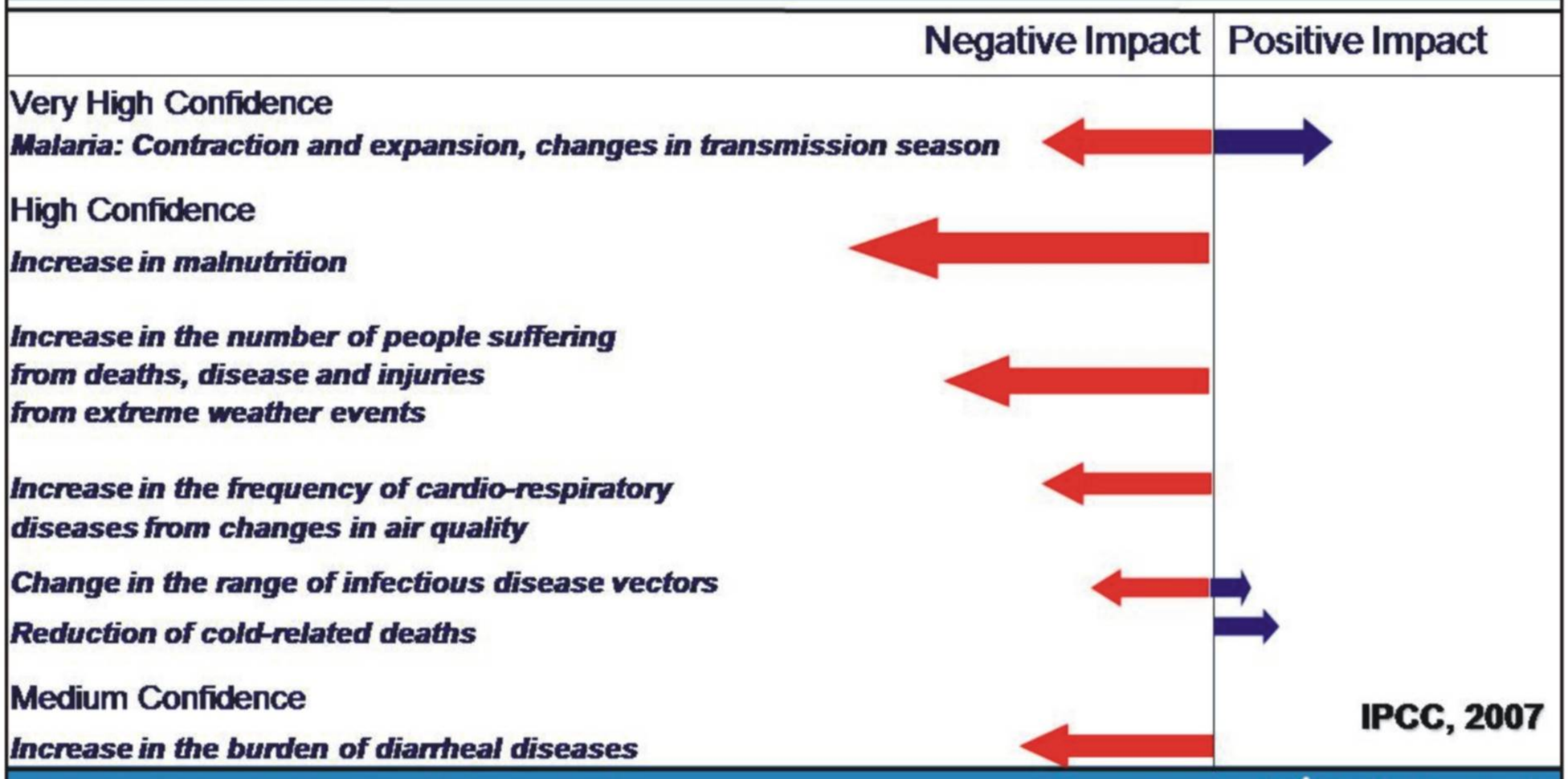
Direction and magnitude of change of selected health impacts of climate change



IPCC, 2007

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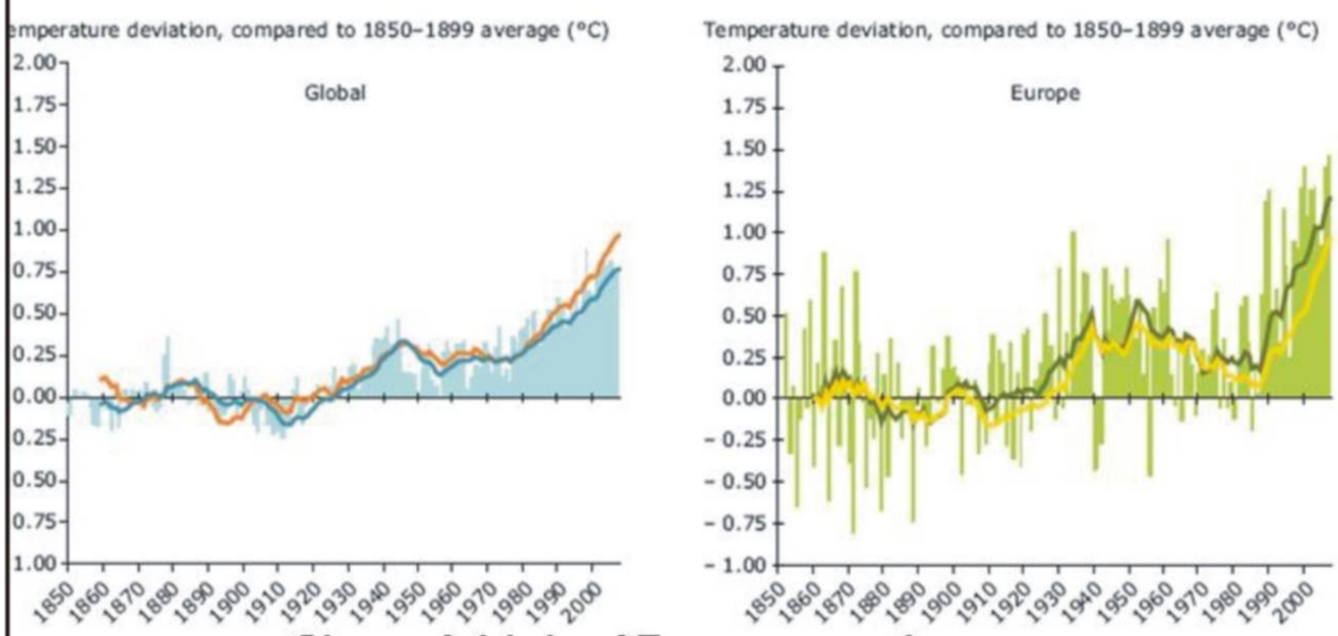
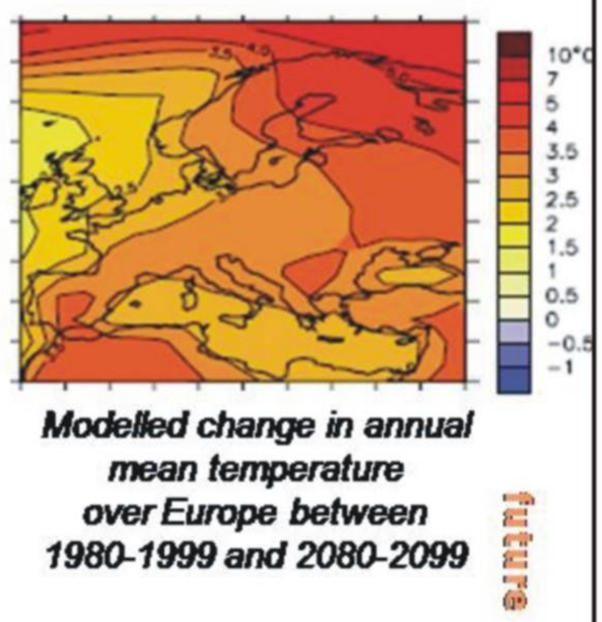
Europe's temperatures have increased more than global temperatures

- Global temperature (2007) : + 0.8 °C (above 1850-1899 average)
- European temperature (2007) : + 1.0 °C (above 1850-1899 average)



Observed global and European annual average temperature deviations 1850-2007



Modelled change in annual mean temperature over Europe between 1980-1999 and 2080-2099

- Global projection (1980-1999 to 2080-2100) : + 1.1-6.4 °C
- Europe (1961-1990 to 2080-2100) : + 1.0–5.5 °C

EEA, 2008

Heat waves in Europe

- Over 70,000 extra deaths reported in Europe in summer 2003 (ROBINE 2008).
- 86,000 extra deaths estimated per year with a global mean temperature projected increase of 3°C in 2071-2100 in the EU

(PESETA 2008).

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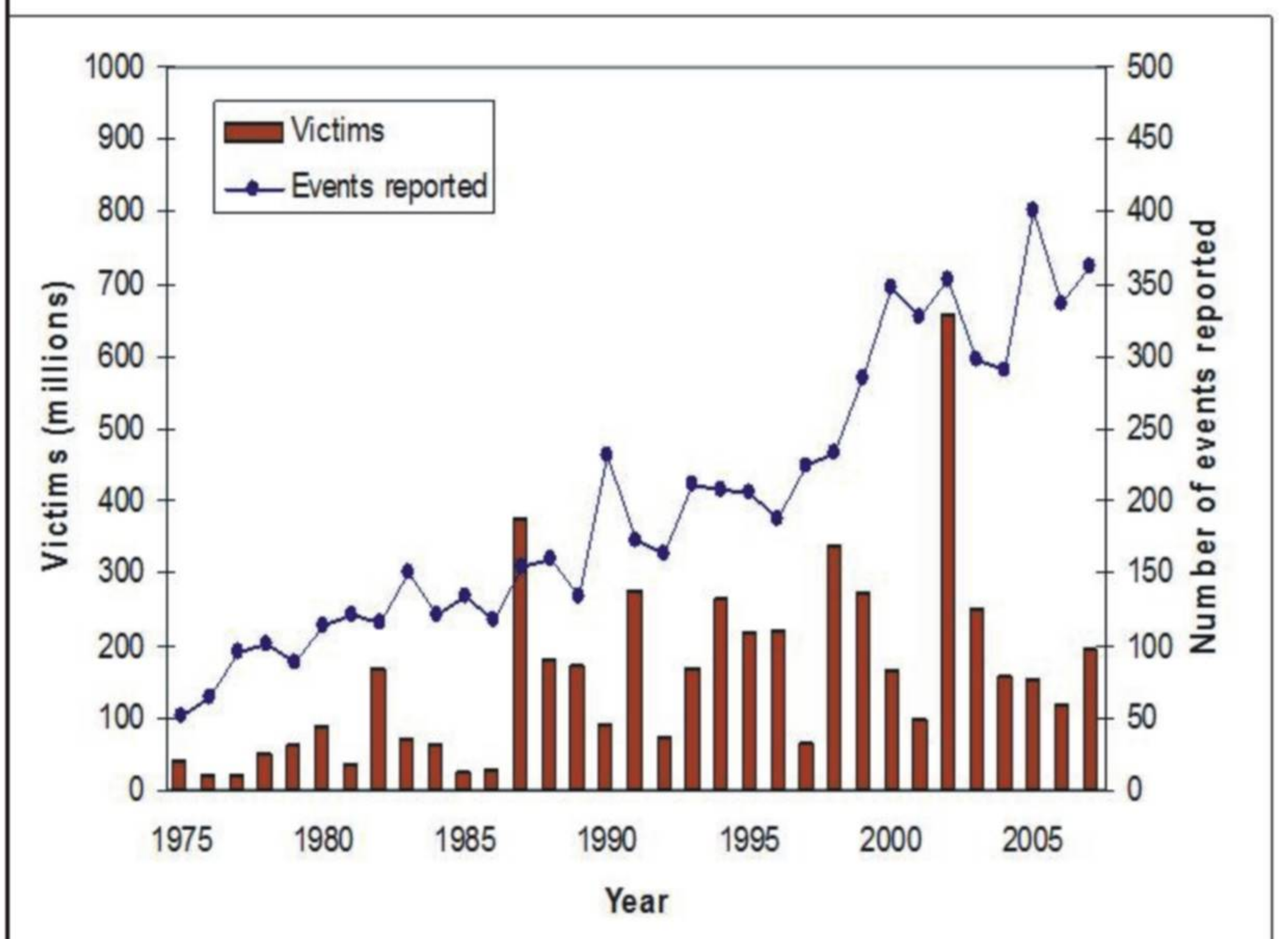
Storms, floods and droughts are increasing globally



Health impacts include:

- Deaths and injuries
- Infections: leptospirosis, hepatitis, diarrheal, respiratory, vector-borne
- Exposure to toxic substances
- Mental health effects
- Destruction of health services

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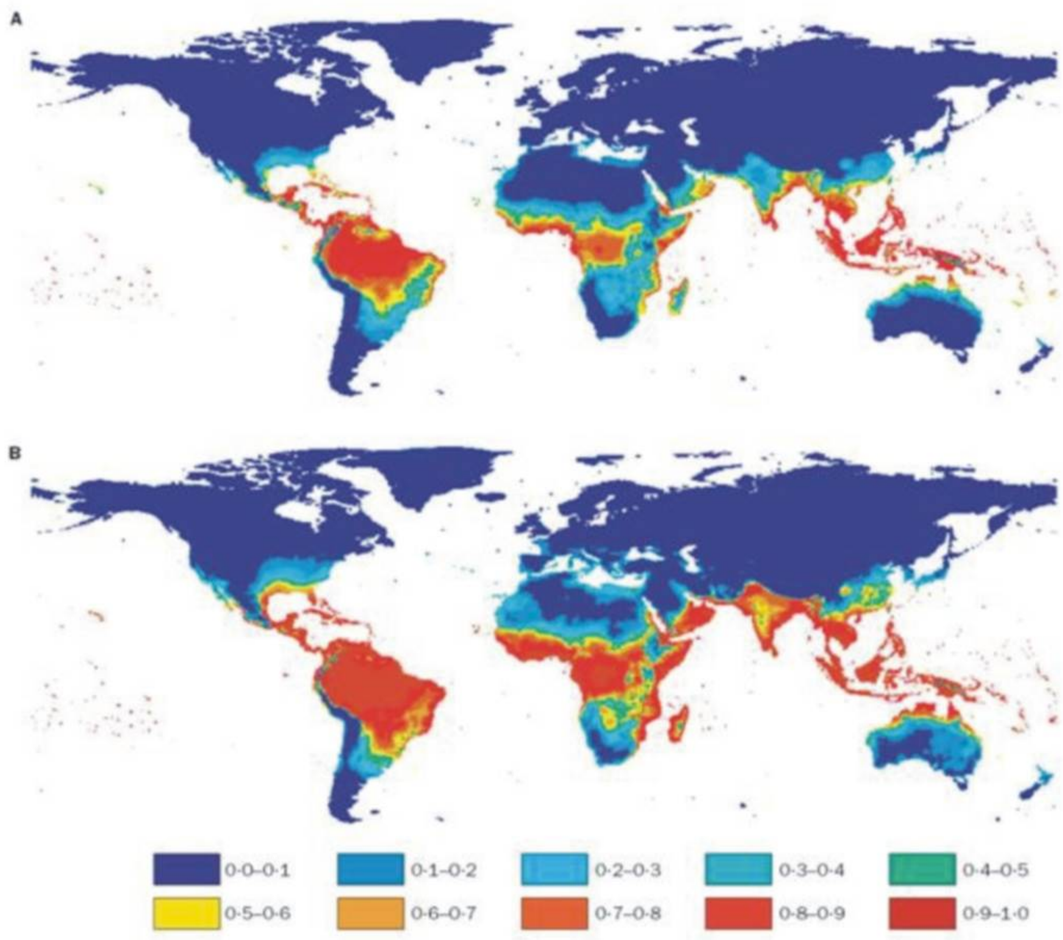
Climate change and dengue



If other conditions hold constant, climate change is expected to increase the proportion of the global population exposed to dengue from about 35% (upper figure), to 50-60% (lower figure), by 2085.

Hales et al, *Lancet* 2002

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Climate change will affect everybody but not in the same way

Populations differ in vulnerability

- Children are most at risk from the effects of climate change.
- Heat primarily affects older people.
- Service providers and labourers in outdoor environments are especially affected by extreme weather events.

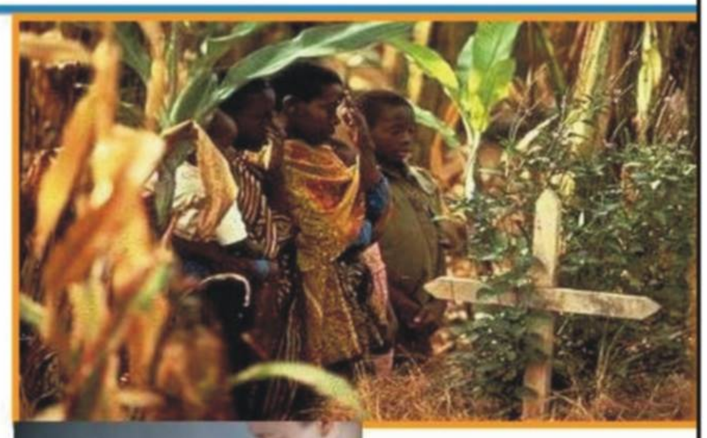

Photo: N'Diaye

Photo: Istockphoto

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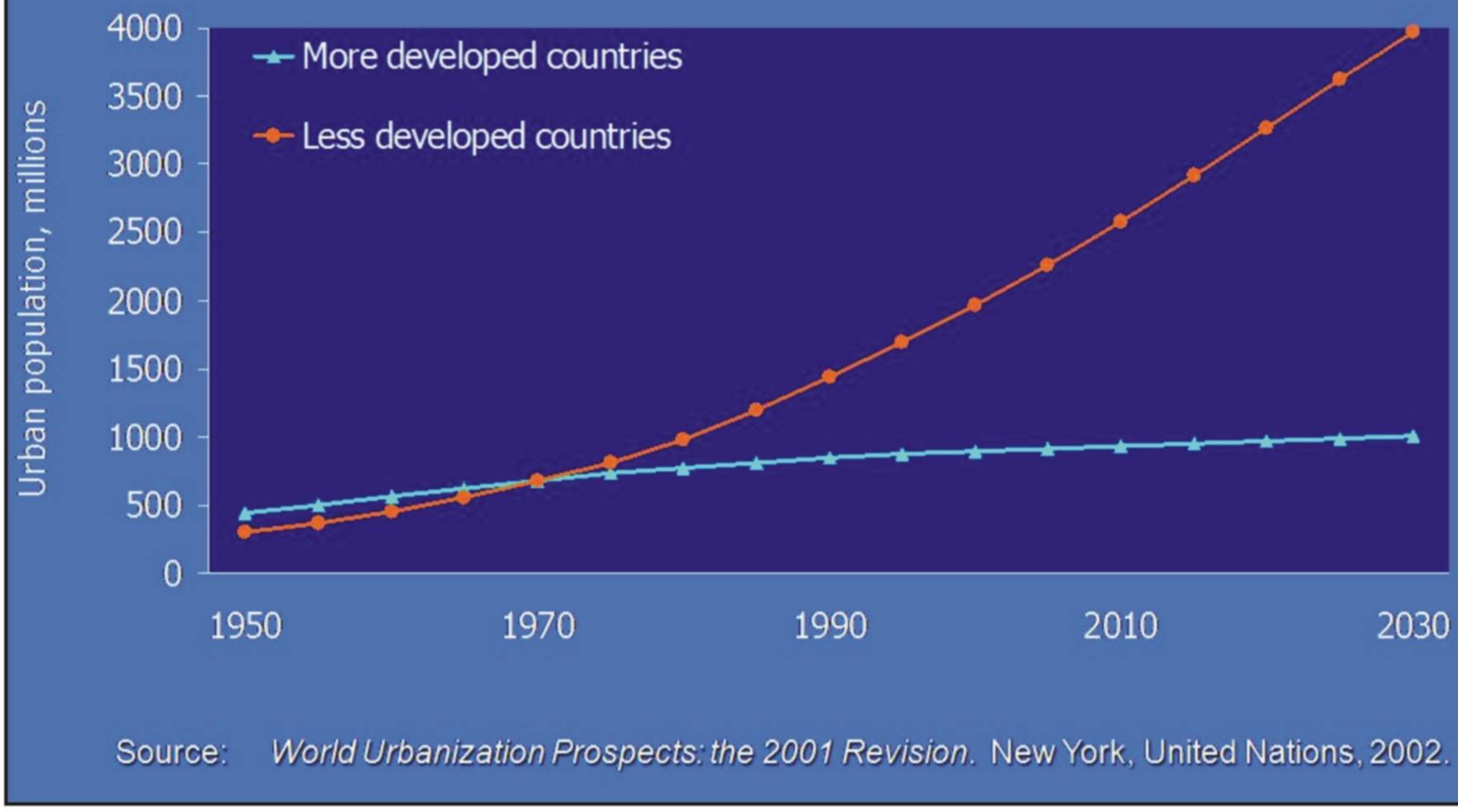
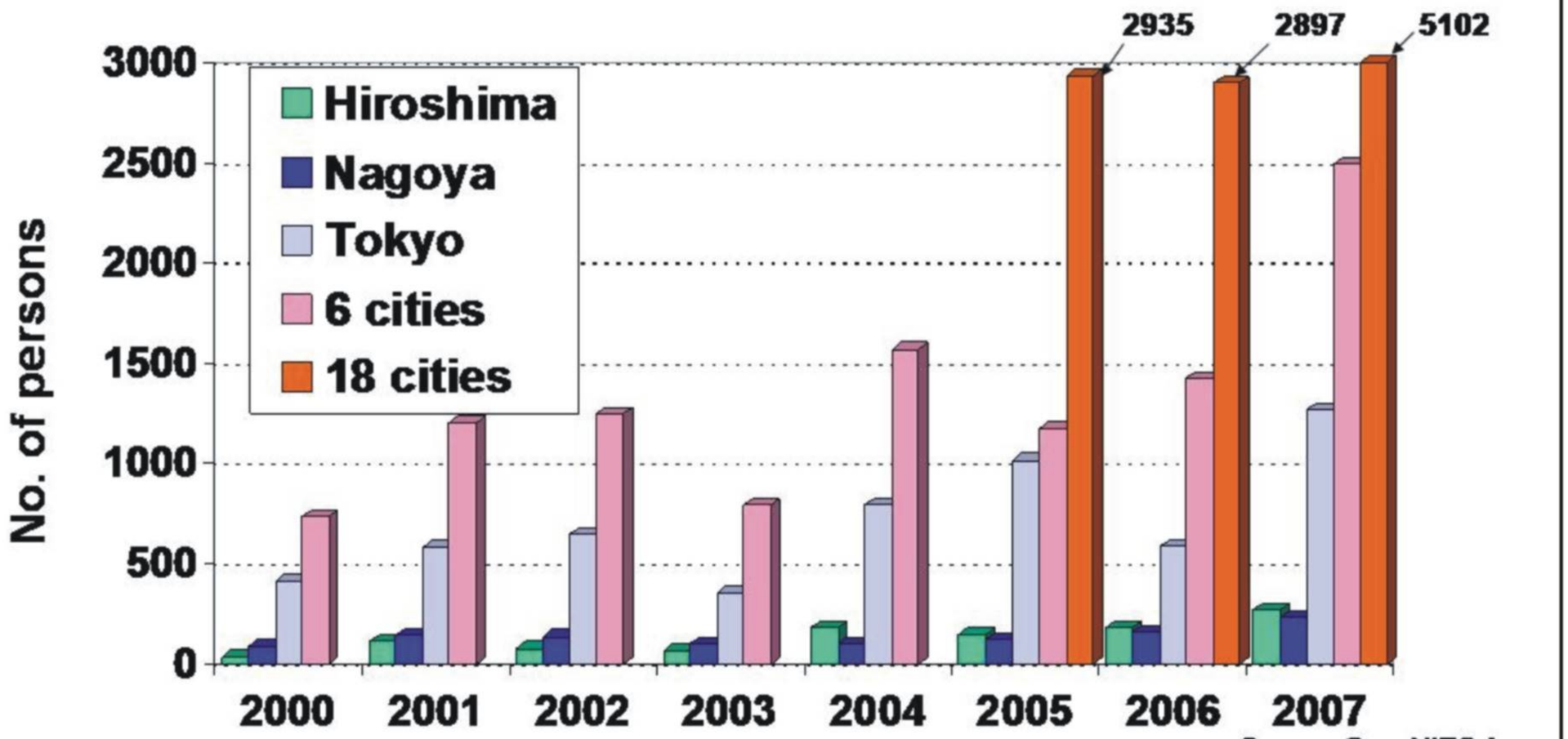
Urbanization trends and projections



Source: *World Urbanization Prospects: the 2001 Revision*. New York, United Nations, 2002.

Heat Disorders, Japan 2000-2007



Source: Ono, NIES Japan

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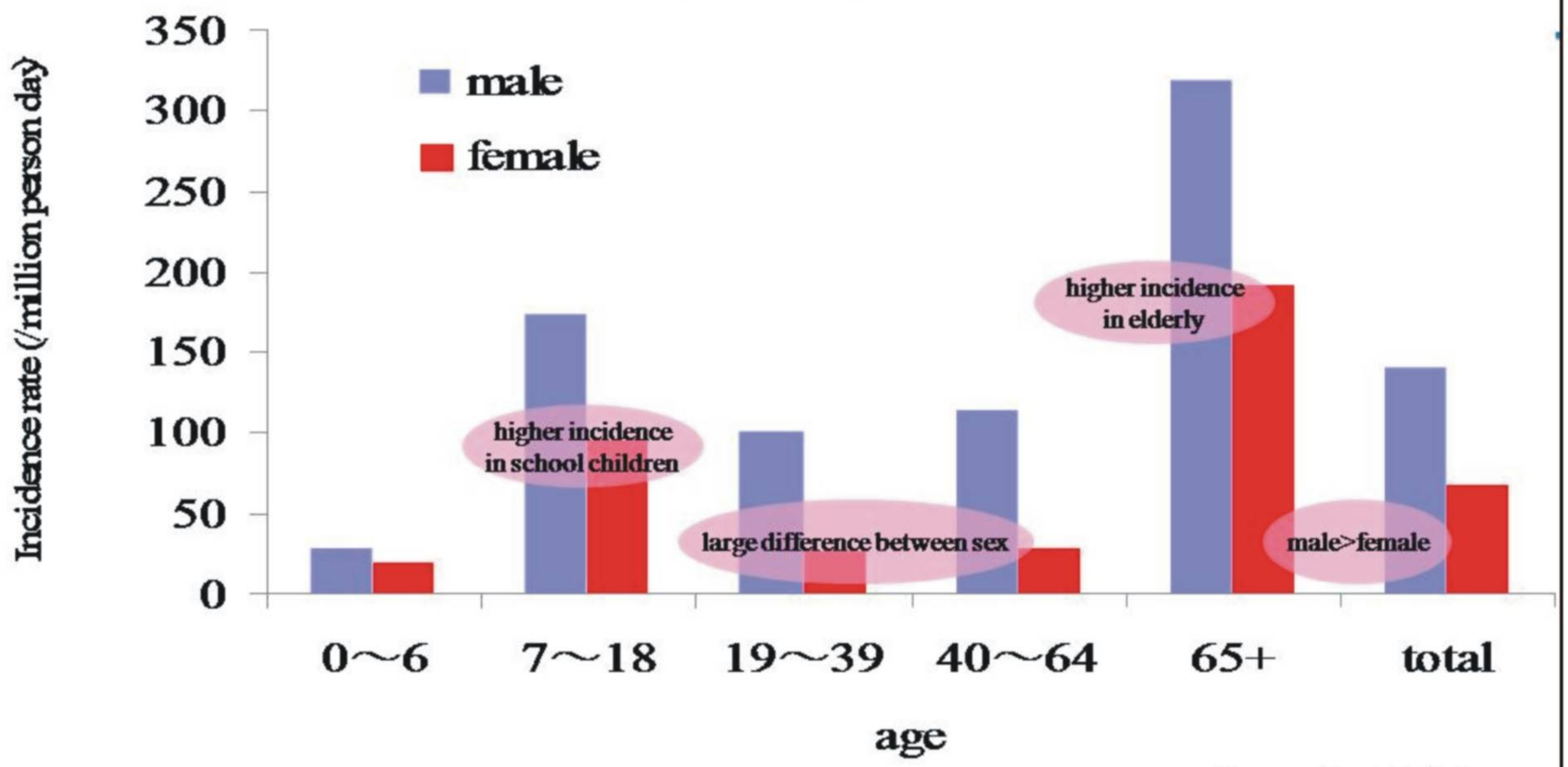
Incidence rate of heat disorders by sex and age (2007)



Source: Ono, NIES Japan

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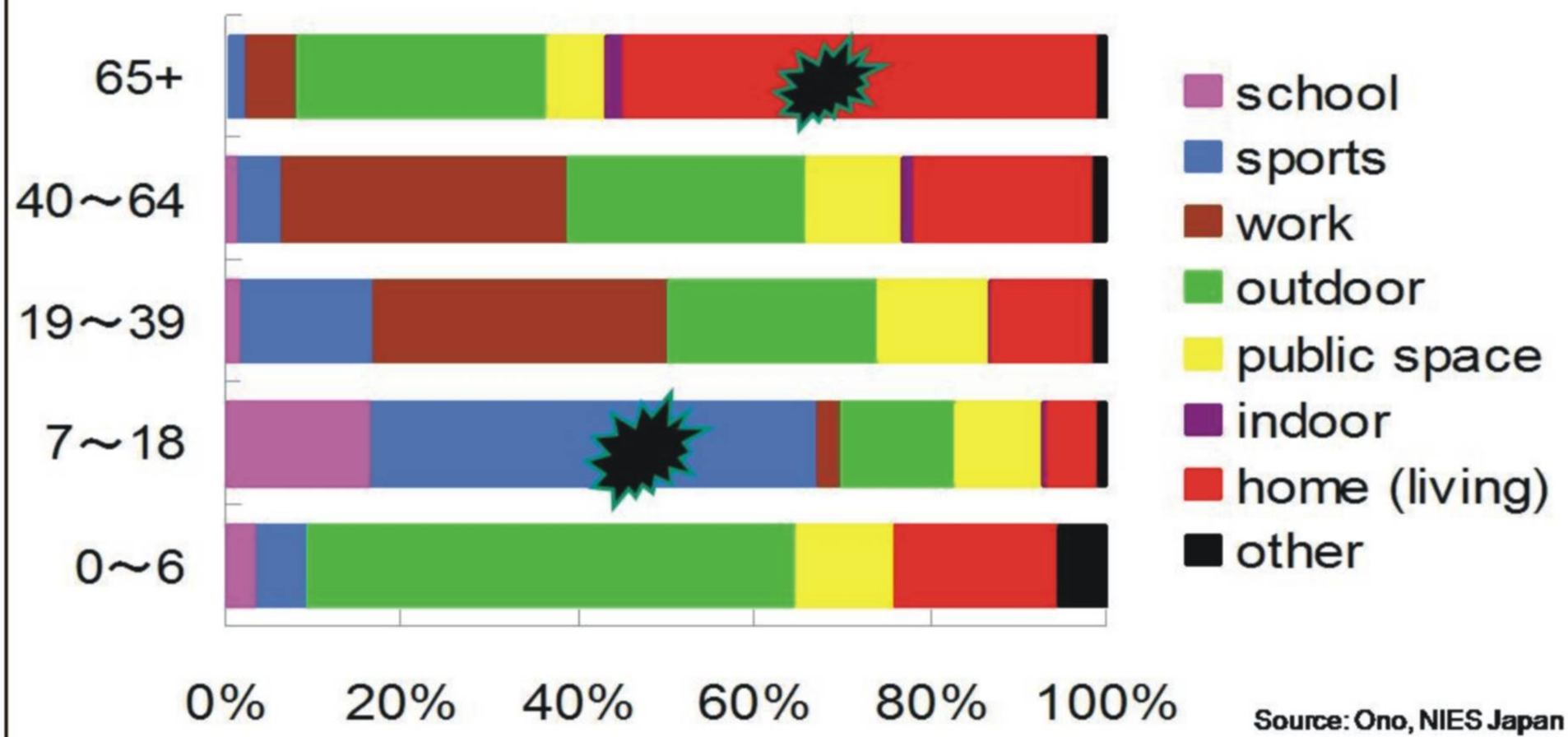
Location of the events by age group (2007)



Source: Ono, NIES Japan

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Shanghai, China

- Shanghai is a populous coastal city on the west coast of the Pacific Ocean.
- Administratively divided into 20 areas
- The population is slightly more than 13 million

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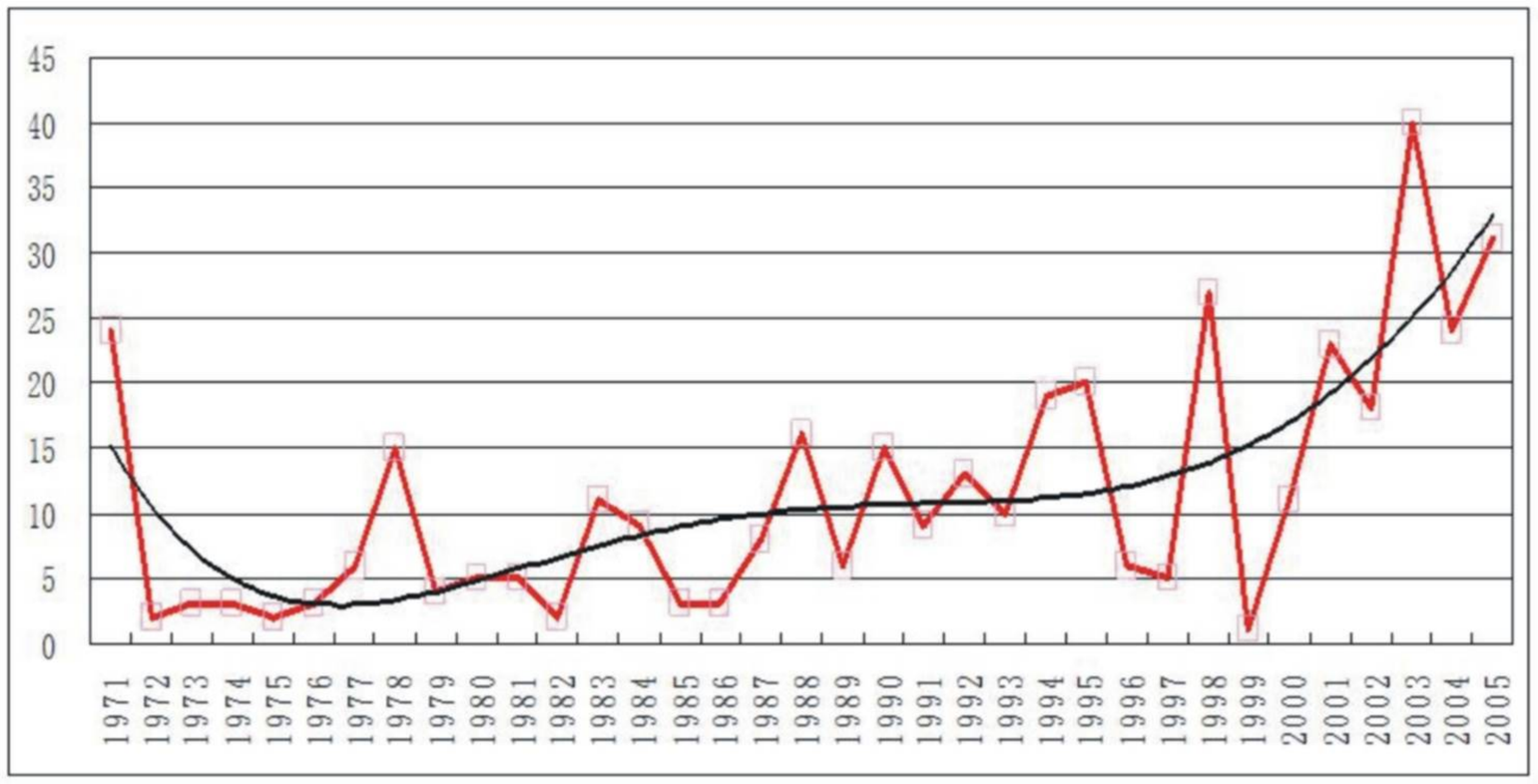
Hot days in Shanghai



Source: Yuan, Shanghai CDC

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Heat waves and extreme cold in Shanghai

- I998 Heat wave (8-16 August 1998):
  Average daily mortality increased by 300%
- 2008 Cold current:
  Number of excess deaths = 2,641

Source: Yuan, Shanghai CDC

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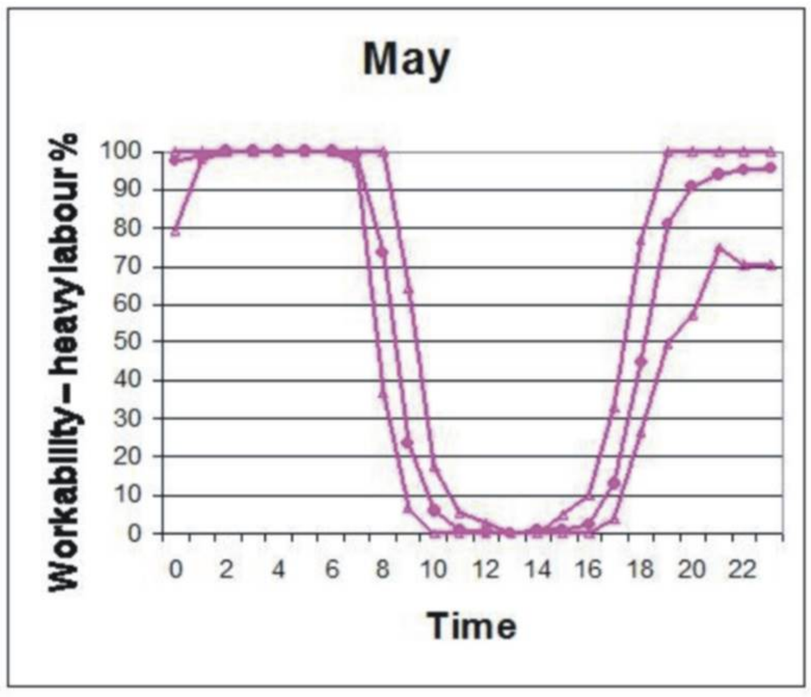
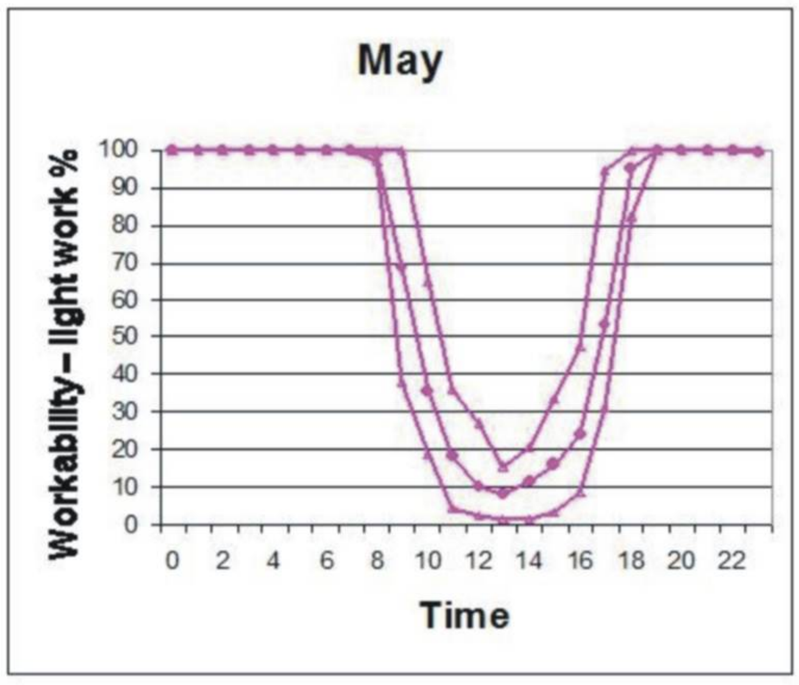
Work ability outdoors
New Delhi, India



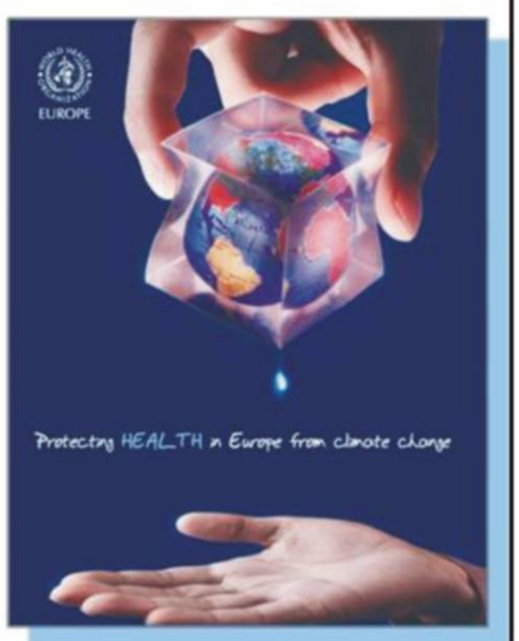


WHAT CAN WE DO?

- Adaptation: strengthen health systems
- Integrated solutions: co-benefits or multiple benefits
- Health and equity: centre of policies
- Sharing lessons learnt
- Champions

ADAPTATION

- **Strengthen health services**
- **Advocate health with other sectors**
- **Share good practice through inter-sectoral action**
- **Build capacity in the health workforce**
- **Set the example by "greening" the health services**



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Strengthen public health systems

Much of "adaptation" is basic, preventive public health:

Improved surveillance and response: Such as warning systems for heat waves

Strengthened action on diseases of poverty: Including wider coverage with vector control and vaccination programmes.

Better management of environmental health determinants :
Provision of safe water and sanitation, control of air pollution

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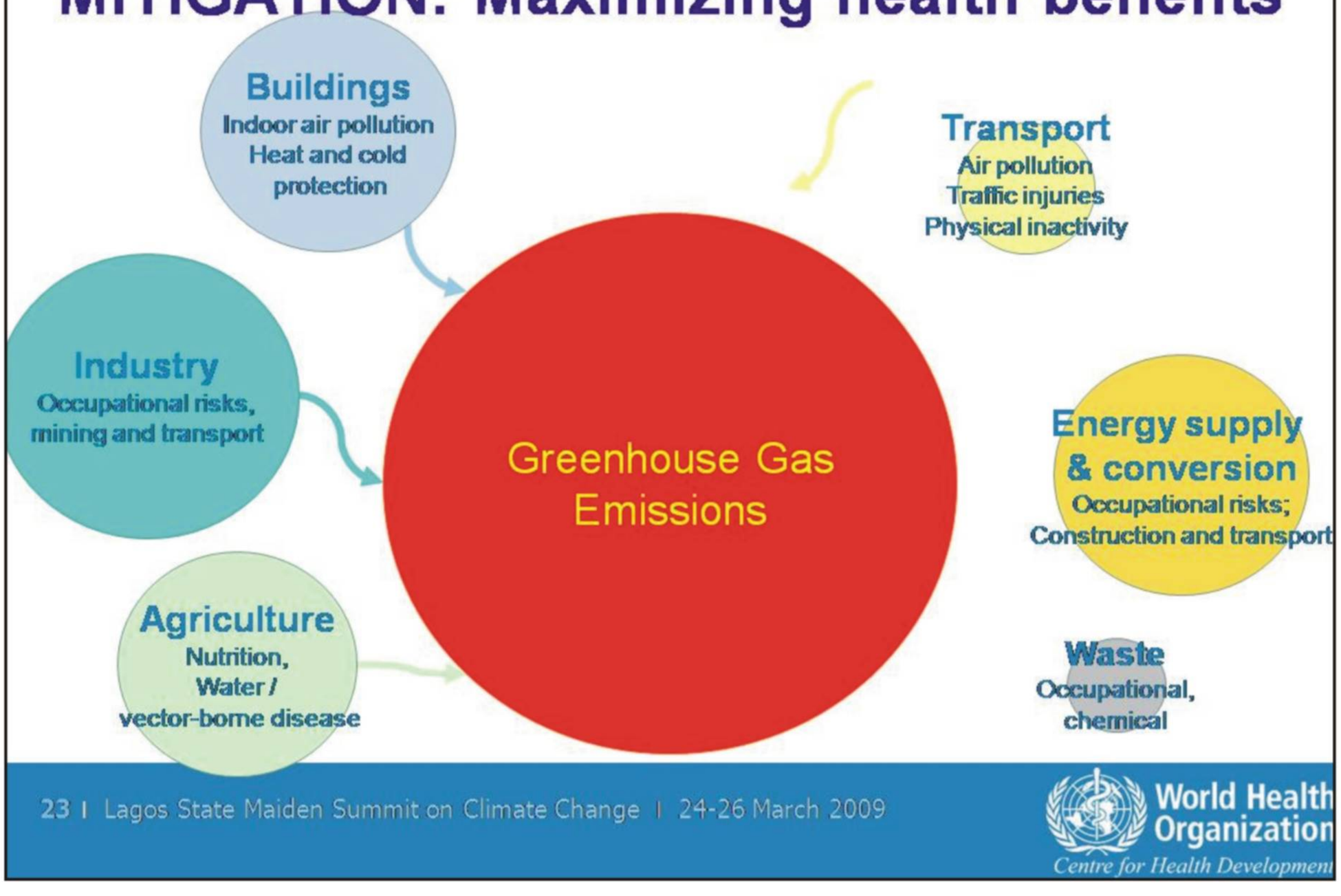
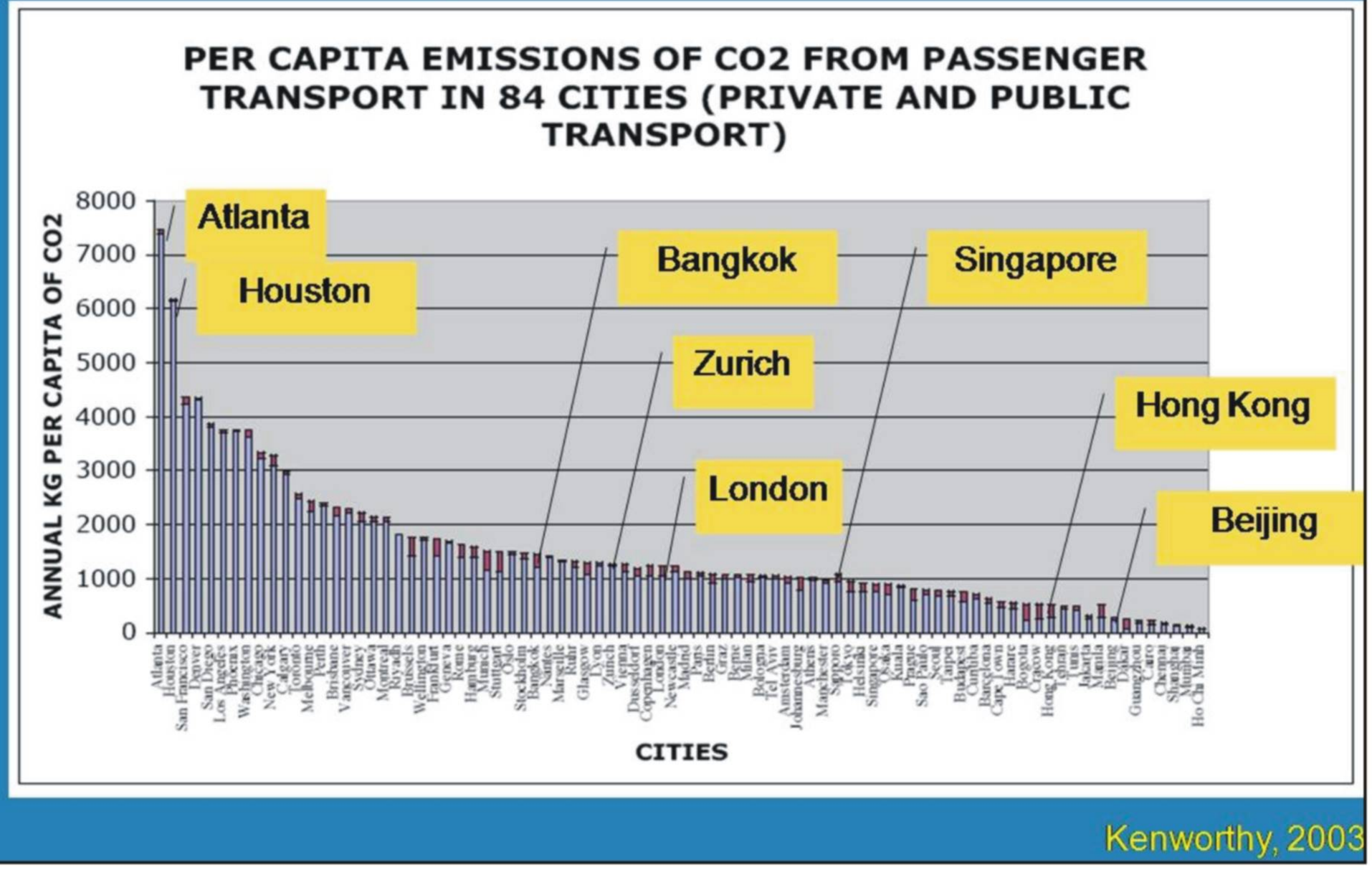
MITIGATION: Maximizing health benefits



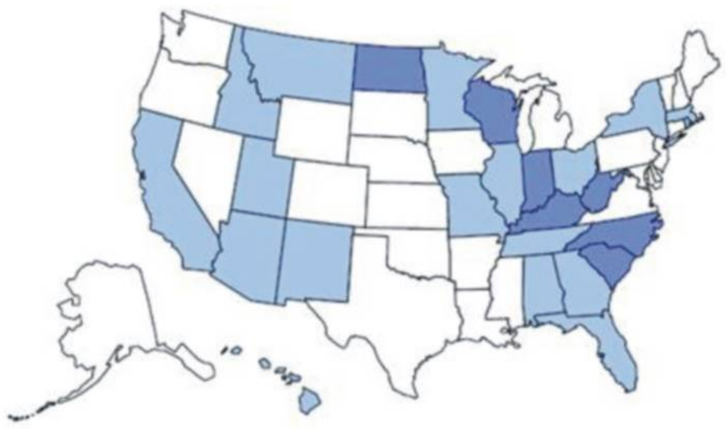
Reducing emissions : co-benefits



Obesity Trends* Among U.S. Adults

BRFSS, 1986

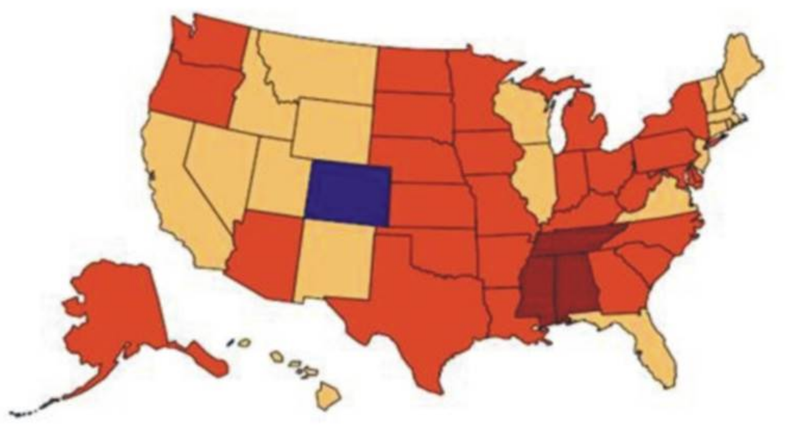
(*BMI ≥30, or ~ 30 lbs overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2007

(*BMI ≥30, or ~ 30 lbs. overweight for 5' 4" person)



What health can do?
Governance

193 Member States agreed on a World Health Assembly resolution, May 2008

- **WHO global workplan for action**

- **Reducing the global carbon footprint of WHO**

"Citizens, too, need to be fully informed of the health issues. In the end, it is their concern that can spur policy-makers to take the right actions, urgently."

Dr Margaret Chan
Director-General, WHO

World Health Organization
Centre for Health Development

WHO Centre for Health Development Kobe, Japan

- Heat Health Impact Assessment
- Health Co-benefits Research
- City Health Systems Preparedness – vector borne diseases attributable to climate change

World Health Organization
Centre for Health Development

Implement city/megacity plans to protect health from climate change

- Identify the risks, health effects, vulnerable populations and areas
- Identify action needs and develop a plan
- Identify implementation deficits
- Identify current available policies and measures
- Identify health co-benefits and/or damages
- Identify new-additional revised measures

World Health Organization
Centre for Health Development

World Health Organization
Centre for Health Development

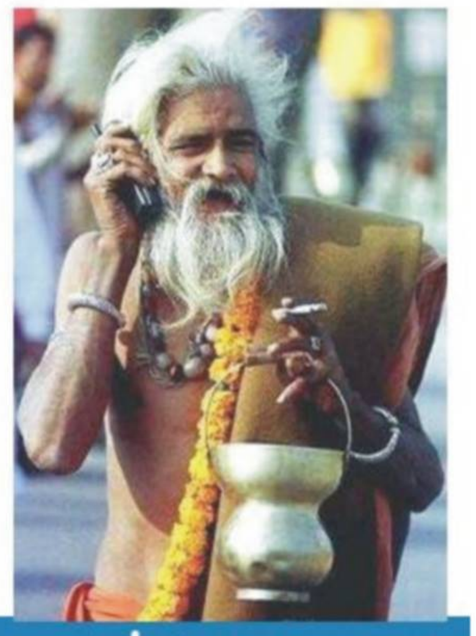
Conclusion

Climate Adaptation:

- Urbanization changes nature of health vulnerabilities.
- Vulnerabilities can be reduced by focusing on needs of disadvantaged groups.

Climate Change Mitigation:

- Policies concerning urban energy sources (e.g. transport) have strong direct links to health impacts.
- Health impacts should be central in energy decisions.



World Health Organization
Centre for Health Development

Climate Change and Public Health

Akinyinka O. Omigbodun,
Provost, College of Medicine,
University of Ibadan,
University College Hospital,
Ibadan, Nigeria

Paper Presented at ***The Lagos State Summit on Global Climate Change*** at Eko Hotel & Suites, Lagos, Nigeria, March 23 – 26, 2008

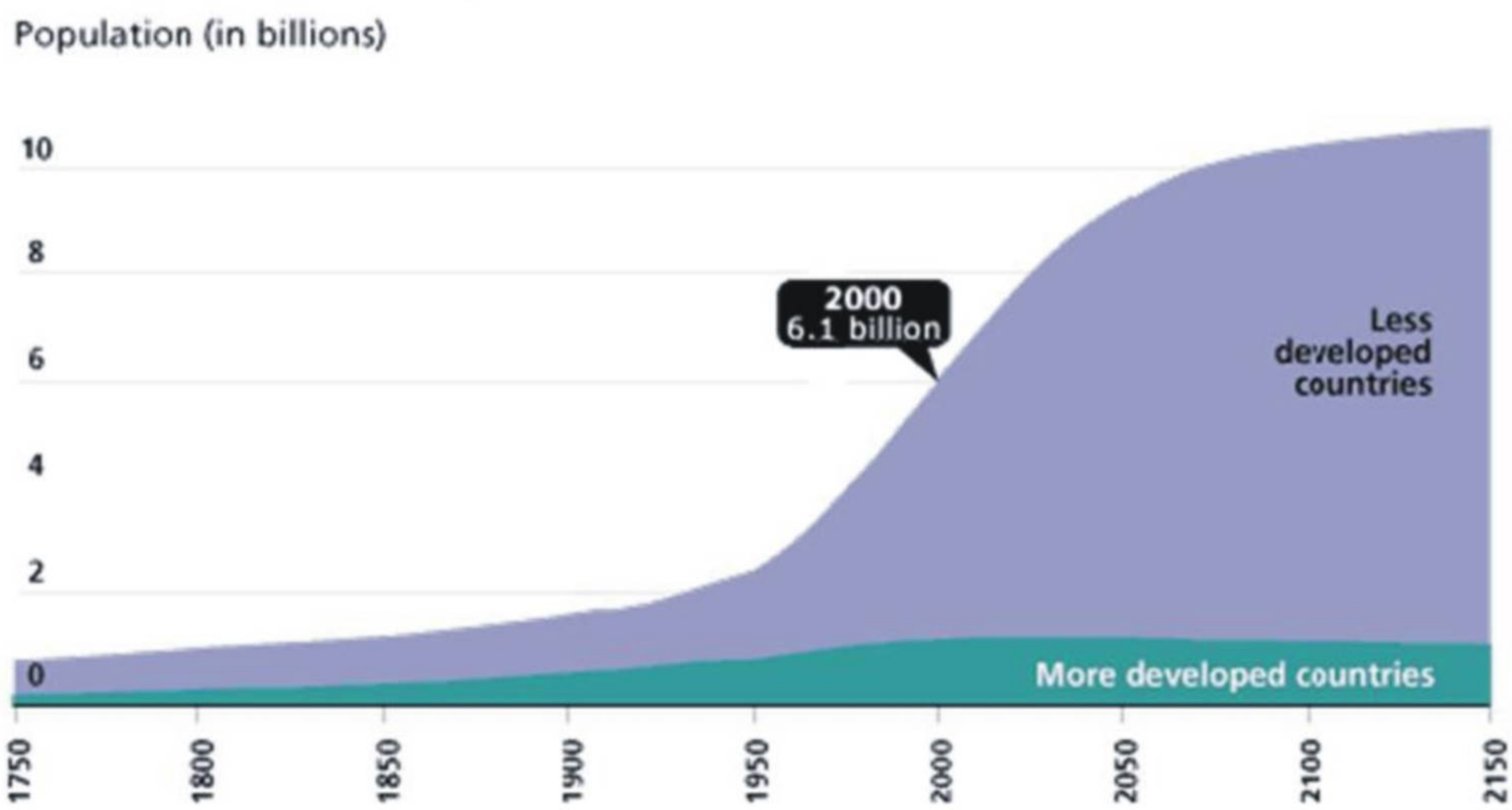
Outline

- 'Push Factors' for Global Climate Change
- Impact of Climate Change on:
  - **Physical Health**
    - Direct Effects
    - Vector-Borne Diseases
    - Food and Water-Borne Diseases
    - Rodent-Borne Diseases
    - Other Infections and Emerging Pathogens
    - Reproductive Health
    - Non-Communicable Diseases
  - **Mental Health**
  - **Social Well-Being**
- Vulnerability of Nigeria's Population
- What Do We Need to Do?

Global Climate Change

- Through the ages, human societies have altered local ecosystems and modified the climate of the areas they inhabited by their various activities
- Relentless population pressure in all the continents of the world has made this impact global in nature

Global Population Pressure



- 6.1 Billion people in 2000 – ~47% in Urban Areas
- ~9.4 to 11.2 Billion in 2050 – ~66% in Urban Areas

Source: United Nations, ***World Population Prospects, The 1998 Revision*** and estimates by the Population Reference Bureau.

Weather and Climate

- "Weather is the continuously changing condition of the atmosphere, usually considered on a time scale that extends from minutes to weeks"
- "Climate is the average state of the lower atmosphere, and the associated characteristics of the underlying land or water, in a particular region, usually spanning at least several years"

WHO Expert Committee

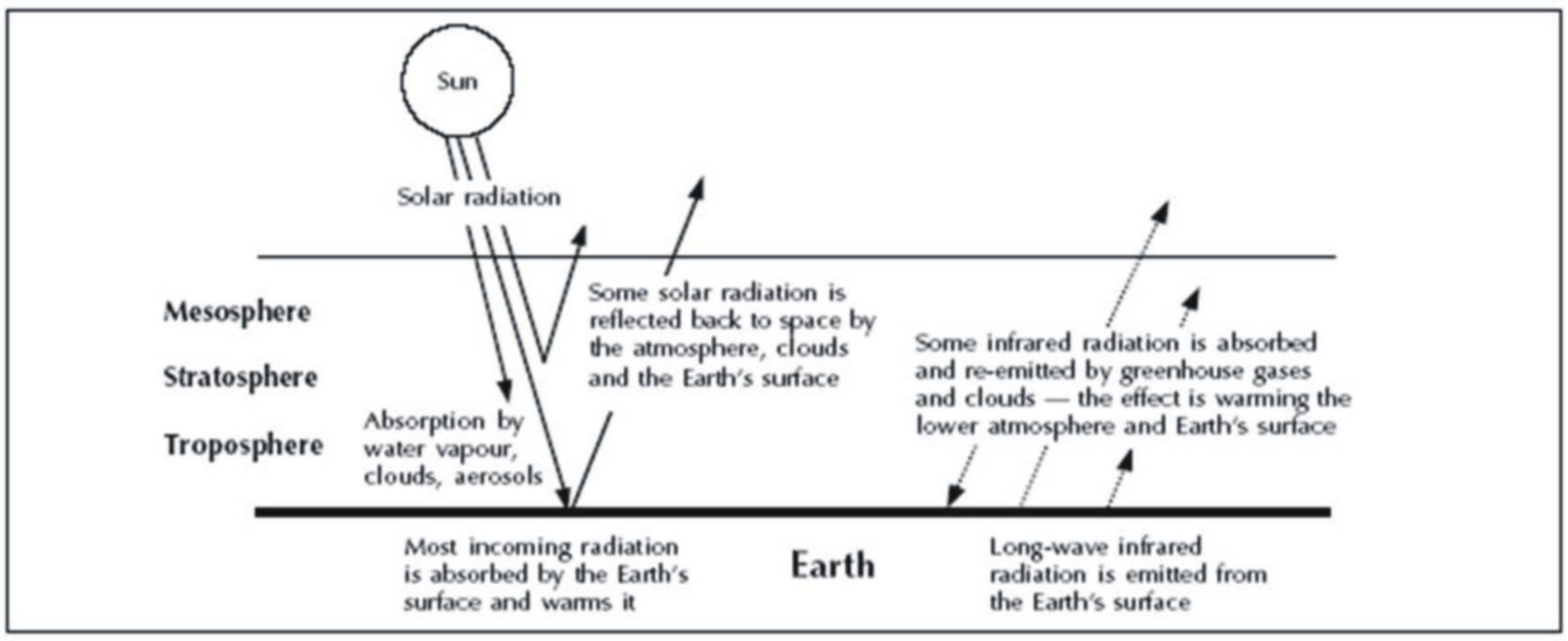
Weather and Climate

- Weather spans minutes, hours and days
- Climate spans years, decades and centuries

Maintenance of Earth's Surface Temperature

- Earth's emission of long wave infra red radiation
- Effect of the 'Greenhouse gases'
  - carbon dioxide
  - methane
  - nitrous oxide
  - ozone
  - water vapour
- The gases trap the emitted radiation and reflect it back to earth raising the surface temperature by about 33°C (from minus 18°C to an average of 15°C)

The 'Greenhouse Effect'



After Haines *et al*, CMAJ, 2000; 163: 729-734

Triggers for Climate Change

- Continental drift
- Astronomical cycles
- Variations in solar energy output
- Cyclic warming & cooling of ocean surfaces (El Niño/La Niña)
- Volcanic activity
- Human activity

Global Climate Change ['Push Factors']

- Such activities that are changing Earth's climate are:
  - High intensity of land-use
  - Surge in energy consumption
  - Expanding industrial production
  - Deforestation
  - Irrigated agriculture
  - Animal husbandry
  - Cement manufacture
- A major consequence is Global Warming
- Global warming triggers other climate changes

Global Climate Change - Pace

The pace of global warming is likely to be much faster than recent predictions, because

- **Industrial greenhouse gas emissions have increased more quickly than expected and**
- **Higher temperatures are triggering self-reinforcing feedback mechanisms in global ecosystems**

Potentiation by Human Activity

Increased Release of Carbon Dioxide into the Atmosphere by Burning Fossil Fuels

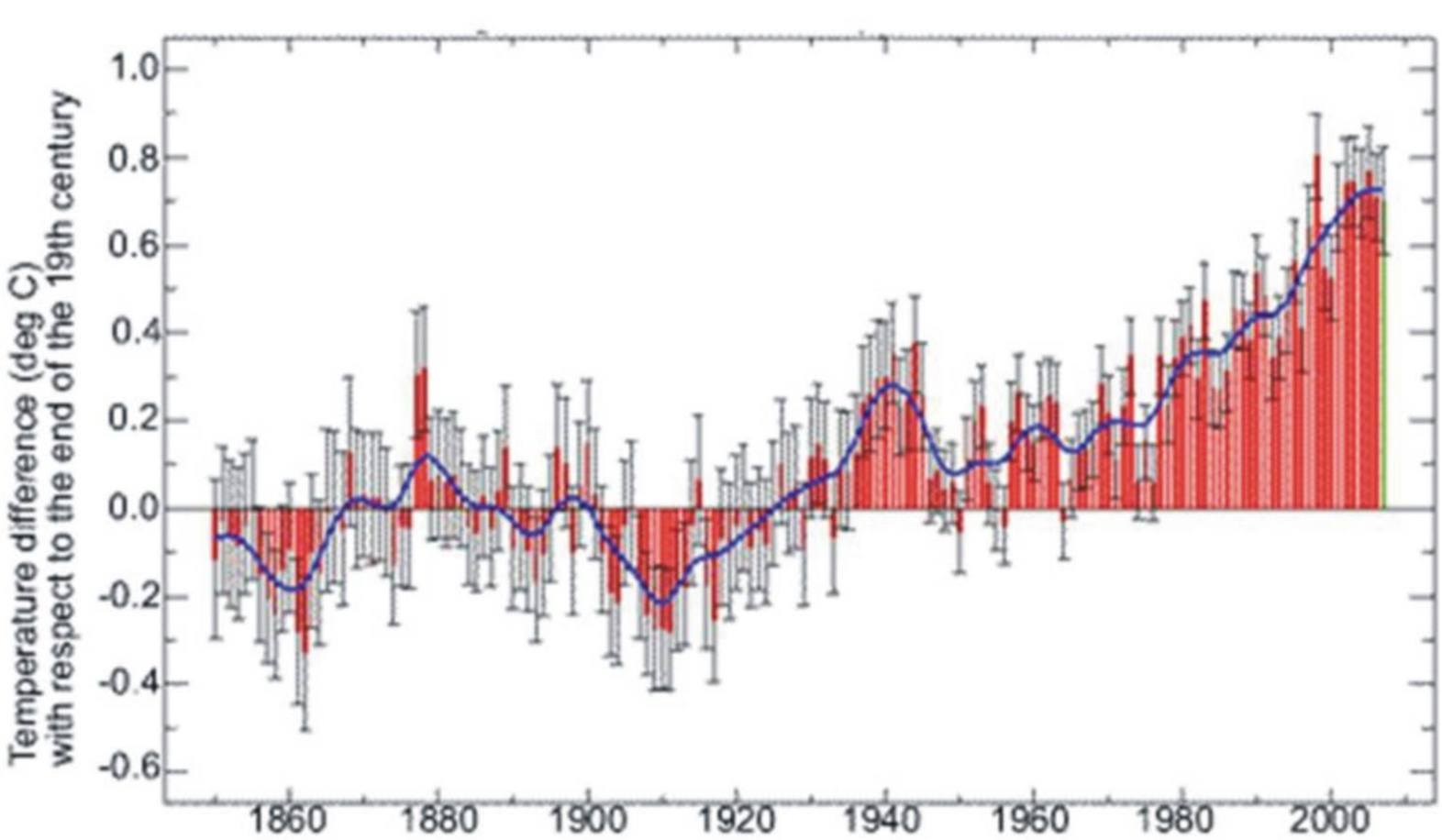
Increased Release of Methane (Agriculture & Petroleum Exploration)

Release of Halocarbons into the Atmosphere

- Chlorofluorocarbons
  - Chlorofluorocarbon-11 [CFC-11]
  - Hydrochlorofluorocarbon-22 [HCFC-22]
- Carbon tetrafluoride [CF_4]

Persistence of Nitrous Oxide in the Atmosphere

Changes in Mean Earth Surface Air Temperatures from 1850 to 2007



From the Hadley Centre for Climate Prediction and Research, UK

Consequences of Global Warming

- Disproportionate mid-atmospheric warming
- Night-time warming
- Winter warming
- Increased temperature variability
- Migration of plants to higher altitudes
- Retreat of mountain-peak glaciers
- Increase in the frequency and intensity of extreme weather events such as drought, floods and storms

Human Health

Health, as defined by the World Health Organization, is not merely the absence of disease

Health is a complete state of physical, mental and social well-being of the individual and, ultimately, the community

The Focus of Health Policy now is Health Promotion

Impact of Climate Change on Health

- **The first detectable changes in human health resulting from climate change may well be alterations in the geographic range (latitude and altitude) and seasonality of certain infectious diseases**
- **In the year 2000, climate change was responsible for approximately 2.4% of worldwide diarrhoea, and 6% of malaria in some countries**

Impact of Climate Change on Health

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Direct Effects of Heat

- Exacerbation of the adverse impact of heat and high relative humidity on the Nigerian populace
- Increased Mortality in the very young and the elderly (J-shaped mortality profile)
- *Increased likelihood of 'natural' disasters (flooding etc) that produce mass casualties*
- *Desertification of the Sahel & Northern fringes of coastal states like Nigeria*
- *Gully Erosion in SE Nigeria*
- *Coastal Flooding*

Vector-Borne Diseases

- Likely effects are being forecast by mathematical modelling
- Higher temperatures in Nigeria may actually shorten the lifespan of mosquitoes
  - ?Reduced malaria transmission
- Reduced viability of *Schistosoma* parasites due to warming and drying
- *Rate of maturation of mosquito-borne viruses accelerates in warmer weather*
  - *? Increased yellow fever & dengue*
  - *? Increased viral encephalitis*

Hard Data on Vector-Borne Diseases

- Malaria & Dengue Fever have been experienced at increasingly higher altitudes in Africa, Asia and Latin America
- Prevalence of Highland Malaria rising in Papua-New Guinea & sub-Saharan Africa
- *Malaria transmission is intensified during El Niño years and the period immediately following these Southern Oscillatory Cycles*

Food-Borne & Water-Borne Diseases

- **Human Contact with Water-Borne Vectors**
  - Ingestion of contaminated water
  - Recreational contact with infected water
  - Fetching water from streams & rivers
- **Factors Fuelling Water-Borne Infections**
  - Human Activities (Sewerage Disposal)
  - Weather-related Events

Water-Borne Pathogens

Major causes of diarrhoea linked to heavy rainfall and contaminated water supplies are:

- Cholera
- Cryptosporidium
- *Escherichia coli*
- Giardia
- Shigella
- Typhoid
- Hepatitis A virus

Rodent-Borne Infections

Major rodent-borne infections include

- Leptospirosis
- Tularaemia
- Lassa fever
- Lyme disease
- Other Viral Haemorrhagic fevers

Rodent-borne infections usually increase

- Following heavy rains and floods
- Following prolonged droughts which decrease the rodent's predators

Other infestations

The Nematodes:

- *Ascaris lumbricoides*
- *Ancylostoma duodenale*
- *Necator americanus*
- *Trichuris trichiura*
- *Strongyloides stercoralis*

are all very sensitive to changes in ecological factors, especially rainfall and temperature.

Emerging Pathogens

Key determinants in the emergence of many infectious diseases:

- *Temperature*
- *Evapo-transpiration*
- *Surface Run-off*

All are affected by Climate Change.

New pathogens of serious potential public health significance are likely to emerge as global warming intensifies.

Emerging Pathogens

Another factor that may lead to new pathogens appearing in the human population is the destruction of the habitat of some wild animals by climate change, forcing them to come in greater contact with humans and transmitting zoonotic viruses to man.

This is already happening in DR Congo

Reproductive Health

Environmental Temperature affects:

- *Semen Quality and Sperm Counts*
- *Birth Weight*
- *Timing of Onset of Labour*

Non-Communicable Diseases

Environmental Temperature affects:

- *Rates of Hospitalization of Patients with Hypertension*
- *Risk of Developing Obesity in Adult Life from Exposure to Cold in Childhood*

Mental Health

Psychological stress is enormous in

- *Climate-related natural disasters leading to the loss of life, homes and property*
- *Climate-induced economic dislocation from forced migration*
- *Heat stress/Heat Waves*

**Seizures may follow ailments triggered by climate change*

Mental Health [2]

These stress factors may lead to

- *Suicidal Ideation and Completed Suicides*
- *Psychoactive Substance Use*
- *Increased incidence of aggressive behaviour (reported from children in flooded areas of Bangladesh)*

**Seizures may follow ailments triggered by climate change (e.g. Malaria)*

Social Well-Being

Climate change affects

- *Quality & quantity of potable water*
- *Air quality (Ozone Concentration)*
- *Food Security*
- *Availability of suitable habitation*

Vulnerability of Nigerians

The World Health Organization has concluded that the climatic changes that have occurred since the mid 1970s could already be causing over 150,000 deaths annually and five million disability-adjusted life-years (DALY), mainly in developing countries

Vulnerability of Nigerians [2]

The population is susceptible to:

- heat-related mortality or morbidity
- air pollution-related illnesses
- infectious diseases
  - Malaria, Yellow Fever, Lassa Fever
  - *Salmonella* food poisoning, typhoid, cholera
- refugee health issues linked to forced population migration

Factors Affecting Vulnerability

- Population Density
- Level of Economic Development
- Food Availability
- Income Level and Distribution
- Local Environmental Conditions
- Pre-existing Health Status
- Quality and Availability of Public Health Care

What do we do?

- Strengthen Meteorological Services to Provide Accurate Weather Forecasts
  - Reduce health impact of adverse weather
  - Orderly evacuation in times of storms, flooding etc
- Strengthening of Healthcare Delivery System at all Levels to Cope with Mass Casualties
- Training of Healthcare Workers to Treat Heat Stress and other Disorders of Climate Change
- Public Health Education

What else do we do?

- Improve Environmental Sanitation, Particularly in Highland areas that may Experience Malaria Epidemics
- Improve Food Hygiene and Potable Water Supply
- More research based on current observations of weather-related changes in population health & modelling effects of climate change
- Inter-Agency Collaboration

Summing up, What do we do?

Focus on Health Promotion Through Education and Other Measures

Role of Public Institutions

- Assessment of the impact of environmental changes on health [HIA]
  - Health impact assessment (HIA) has been defined as "a combination of procedures, methods and tools by which a policy, project or hazard may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population
- Standardization of health impact assessment procedures and tools

Relevant Research

Seek evidence of the early health effects of climate change by focusing on these five areas:

1. Establishing baseline relationships between weather and health
2. Seeking evidence of the early effects of climate change
3. Scenario-based predictive models
4. Evaluating adaptation options through relevant pilot projects
5. Estimating the co-incidental benefits and costs of mitigation and adaptation

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Relevant Research

Changes in infectious disease transmission patterns are a likely major consequence of climate change.

We need to learn more about the underlying complex causal relationships, and apply this information to the prediction of future impacts, using more complete, better-validated, integrated models.

Conclusion

Some degree of global warming and climate change now seems certain.

Multidisciplinary research into the identification, understanding and modeling of health impacts needs support.

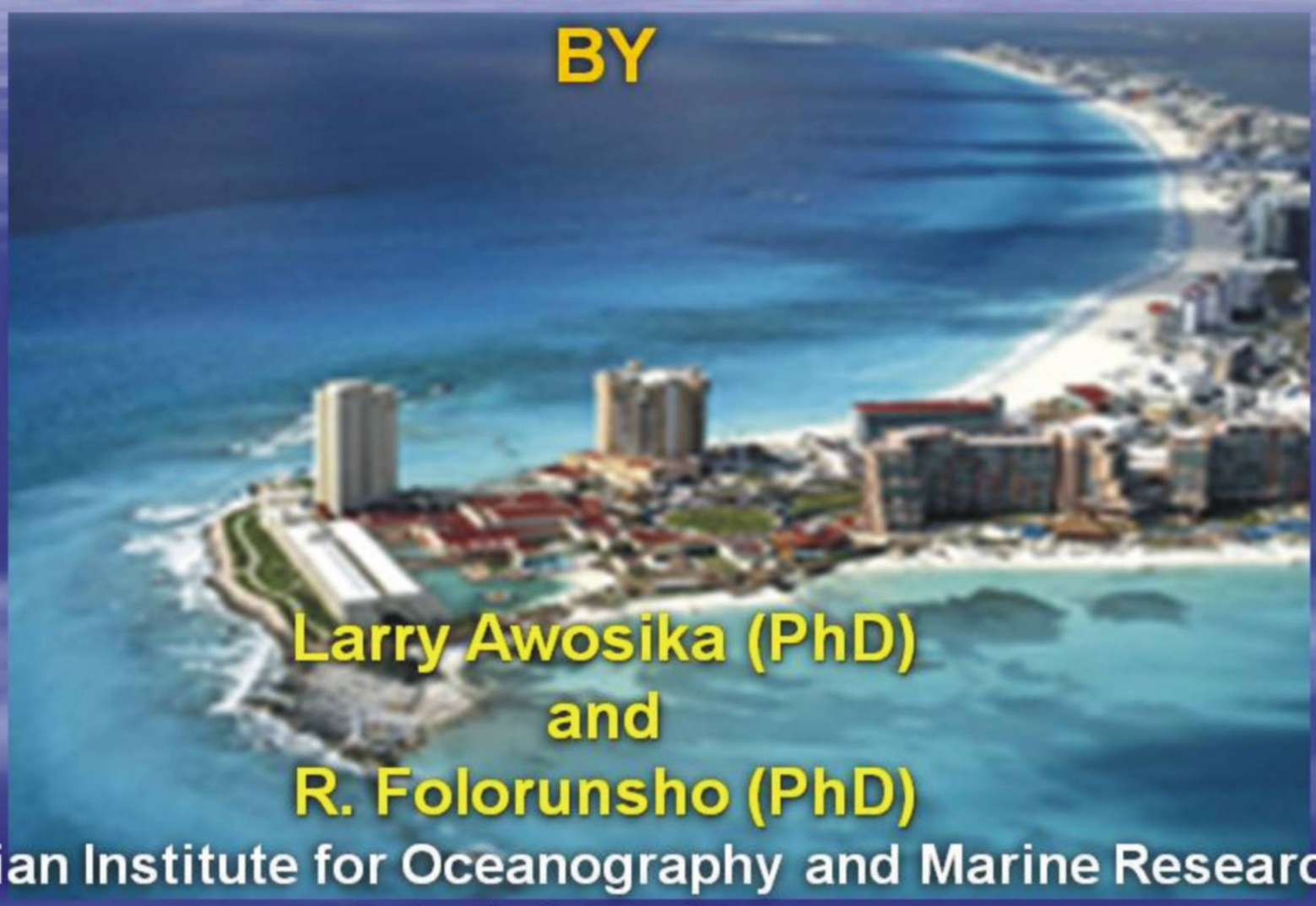
Intergovernmental and interagency collaborations to develop early warning systems that can facilitate timely, environmentally-friendly public health interventions are needed.

Thank You

PLENARY SESSION 4

CLIMATE CHANGE, SEA LEVEL RISE AND COASTAL ADAPTATION

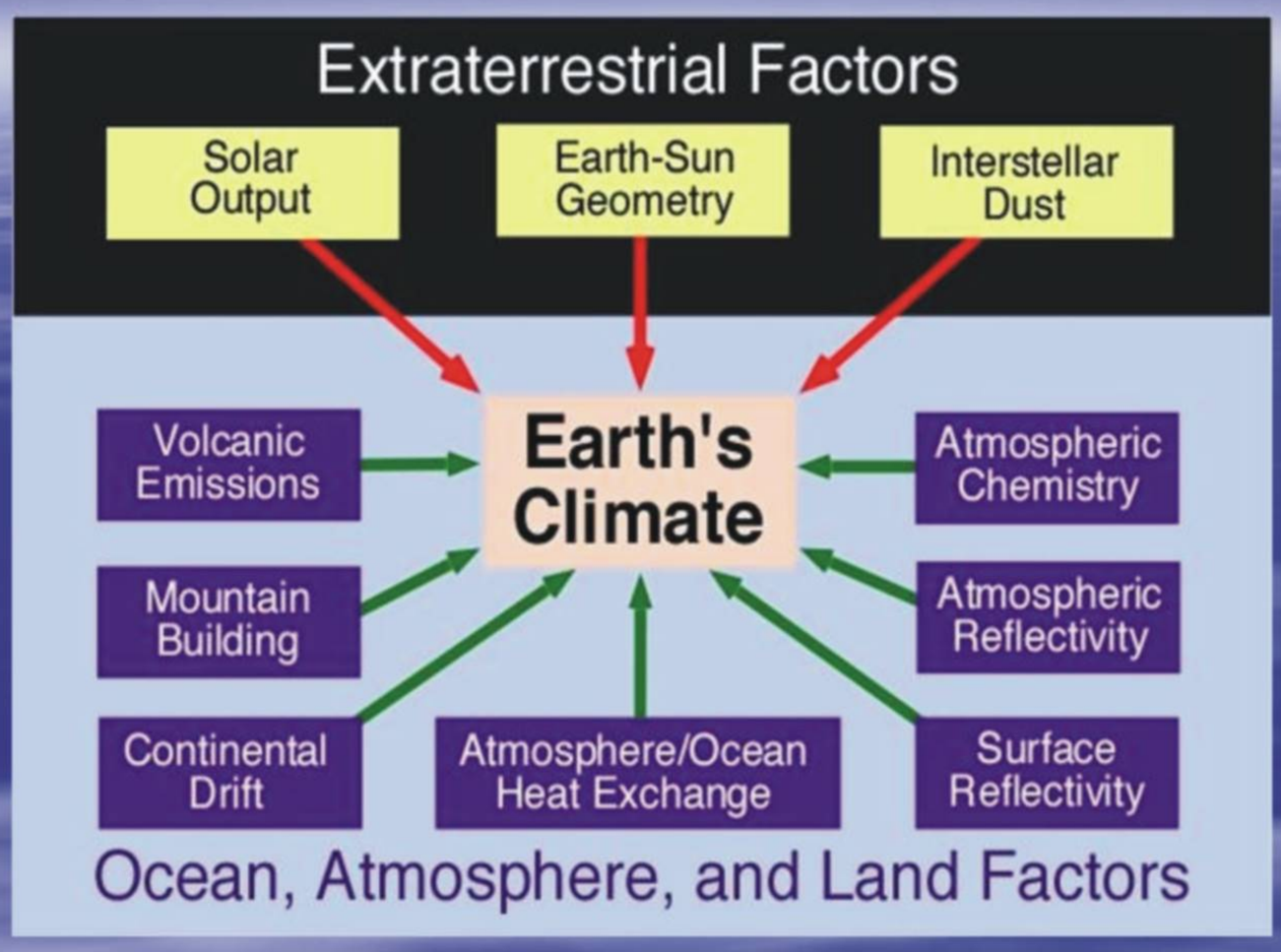
BY



Larry Awosika (PhD)
and
R. Folorunsho (PhD)
Nigerian Institute for Oceanography and Marine Research
Victoria Island Lagos

1

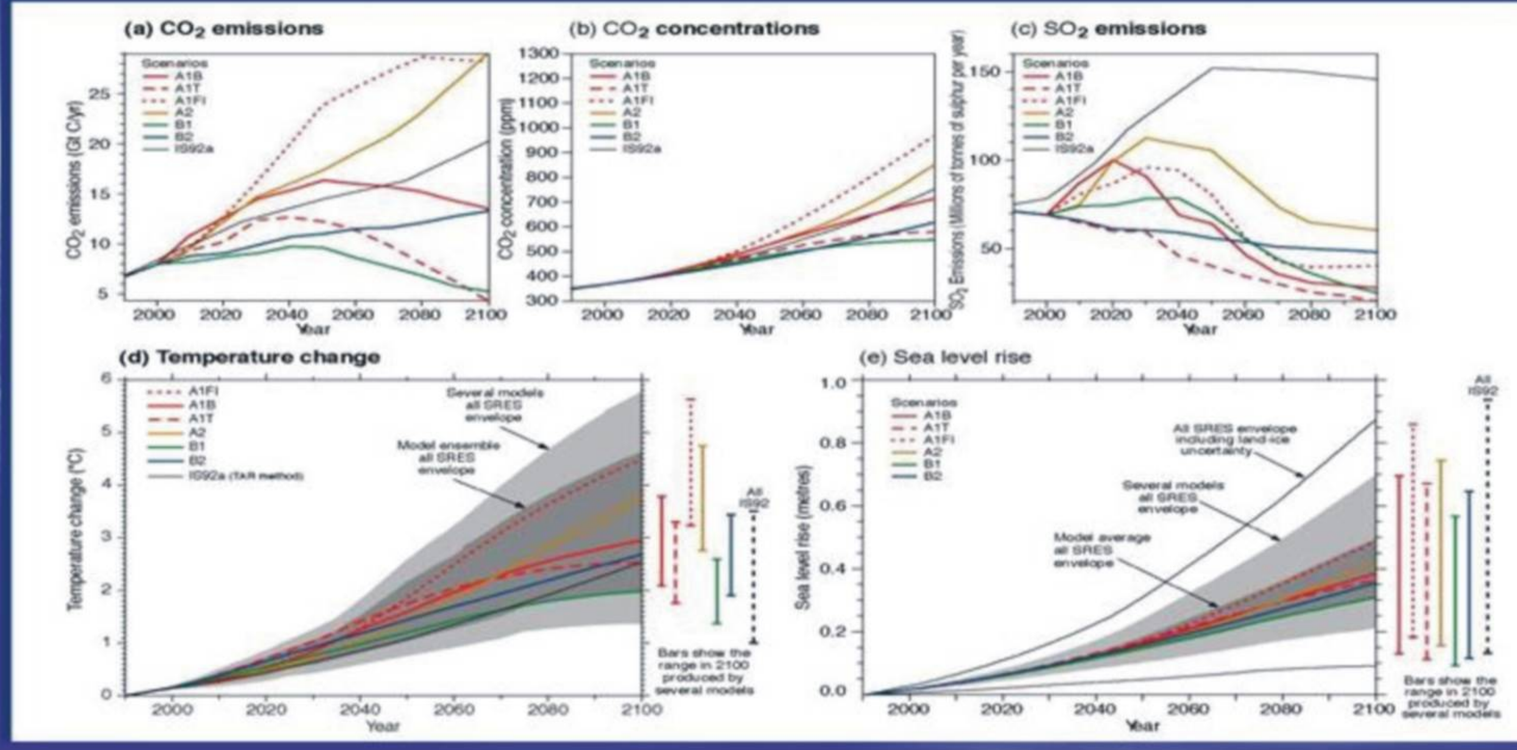
Factors that influence the Earth's climate



Climate change is when the climate is altered over time for a long time as a result of human or natural influences.

2

The global climate of the 21st century

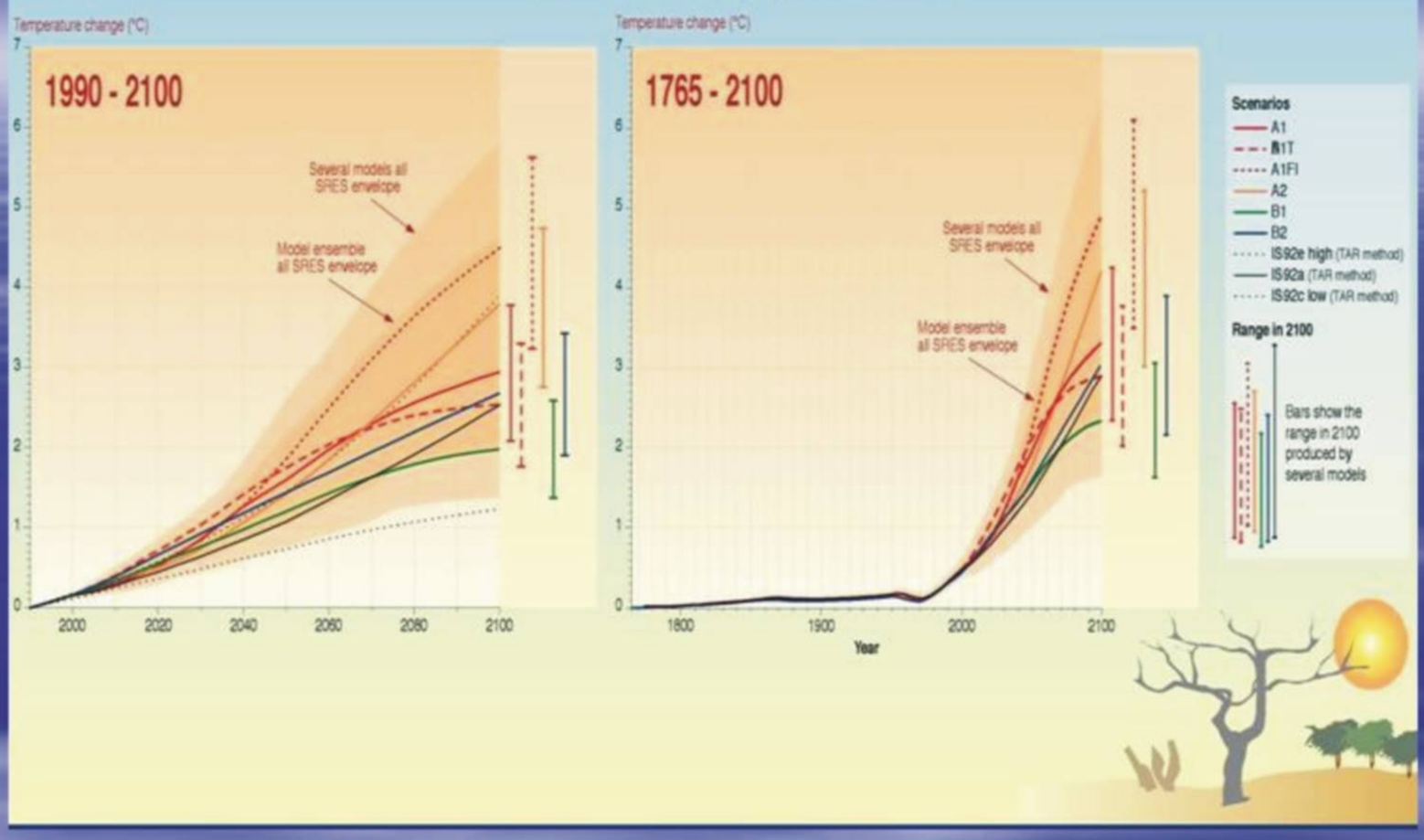


The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about **280 ppm to 379 ppm in 2005.**

carbon dioxide concentration growth-rate was larger during the last 10 years (1995 – 2005) averaging **1.9 ppm per year than it has been since 1960 – 2005.**

3

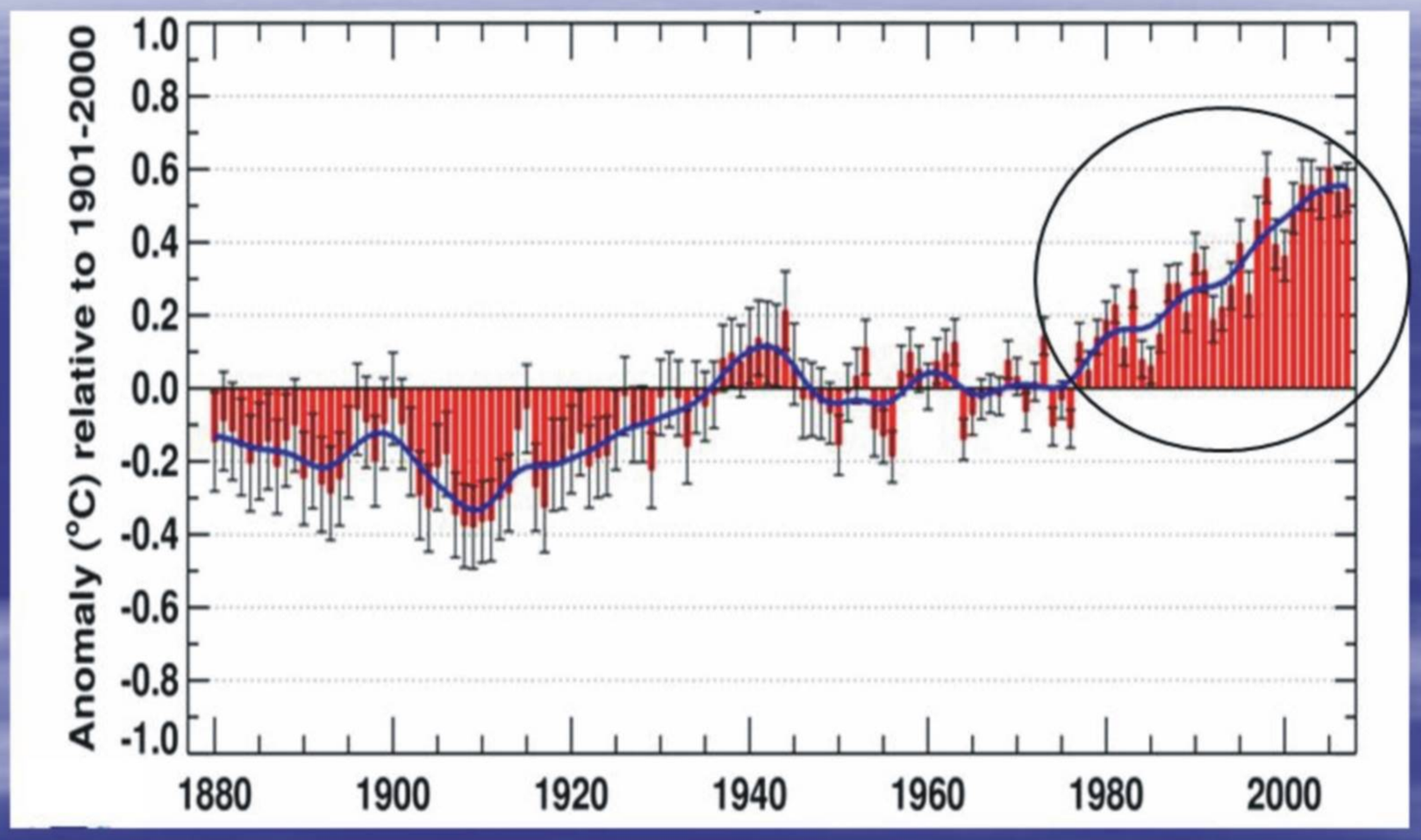
Temperature change (1760 - 2100)



Since IPCC's first report in 1990, assessed projections have suggested global averaged **temperature increases between about 0.15 and 0.3°C per** decade between 1990 to 2005

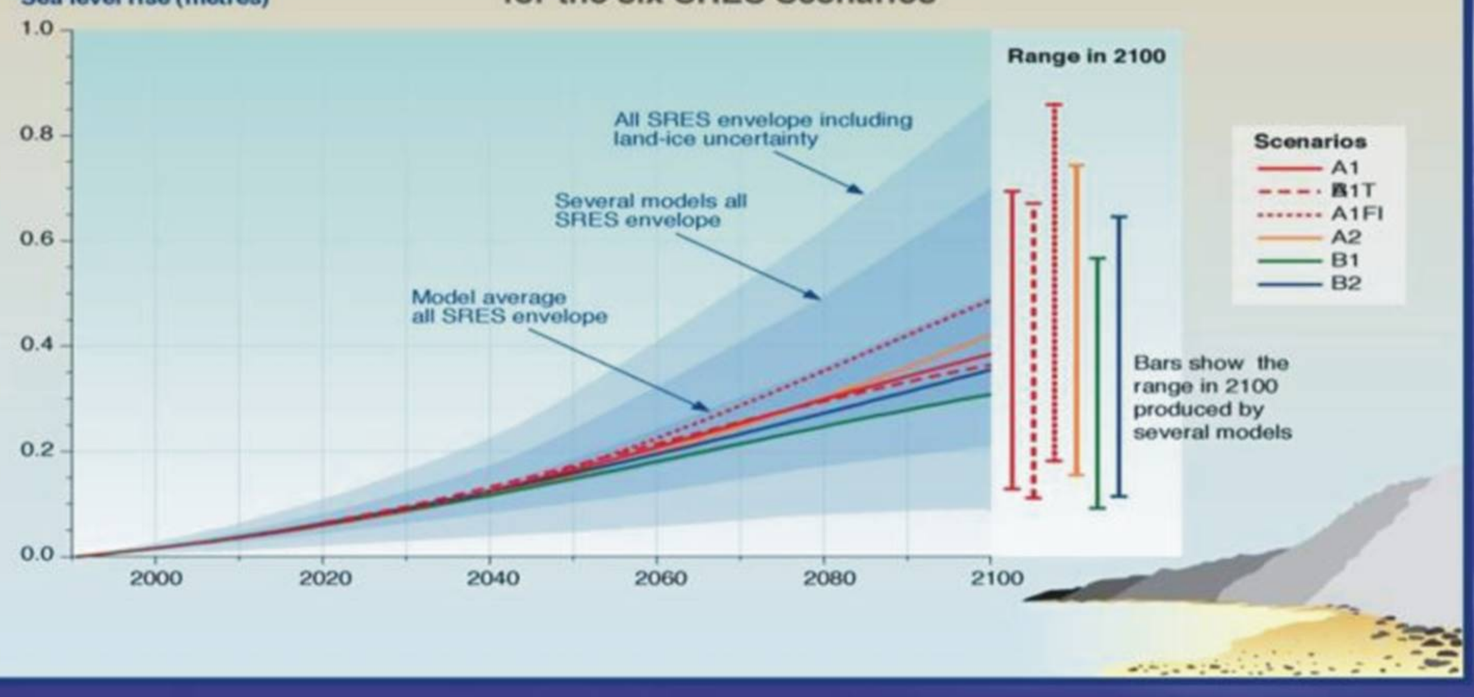
4

Jan-Dec Global mean Temperature over land and ocean



5

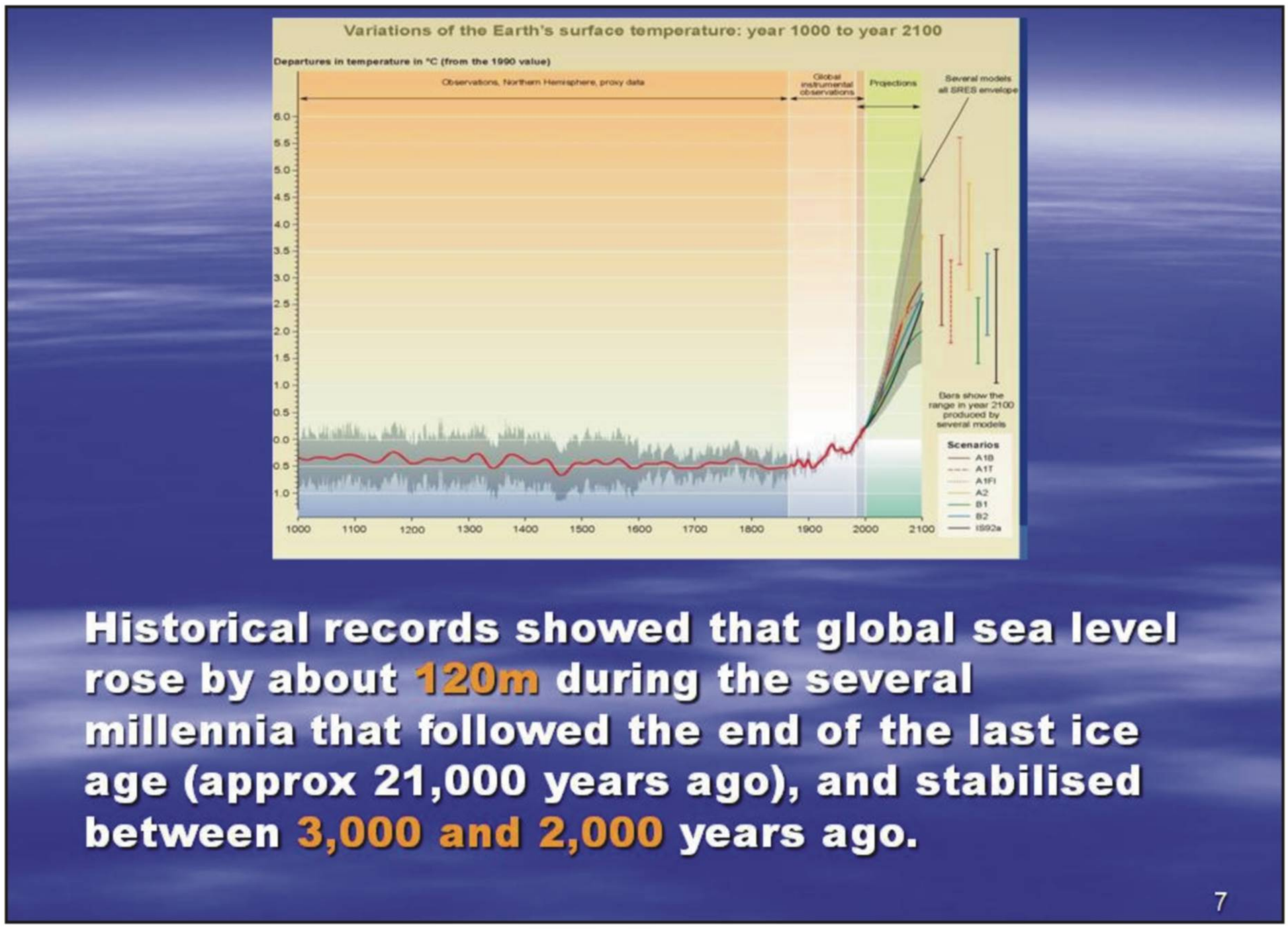
Global average sea level rise (1990 - 2100) for the six SRES Scenarios

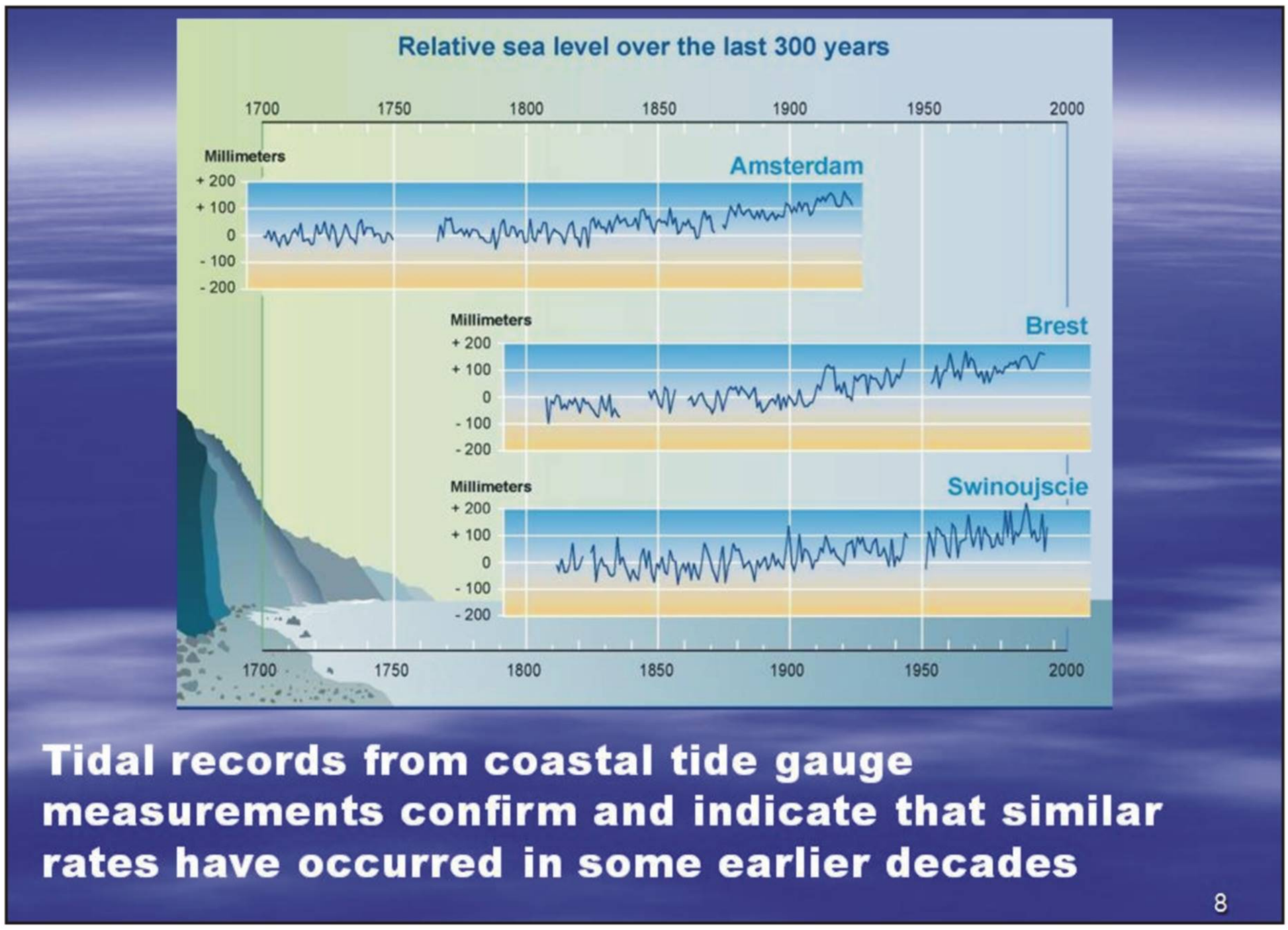


6

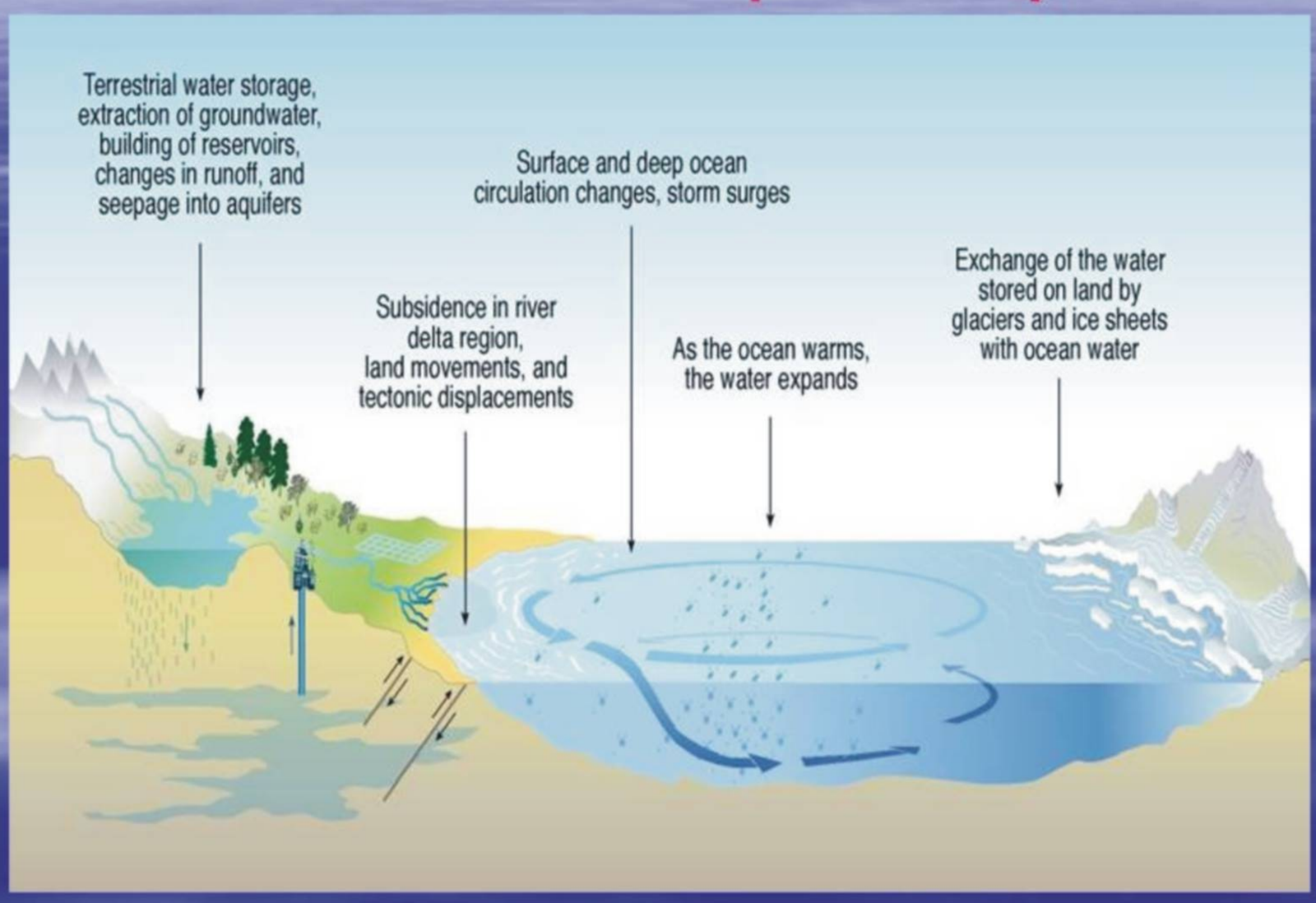
Estimates for the 20th century SLR show that global average sea level rose at a rate of 1.7 mm yr-1.

Global average sea level rise from 1990 to 2100 for the six SRES scenarios to be between 0.25 to 0.45m by the end of the 21st century


Variations of the Earth's surface temperature: year 1000 to year 2100
Departures in temperature in °C (from the 1990 value)
Observations, Northern Hemisphere, proxy data
Global instrumental observations
Projections
Several models all SRES envelope
Bars show the range in year 2100 produced by several models
Scenarios
A1B
A1T
A1FI
A2
B1
B2
IS92a
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.5
1.0
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
Historical records showed that global sea level rose by about 120m during the several millennia that followed the end of the last ice age (approx 21,000 years ago), and stabilised between 3,000 and 2,000 years ago.
7


Relative sea level over the last 300 years
1700
1750
1800
1850
1900
1950
2000
Millimeters
+ 200
+ 100
0
- 100
- 200
Amsterdam
Brest
Swinoujscie
Tidal records from coastal tide gauge measurements confirm and indicate that similar rates have occurred in some earlier decades
8

Causes of sea level change (IPCC 4th Assessment report 2007)



SOURCES OF SEA LEVEL RISE

SOURCE OF SEA LEVEL RISE	RATE OF SLR (mm /year)	
	1961-2003	1993-2003
a. Thermal expansion	0.42 ± 0.12	1.6 ± 0.5
b. Glaciers and ice caps	0.50 ± 0.18	0.77 ± 0.22
c. Greenland ice sheet	0.05 ± 0.12	0.21 ± 0.07
d. Antarctic ice sheet	0.14 ± 0.41	0.21 ± 0.35
e. Sum of individual climate contributions to sea level rise	1.1 ± 0.5	2.8 ± 0.7
f. Observed total sea level rise	1.8 ± 0.5*	3.1 ± 0.7*
Difference (f - e)	0.7 ± 0.7	0.3 ± 1.0

SEA LEVEL RISE PROJECTIONS

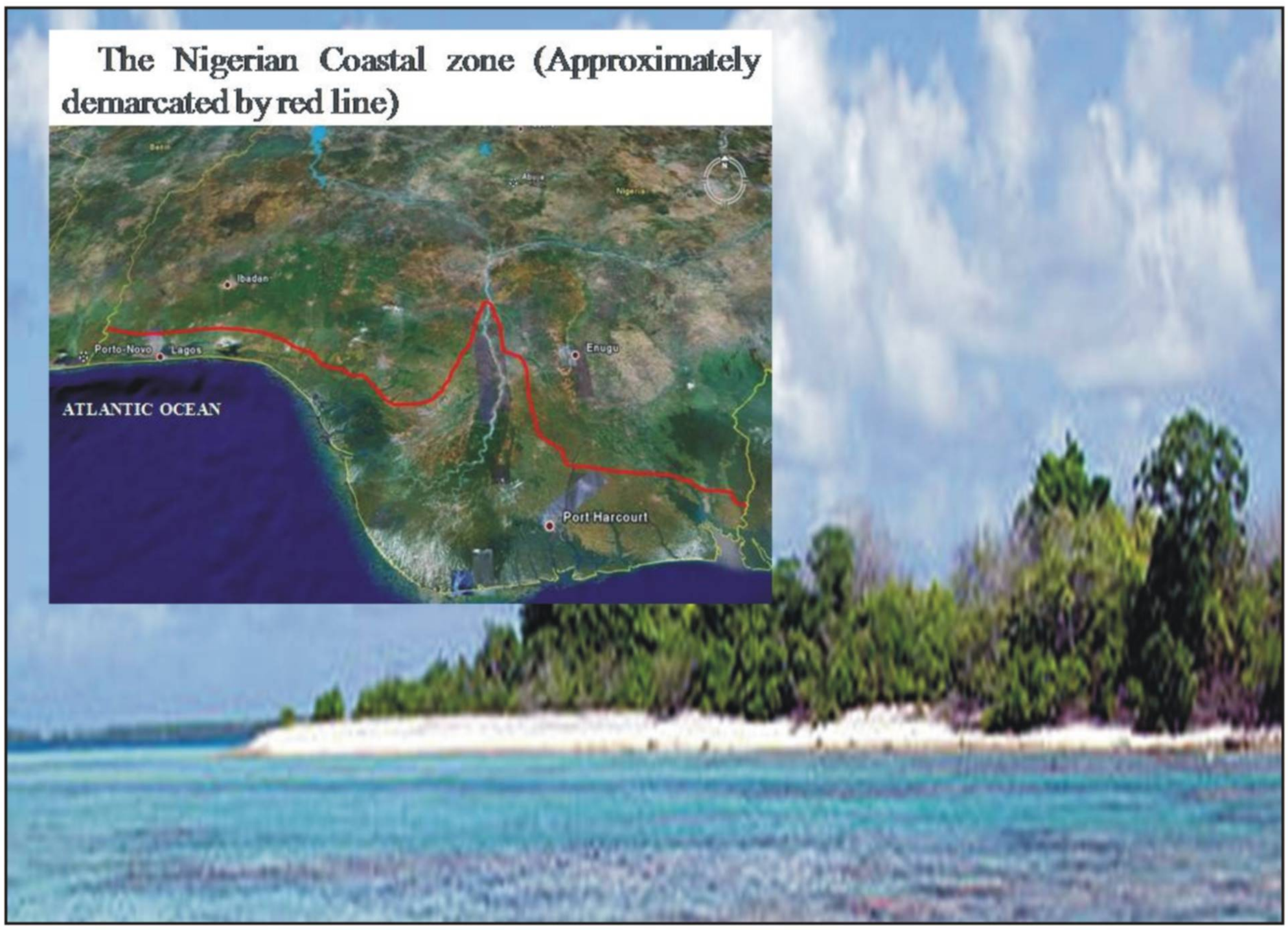
- Global warming will continue even if all the greenhouse gases and aerosols were to be kept at the year 2000 levels.
- For the next two decades, a warming of about 0.2°C per decade is projected for a range of IPCC emission scenarios.
- If radioactive forcing were to be stabilized in 2100, thermal expansion alone would lead to 0.3 to 0.8 m of sea level rise by year 2300 (relative to 1980–1999).
- Thermal expansion would continue for many centuries, due to the time required to transport heat into the deep ocean.
- Greenland ice sheet is projected to continue to contribute to sea level rise after 2100.
- With this projected warming trend, sea ice is projected to shrink in both the Arctic and Antarctic under all SRES (IPCC Special Report on Emission Scenarios)

11

SLR IMPACTS

- large-scale inundation, exacerbation of coastal erosion and salt water intrusion into coastal aquifer.
- losses of ecotones with direct effects on wildlife distribution, survival, and subsistence of local communities.
- Increased frequency of ocean storm surges.
- Changes in ocean dynamics, which could have effects on fishery resources, migration and nutrient distribution patterns.

12



SLR IMPACTS ON NIGERIA

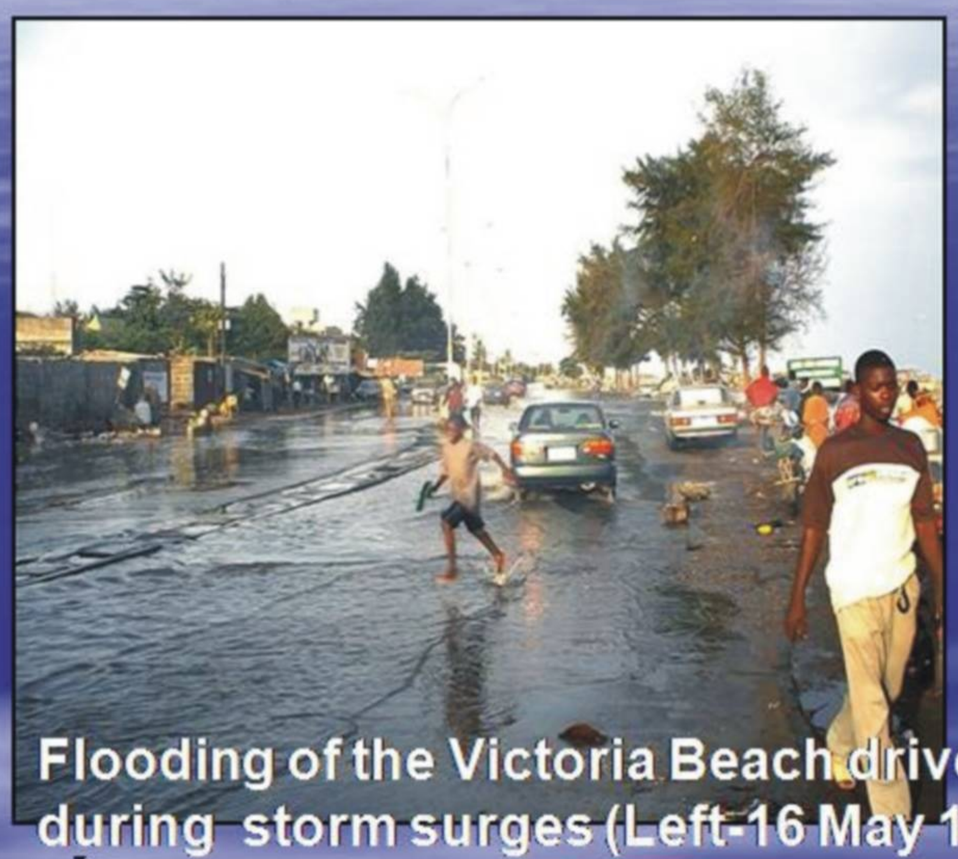
- Inundation, flooding.
- exacerbation of coastal erosion,
- Increased frequency of ocean storm surges.
- Changes in ocean dynamics, which could have effects on fishery resources, migration and nutrient distribution patterns

14

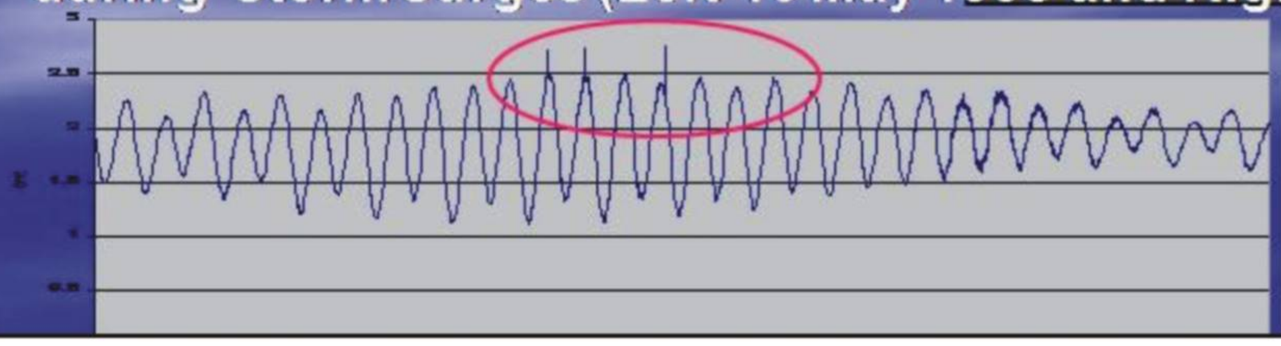
FLOODED LOCAL AIYETORO COMMUNITY IN NIGERIA (Awosika et. Al. 2002

15

FLOODING OF VICTORIA ISLAND, LAGOS DURING OCEAN STORM SURGE .
(Twice annually : April –June and Sept - Oct)



Flooding of the Victoria Beach drive in Victoria Island Lagos during storm surges (Left-16 May 1995 and Right - 23 July 2005).



Storm surge tidal signal from NIOMR's tide NGWLM gauge

Total land loss (Km^2 by shoreline type) due to erosion and inundation by different SLR scenarios. (Awosika et. al., 1992).

	LOW ESTIMATE				HIGH ESTIMATE			
SLR	0.2m	0.5m	1.0m	2.0m	0.2m	0.5.m	1.0m	2.0m
Barrier	177	284	584	1167	118	289	602	1204
Mud	403	1008	2016	3456	403	1008	2016	3456
Delta	2846	7453	15125	18398	2865	7500	15332	18803
Strand	79	197	395	575	85	212	446	677
Total	3445	8942	18120	23596	3471	9009	18396	24140

17

Estimated number of people (in millions) that will be displaced by sea level scenarios (Awosika et al 1992)

SLR SCENARIOS	0.2m	0.5m	1.0m	2.0m
BARRIER	0.6	1.5	3.0	6.0
MUD	0.032	0.071	0.140	0.180
DELTA	0.10	0.25	0.47	0.21
STRAND	0.014	0.034	0.069	0.610
TOTAL	0.75	1.86	3.68	10.00
% TOTAL POP.	0.07	1.61	3.20	8.70

18

Estimated number of villages to be impacted by sea-level rise along the four Nigerian morphological zones and their value (millions of U.S. dollars) French et al 1995).

Village Along	SLR Scenario (m) 0.2		0.5		1.0		2.0	
	Count	Value ($ Mil)	Count	Value ($ Mil)	Count	Value ($ Mil)	Count	Value ($ Mil)
Barrier	**7**	**2.2**	**16**	**5.1**	**32**	**10.2**	**58**	**18.5**
Mahin Mud	30	9.5	75	23.9	150	47.7	200	63.6
Delta	110	35.0	275	87.5	550	175.0	800	254.5
Strand	16	5.1	40	12.7	80	25.5	125	39.8
TOTAL	163	51.8	406	129.2	812	258.4	1,183	376.4

19

SLR IMPACTS ON LAGOS

Inundation, flooding, subsidence.

Exacerbation of coastal erosion,

Increased frequency of ocean storm surges.

Changes in ocean dynamics, which could have effects on fishery (saltwater into freshwater bodies)

Resources, migration and nutrient distribution patterns

20

Inundation, flooding, subsidence.

Exacerbation of coastal erosion

5th September 2008 Sea Swell Condition

The synoptic conditions for the S. Atlantic and it appears that there is a high pressure system moving to the east (towards Angola) which is producing some near gale force winds and high seas (>4M) along the coast which are then propagating north towards Nigeria. RESULT IN THIS

CHANGES IN OCEAN DYNAMICS, WHICH COULD HAVE EFFECTS ON FISHERY (SALTWATER INTO FRESHWATER BODIES)

24

IMPACTS OF SEA LEVEL RISE ON DRAINAGE CHANNELS IN VICTORIA AND IKOYI ISLANDS LAGOS (Awosika et. al., 1993)

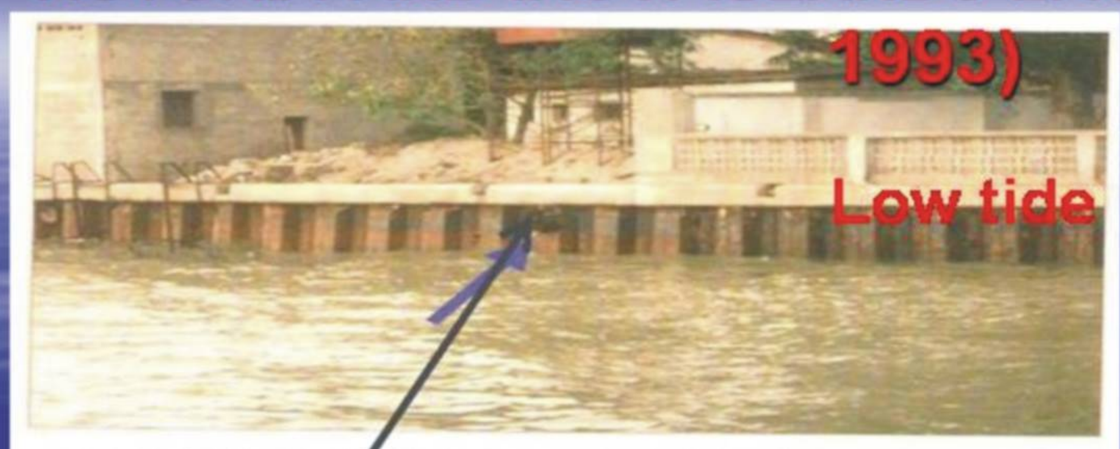
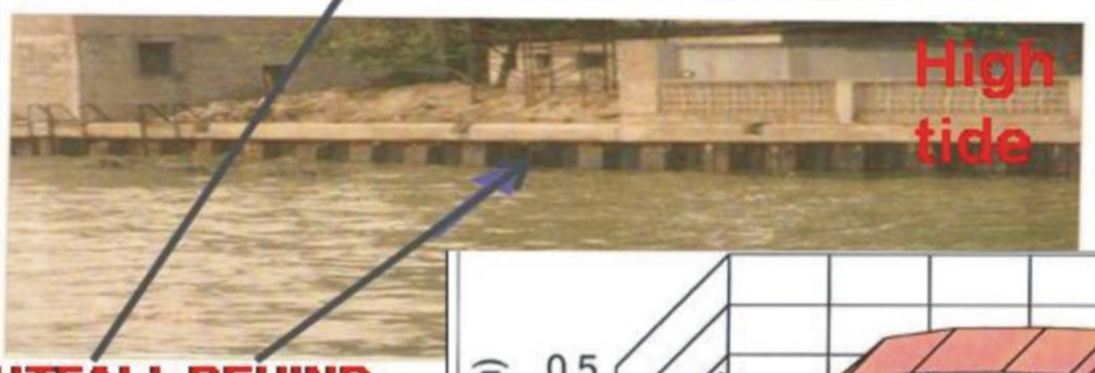
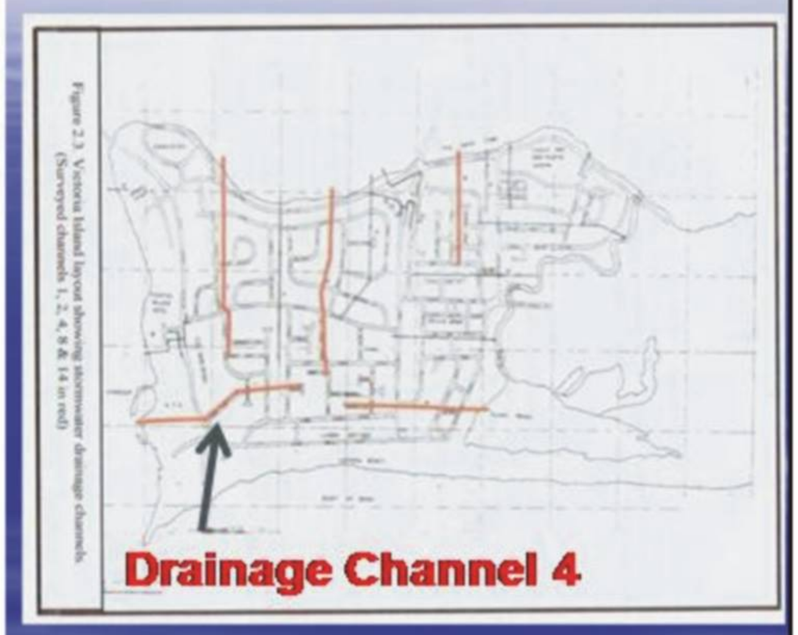
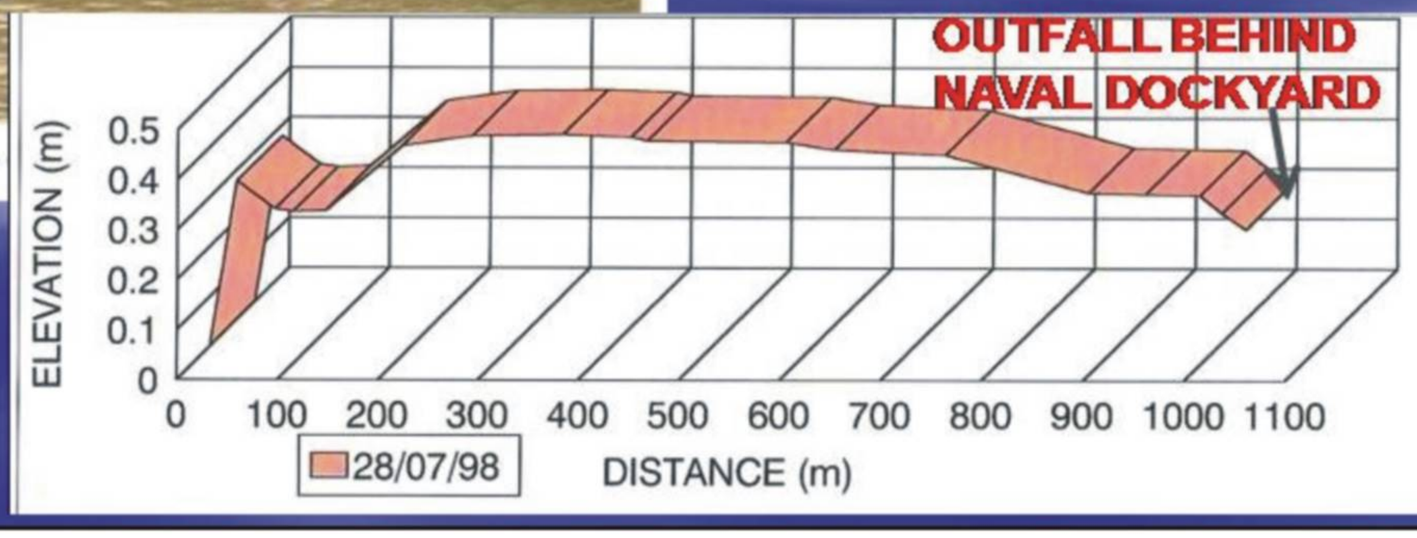


Figure 3.26^A. Drainage channel outfall near Naval Dockyard/NIOMR at Low Tide





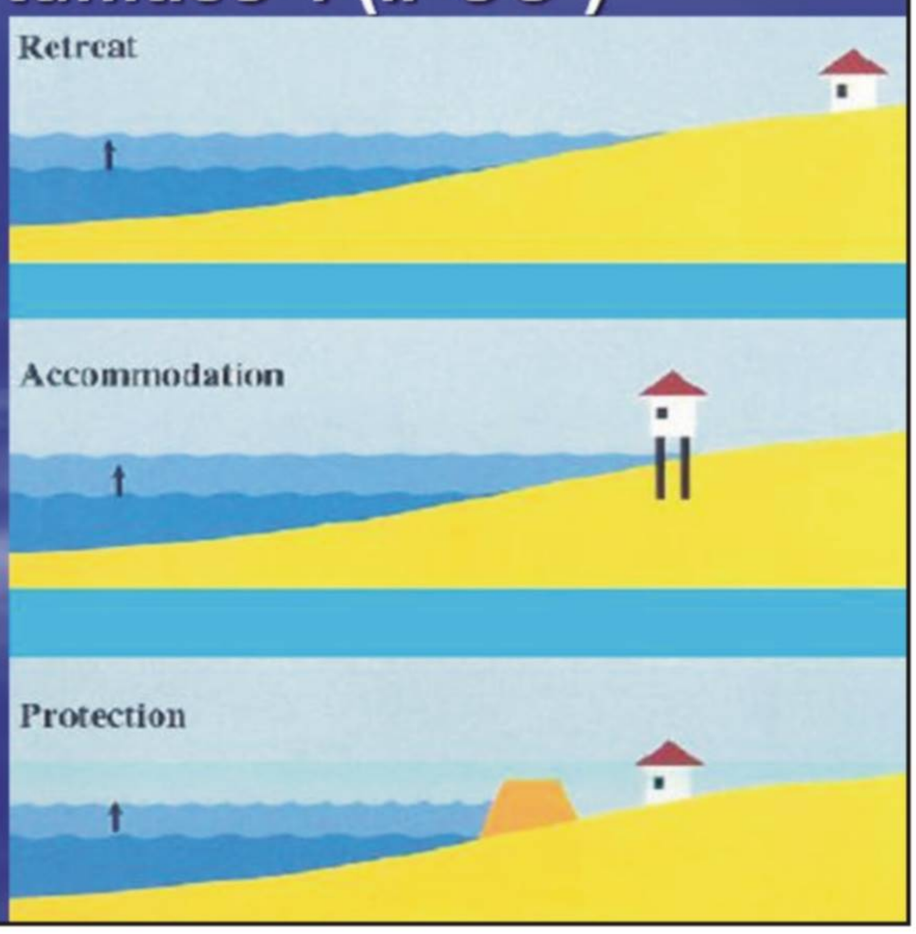


ADAPTING TO SEA LEVEL RISE

"Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". (IPCC)

OPTIONS

- Retreat
- Accommodation and
- Protection



ADAPTING TO SEA LEVEL RISE: RETREAT

- **Retreat involves no effort to protect the land from the sea**

- Coastal zone abandoned and ecosystems
- shift landward.

- In the extreme case, an entire area
- may be abandoned.

- Ocean side erosion- critical area of concern
- as it is the area easily prone to inundation.

- Option requires setbacks and post-disaster plans.

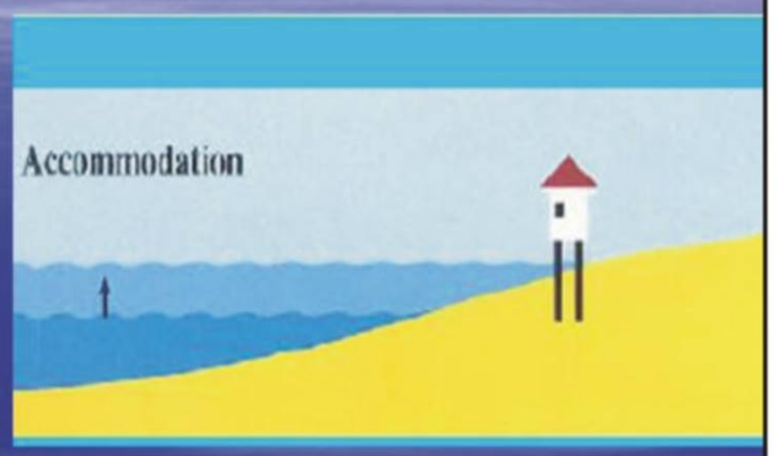
- Timely planning for resettlement and emergency management pending resettlement is important.

- Assessments of potential relocation sites should be made

27

ADAPTING TO SEA LEVEL RISE: ACCOMMODATION

- **Continue to use the land at risk but do not attempt to prevent the land from being flooded.**



- Includes erecting emergency flood shelters, elevating buildings on piles, converting agriculture to fish farming, or growing flood or salt tolerant crops.

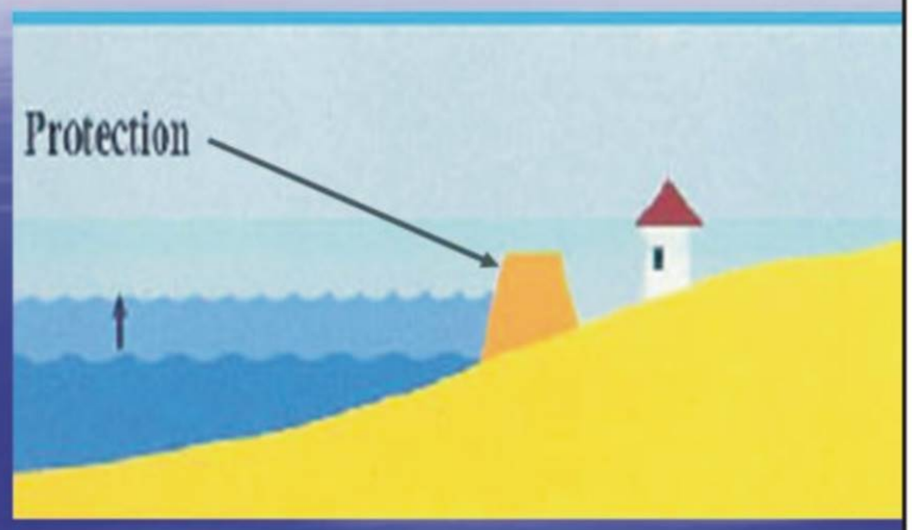
- artificially assisting a landward migration, raising the island in place, and encircling it with a levee (Netherlands, river deltas in China, Belgium, and Louisiana.

- involves huge capital expenditure

28

ADAPTING TO SEA LEVEL RISE: PROTECTION

- Involves hard structures such as sea walls and dikes etc.



- Soft solutions such as dunes and vegetation.
- EXPENSIVE
- Structures would protect economic development, but could adversely affect economic interests that depend on recreation and fisheries.

29

EFFECTIVE SLR ADAPTATION OPTIONS REQUIREMENTS .

- Strengthen national capacity by developing and implementing Integrated Coastal/Fresh Water Area Management plan.
- Develop human and infrastructural capacity for coastal erosion, flooding and salt water intrusion.
- Develop capacity for modeling, evaluating and designing physical structures (e.g. groin, breakwaters, dykes, and sea wall) to combat sporadic flooding and coastal erosion.

30

CONCLUSION

National/ State Plan of Action to combat Climate change and SLR

LAGOS NEEDS A PRAGMATIC OPTION

INTERNATIONAL OOPERATION AND ASSISTNACE NEEDED

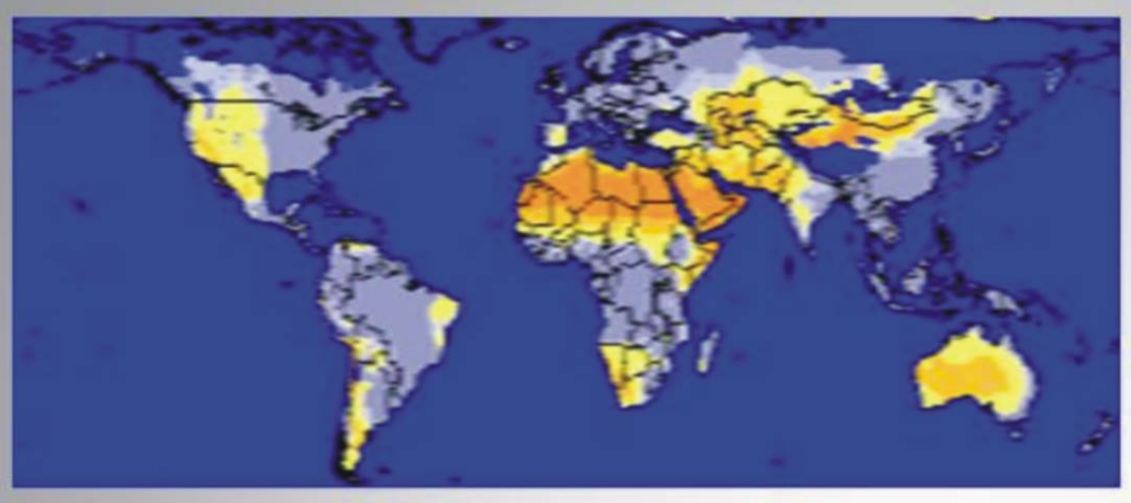
31

PLENARY SESSION 5

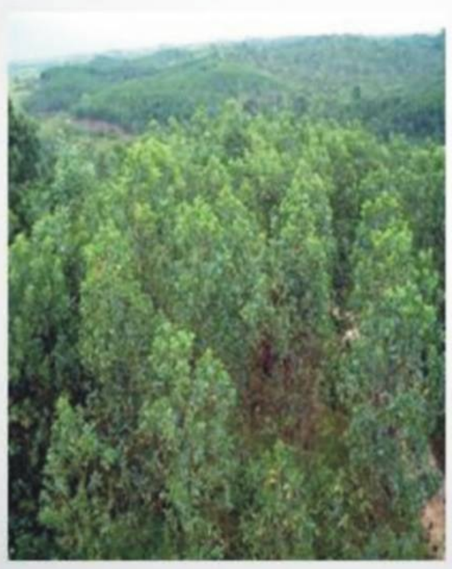
Using plants to rescue our planet from serious environmental and food crises on Earth

Tomokazu Koshiba

Tokyo Metropolitan University
Department of Biological Sciences
Plant Hormone Mechanism Lab.



Arid and desert land is now spreading more than 25% of the total land of our planet



Crops (corn, soybean , rice ...)

Biomass (eucalyptus, Jatropha ...)

- Destruction of ecosystem
- Competition between food and biomass

Decreasing the desert land area using improved plants is the important approach to resolve these problems.

Increase arable land by developing improved plants highly tolerant against drought and salt stresses

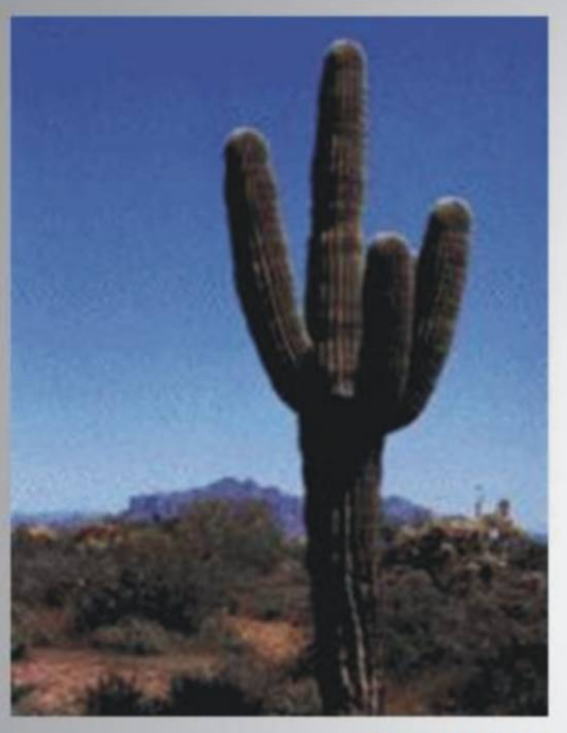
1. Reduction of drought, salinity areas.

2. Reduction of CO_2 levels by photosynthetic activity.

3. Reduction of fossil fuel use by increasing biomass for biofuel.

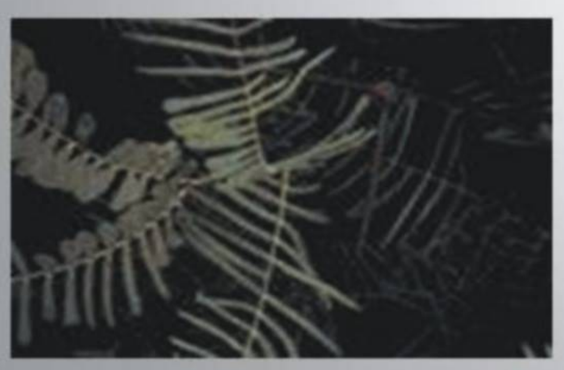
This is an essential and radical way not only to alleviate global warming but also to increase the world's food supply in the future.

Desert plants



Saguaro

Mohave desert star

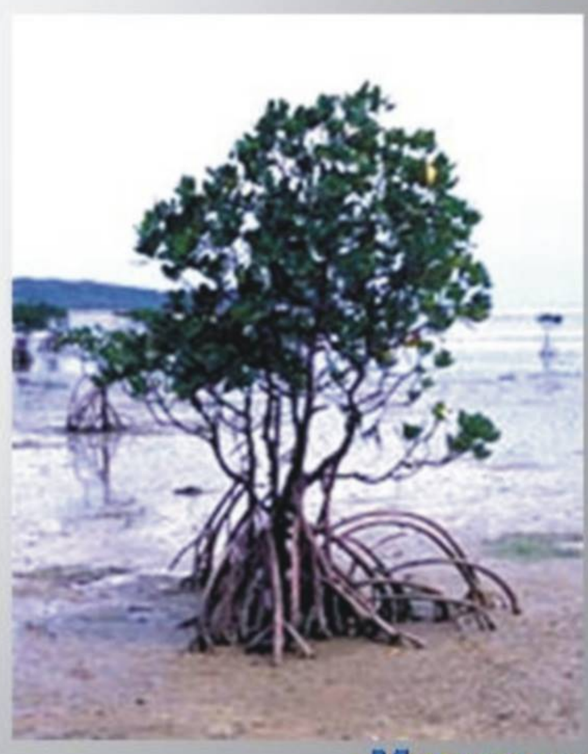


Honey mesquite

Rusurrection Plant
(Glossopsida)

Plants in high salt place (Halophyte)

Eelgrass



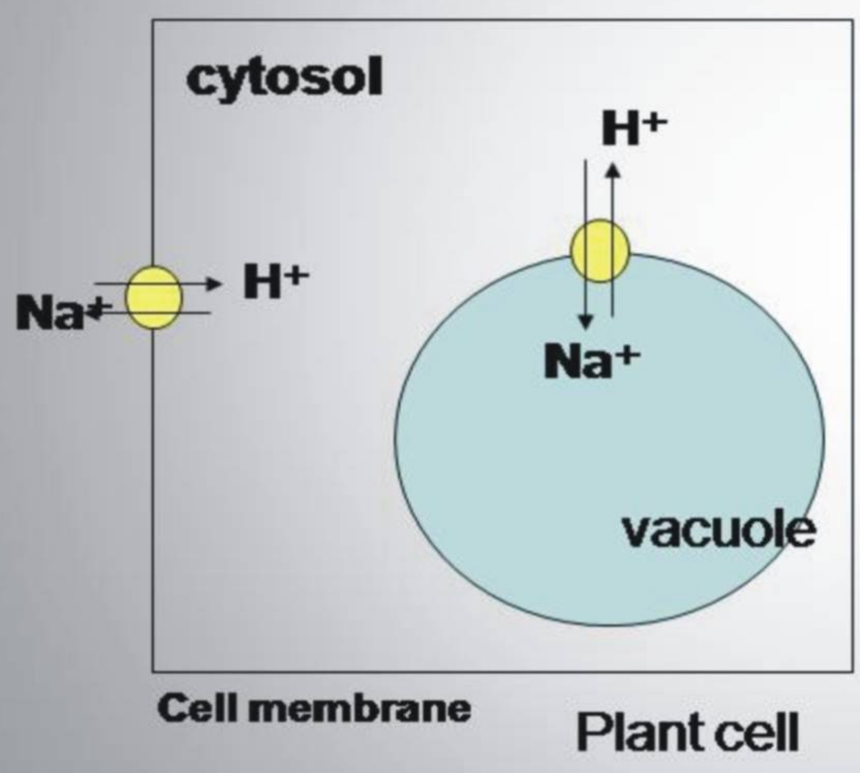
Mangrove

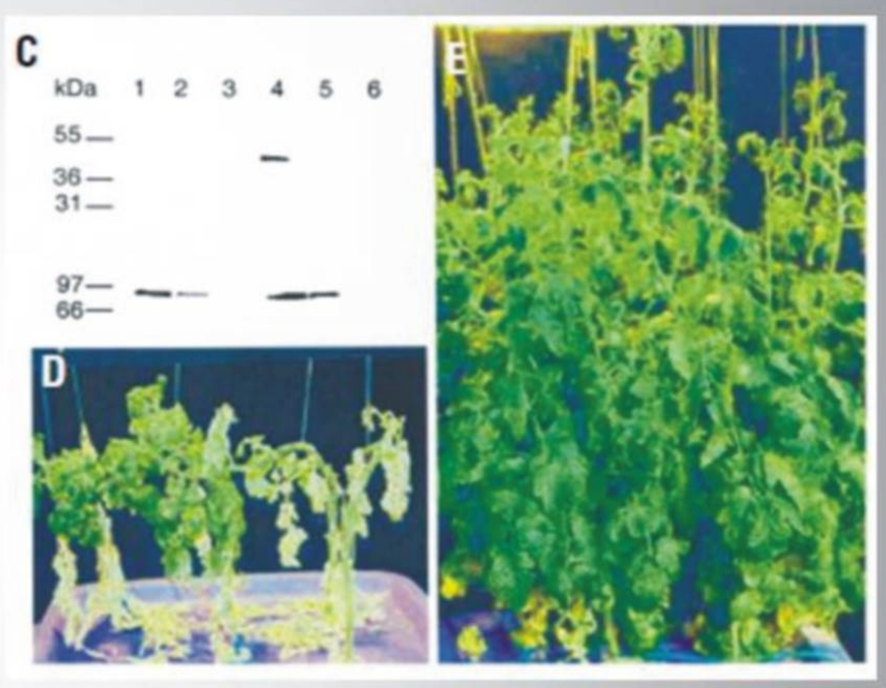
Current strategies to develop improved plants highly tolerant against drought and salt stress

* Na^+/H^+ antiporter, Na^+ transporter, Na^+ pump
* Over-producing osmoprotectants (like sugar)
  - Trehalose, glycine-betain .....
* Stress responsive genes
  - Transcription factors; DREB, NAC, SAP1 ...
  - Stress related genes; dehydrin, HSP, PR10 ...
* Others (polyamine, glyoxalase, ...)

Enhancement of salt tolerance by over-expression of Na^+/ H^+ antiporter

Exclusion of Na^+ from cytosol by Na^+/ H^+ antiporter





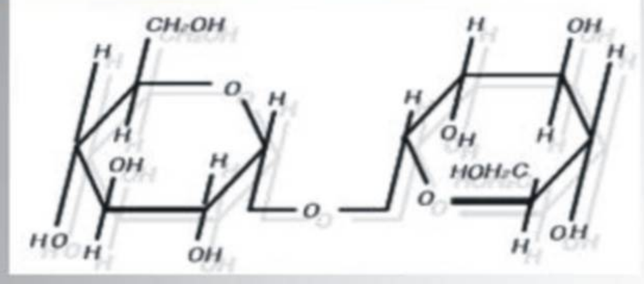
Wild type tomato can not survive at 200mM NaCl (D), while Na^+/H^+ antiporter transgenic tomato plants grow normally (E).

Zhang and Blumwald, Nature (2001)

Transgenic salt-tolerant tomato plants accumulate salt in foliage but not in fruit

Over production of trehalose confers highly tolerant plants

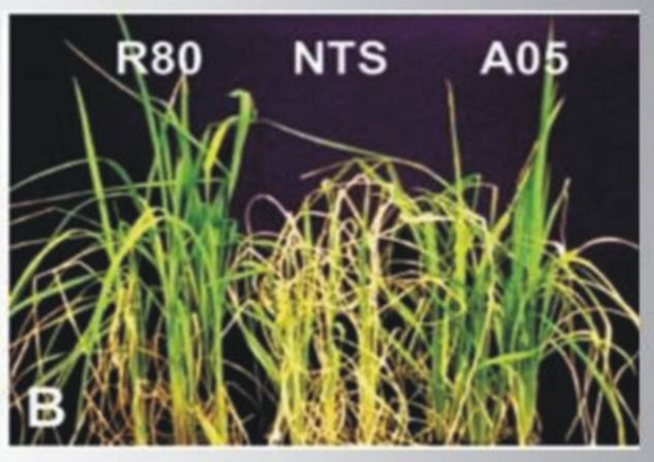
Trehalose



Rusurrection Plant

(It is well known that Sleeping Chironomid contains high amounts of trehalose and thus can survive under desiccated conditions.)

Rice with accumulated trehalose confers high tolerance to abiotic stresses



After 100 hrs dehydration.
NTS: Wild type rice
R80, A05: Rice with introduced trehalose synthetic gene

Garg et al., PNAS (2002)

Trehalose accumulation in rice plants confers high tolerance levels to different abiotic stresses

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DREB1 genes are useful for improvement of stress tolerant plants including rice

Wild type and the transgenic rice plants over-expressing *DREB1* genes were exposed drought stress for 9 days and then watered for 13 days.

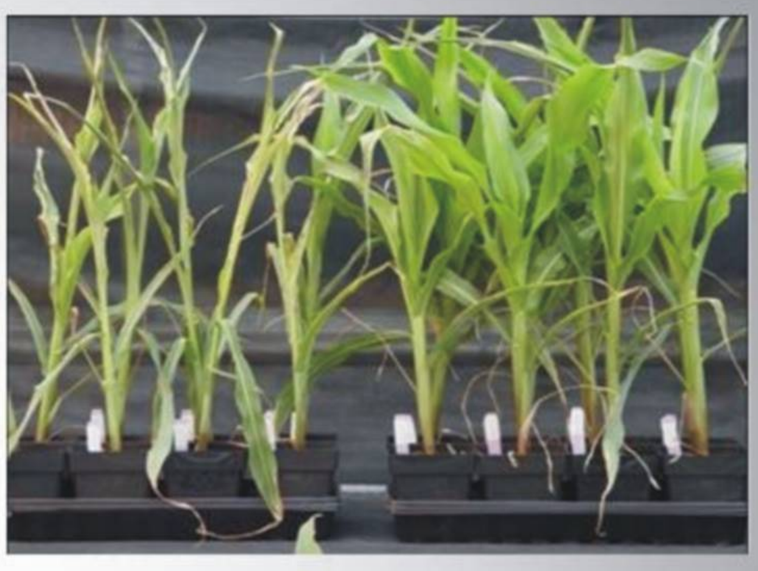
PCP (2006) 47:141-153

Functional Analysis of Rice DREB1/CBF-type Transcription Factors Involved in Cold-responsive Gene Expression in Transgenic Rice

Yusuke Ito [1], Koji Katsura [1], Kyonoshin Maruyama [1], Teruaki Taji [2, 6], Masatomo Kobayashi [3], Motoaki Seki [2], Kazuo Shinozaki [2, 4, 7] and Kazuko Yamaguchi-Shinozaki [1, 4, 5, *]

[1] *Biological Resources Division, Japan International Research Center for Agricultural Sciences (JIRCAS), Tsukuba, Ibaraki, 305-8686 Japan*
[2] *Laboratory of Plant Molecular Biology, RIKEN Tsukuba Institute, Tsukuba, Ibaraki, 305-0074 Japan*
[3] *Experimental Plant Division, BioResource Center, RIKEN Tsukuba Institute, Tsukuba, Ibaraki, 305-0074 Japan*
[4] *Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency, Kawaguchi, Saitama, 332-0012 Japan*
[5] *Graduate School of Agricultural and Life Sciences, The University of Tokyo, Bunkyo, Tokyo, 113-8657 Japan*

Plant nuclear factor (NF-YB) leads to improved corn yield on water-limited acres



10 days of drought, 3 days of watering, 9 days of drought, and then 2 days of full water.
Left: wild type corn
Right: *NF-YB1* transgenic corn

PNAS (2007) 164:16450-16455

Plant nuclear factor Y (NF-Y) B subunits confer drought tolerance and lead to improved corn yields on water-limited acres

Donald E. Nelson*†, Peter P. Repetti‡, Tom R. Adams*, Robert A. Creelman‡, Jingrui Wu*, David C. Warner*, Don C. Anstrom*, Robert J. Bensen*, Paolo P. Castiglioni*, Meghan G. Donnarummo*, Brendan S. Hinchey*, Roderick W. Kumimoto‡, Don R. Maszle‡, Roger D. Canales*§§, Katherine A. Krolikowski‡, Stanton B. Dotson*, Neal Gutterson‡, Oliver J. Ratcliffe‡, and Jacqueline E. Heard*§§

*Monsanto Company, 62 Maritime Drive, Mystic, CT 06355; and ‡Mendel Biotechnology, Inc., 21375 Cabot Boulevard, Hayward, CA 94545

Finding of novel Rice PR10 gene

We investigated stress-response proteins from rice roots, and found a novel rice protein which was induced by salt and drought stresses [Fig. 1; arrows]. The full-length cDNA was cloned, and we named the gene "*RSOsPR10* (root specific *Oryza sativa* PR10). (Hashimoto et al., 2004, Plant Cell Physiol.)

RSOsPR10 protein was expressed in cortex cells, surrounding the central cylinder [Fig. 2], suggesting its role on plant stress tolerance [Fig. 3].

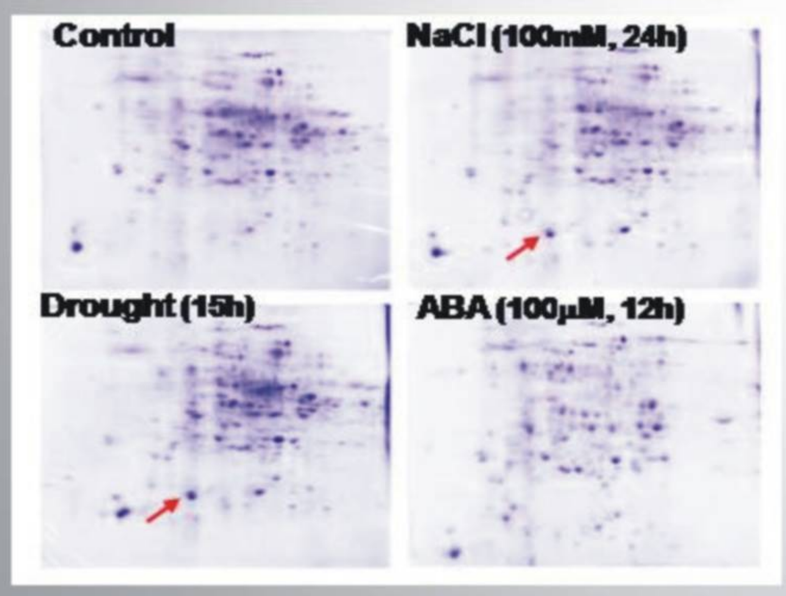


Fig. 1 The protein profiles of rice roots after stress treatments.

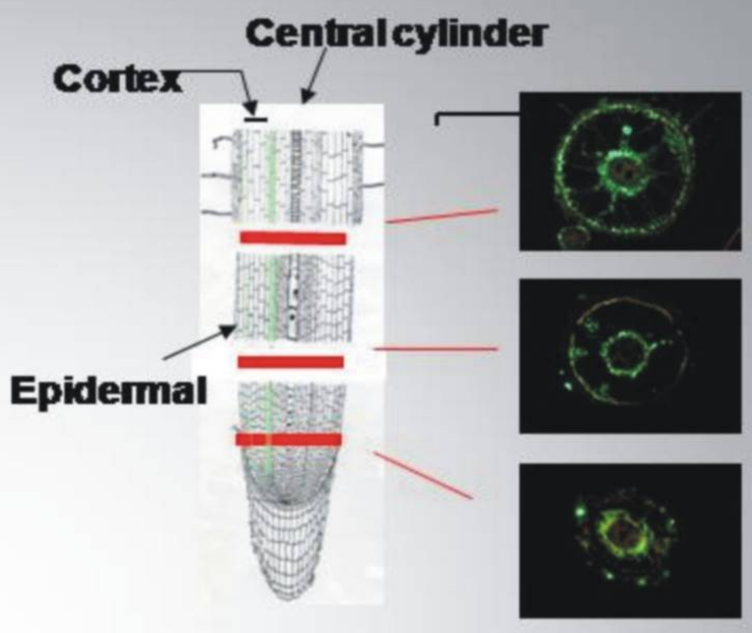


Fig. 2 Expression of RSOsPR10 in cortex cells throughout the root.

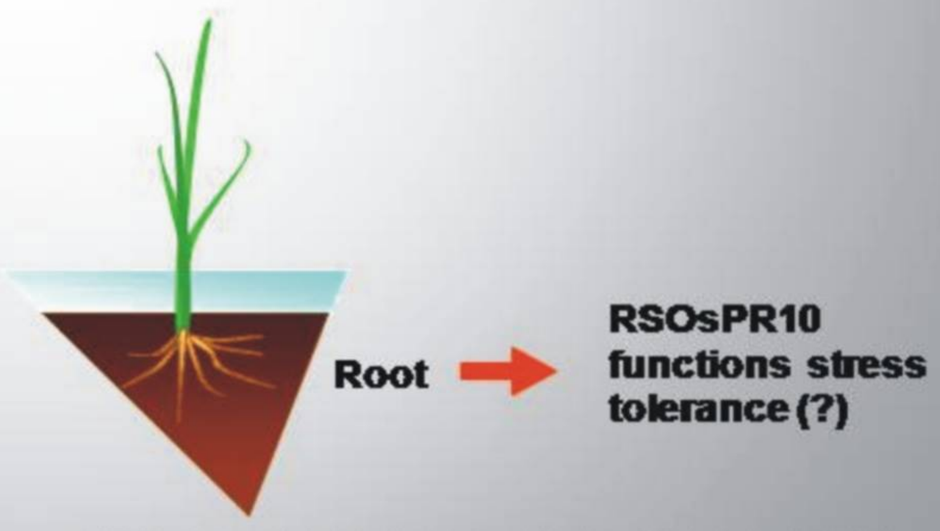


Fig. 3 RSOsPR10 seems to have a function for stress tolerance.

Over-expression of RSOsPR10 enhances tolerance to salt and drought stresses

RSOsPR10 was introduced to rice and several transgenic lines were obtained. Constitutive expression of RSOsPR10 was observed in leaves and roots of the seedlings [Fig. 4].

Two-week seedlings of S3 line and wild type were immersed in 100mM NaCl solution for 1 day and then were cultured in nutrition solution for 1 week. S3 line exhibited tolerance to salt treatment [Fig. 5].

About two-month rice plants were subjected to 10 days drought treatment. Then, they were well watered for 1 month [Fig. 6].

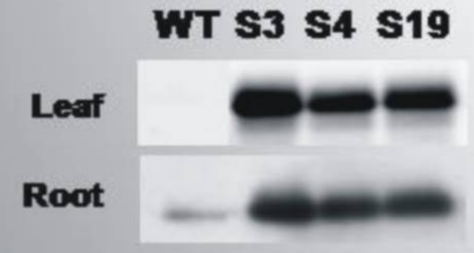


Fig. 4 Western blotting using anti-RSOsPR10 antibody.

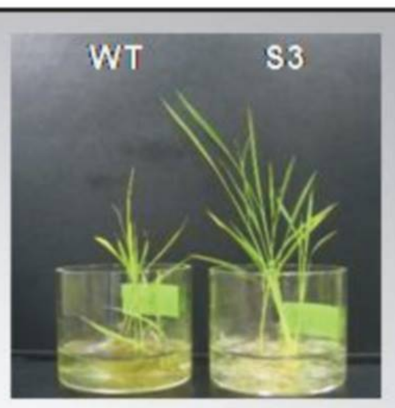


Fig. 5 Effect of 100 mM NaCl treatment for 24 hrs on growth of wild type and S3 seedlings.

Fig. 6 Effect of drought treatment on WT and transgenic rice plants.
W: wild-type (cv. Nipponbare),
VC: vector control,
S3, S4, S19: overexpressing *RSOsPR10* gene,

RSOsPR10 transgenic bentgrass confers high tolerance to salt and drought stresses

RSOsPR10 **introduced grass plants exhibit high tolerance to salt [Fig. 7] and drought [Fig. 8] stress.**

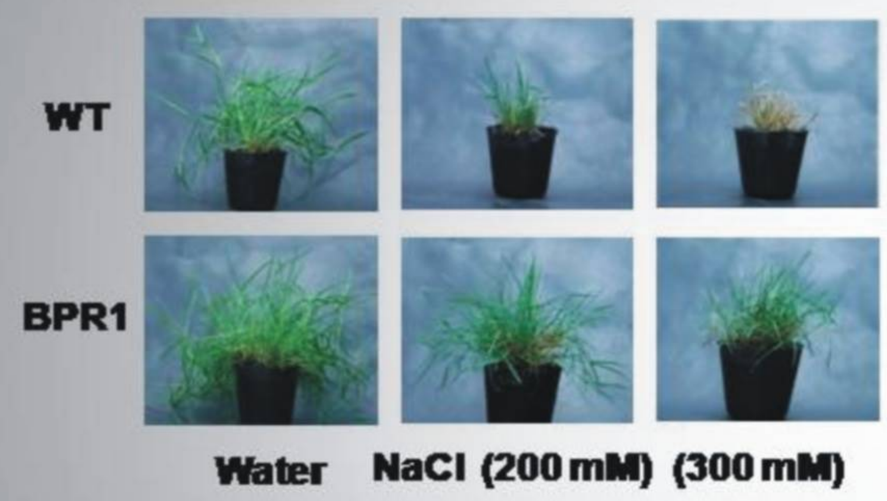


Fig.7 Salt-tolerance of transgenic bentgrass plants over-expressing RSOsPR10 gene and wild-type after 28-days growth. NaCl solution was supplied every 2 days.
WT: wild type (pencross)
BPR1: RSOsPR10 transgenic plants

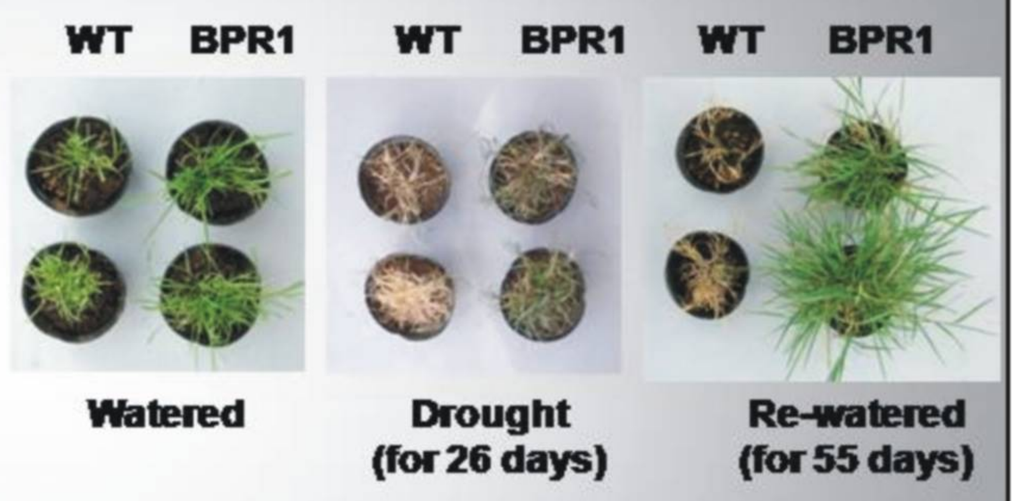
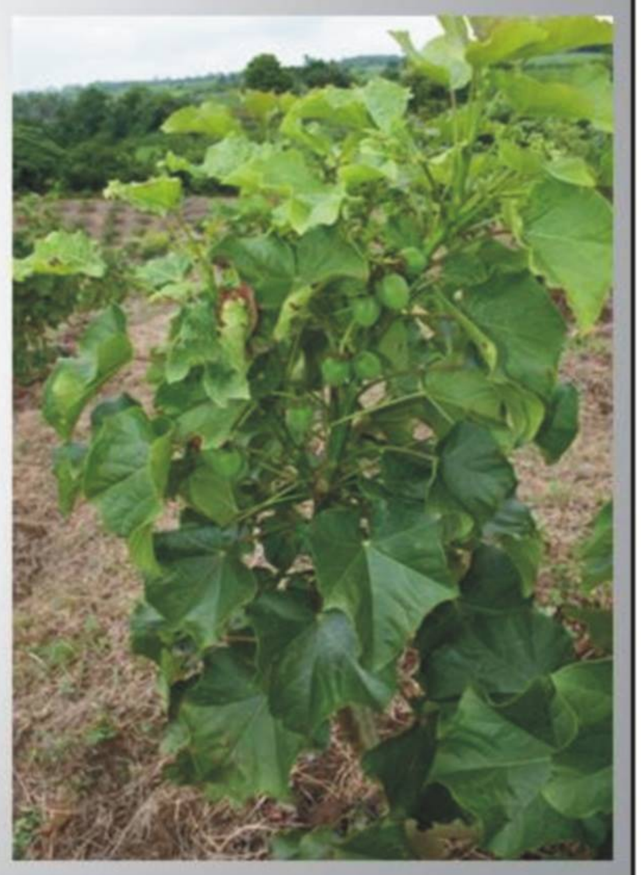


Fig.8 Drought-tolerance of transgenic bentgrass plants overexpressing RSOsPR10 gene and wild-type. Plants were watered for 26 days and then re-watered for 55 days.
WT: wild type (pencross)
BPR1: RSOsPR10 transgenic plants

We are planning to produce other transgenic plants with this gene, such as corn, soybean, and even some trees.

Strategies for the next generation of improved plants [Crops, tree ...]

- Enhancing photosynthetic efficiency.
- Increase in ability of N_2 fixation.
- Highly efficient biomass plants.
  (e.g., Jatropha (bio-diesel))



Jatropha (*Jatropha curcas*) in Philippine

Jatropha (*Jatropha curcas*)

- It can grow even in adverse land conditions and can produce seeds within a year of planting.
- It has a productive age of 35 to 50 years.
- The dry seed contains more than 30% of its weight in oil. (The oil can be used for bio-diesel, only after a simple purification step).
- Animals can not eat the fruits (seeds).

Jatropha growth in Tokyo

(In the green house of our university)

Jatropha plants and seeds were brought from Philippine (09/11/15)

- Even in Tokyo, they can grow and make fruits?
- We will try to cross between *J. curcas* and Japanese native Jatropha.

References

See "Editor's choice series on the next generation of biotech crops. Plant Physiol., 2008, vol. 147", and also references cited in the issue.

Acknowledgements

RSOsPR10 experiments:
Ishii, N., Hatakeyama, A., Okamoto, T. (Lab members)
Prof. Peter, N. (Bot. Inst., Karlsruhe Univ., Germany)
Drs. Terakawa, T., Oota, K., Hasegawa, H (Hokko Chemical Industry Co., Ltd.)
Jatropha experiments:
Prof. Haruta, S., Sugiyama, E., Yasuki, T., Prof. Kawakami, M. (Tokyo Metropolitan Univ.); Hori, M. (FPS Inc.); Sakamoto, A. (NES Inc.)
Financial supports:
- A Grant-in-Aid for Scientific Research from the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT) (2007-2008)
- A grant from Japan Science and Technology Agency (JST)(2007).
- A grant from the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF)(2008-2011).

Patents

- Stress-Responsive Gene Specific To Root. PCT/JP2003/06274
- Transformed Plant with Introduced Stress Response Gene. PCT/JP2007/050522

Illustrated by Prof. Michio Ohishi of Kazusa DNA Institute, Chiba

CLIMATE CHANGE AND FOOD SECURITY

BY

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1

INTRODUCTION

- Climate change is a major global challenge.
- Earth's average temperature has increased by approximately 0.74°C over the past century.
- estimate for warming over this century has projected by (IPCC) is between a further 1.8 and 4°C.
- **Visible evidence on climate change impacts include:**
  - Sea level rise.
  - Increasing frequency and intensity of heat waves, storms, floods and drought.
  - Increasing concern about likelihood of changes in rainfall patterns and water availability, thereby affecting food security.

2

OBJECTIVE

Our broad objective is a discussion of the impact of climate change on food security and food production system.

- Climate is a particularly important factor in food production system at the farm level.
- It affects the qualities and types of food produced and the adequacy of production-related income.
- Extreme weather events can damage or destroy distribution infrastructure and affect other non-agricultural parts of the food production system adversely.

3

FOOD SECURITY

- **Food security exists when all people, at all times, have physical and economic access to enough safe and nutritious food to meet their dietary needs and food preferences for an active and healthy lifestyle (World Food Summit, 1996).**

Aspects of food security:

- Food availability - Supply
- Food Accessibility - Demand
- Food adequacy – Quantity and Quality

4

EFFECTS OF CLIMATE CHANGE AND GLOBAL WARMING

- The process of global warming is expected to bring a long term changes in weather conditions,
- These changes will have serious impacts on the main dimensions of food security: food availability, food accessibility, food adequacy and food system stability
- Agriculture, forestry, and fisheries are all sensitive to climate. Therefore their production processes – whether for food, beverage, energy or industrial crops, or for livestock, poultry, fish or forest products - are likely to be impacted by climate change.

5

FOOD SECURITY IMPLICATIONS OF CHANGES IN AGRICULTURE PRODUCTION PATTERNS

- Impacts on the production of food will affect food supply at both global and local level.
- Impacts on all forms of agricultural production will affect livelihoods and ability to access food.
- Besides food and agricultural production, other food system processes e.g, processing, distribution, acquisition., preparation and consumption are equally important for food security.

6

NEGATIVE IMPACT ON FOOD SECURITY

- Climate change will worsen food insecurity in many countries.
- More frequent and more intense, extreme weather events (drought, heat and cold waves, heavy storms, floods), rising sea levels, and increasing irregularities in rainy seasonal patterns (including flooding), are already having immediate impacts not only on:
  - Food production,
  - Food distribution infrastructure,
  - Food emergencies,
  - Livelihood assets and opportunities
  - And human health in both rural and urban areas.

7

NEGATIVE IMPACT ON FOOD SECURITY Cont.

Less immediate impacts are anticipated due to gradual changes in mean temperatures and rainfall in addition to the above mentioned factors. This will affect the:

- Suitability of the land for different types of crops and pasture
- The health and productivity of forests
- The distribution, productivity and community composition of marine resources
- The incidence and vectors of different types of pests and diseases
- The biodiversity and ecosystem functioning of natural habitats
- And the availability of good quality water for crop, livestock and inland fish production.
- Climate change will also cause an increase in food prices due to growing scarcity of water, land and other food production resources.

8

EFFECTS ON LIVELIHOOD PATTERNS

❖ Agriculturally-based livelihood that are already vulnerable to climate change face immediate risk of:

- Increased crop failure
- Loss of livelihood and Fish stocks
- Increasing water scarcities and destruction of productive assets.

✓Examples of such agricultural-based livelihood patterns could be found in :

- Small-scale rainfed farming system
- Pastoralist systems inland and coastal fishing/aquaculture communities
- Forest-based systems
- And people inhabiting coasts, floodplains, mountains, drylands and the artic are the most at risk.

9

FUTURE VULNERABILITY

In addition future vulnerability is likely to affect

- low-income city dwellers, in both developed and developing countries,m whose sources of livelihood and access to food may be at risk from the impact of extreme weather events and variable for food prices, and who lack adequate insurance coverage.
- The livelihood status of agricultural workers will also change as centres of agricultural production shift or become more concentrated in the face of climate change
- Risk and vulnerability within communities is also likely to vary and shift – between men and women, landowners and not, young and old, infirm and healthy.

10

Contribution of Food and Agricultural Sector to Greenhouse Gas Emissions.

Greenhouse gas emissions from the food and agriculture sector contribut over one-third of the current annual total. These emissions are analyzed

In the next slide.

11

CONTRIBUTION OF FOOD AND AGRICULTURE SECTOR TO GREENHOUSE GAS EMISSIONS

SECTOR	CONTRIBUTION (%)
Deforestation	18
Burning of crop residue	2
Other agricultural uses	1
Use of fossils as a source of energy for on-farm activities, food processing and packaging	2
Release of methane and nitrous oxide from intensive livestock operations, irrigated rice paddies and application of synthetic fertilizers on cultivated land	13.5
The livestock sector	18

Source FAO 2007.

12

MITIGATION TO CLIMATE CHANGE IN FOOD AND AGRICULTURAL SECTOR

❖ **This involves actions to reduce greenhouse emission and sequestering or storing carbon in the short-term and making development choices that will lead to low emissions in the long-term.**

❖ **Best practices include:**

➢ Reducing emissions of carbon dioxide and other greenhouse gas.

Examples are:

- Through reduction in the rate of land conversion
- Better control of wildfires
- Finding alternatives to the practice of burning crop residues after harvest
- Reduction of emissions from commercial fishing operations, and more efficient energy use by commercial agriculture and agro-industries.

13

❖ **Reducing emissions of methane and nitrous oxide.**

Examples are:

- Through improving nutrition for ruminant livestock
- Efficient management of livestock waste
- Efficient management of irrigation water on rice paddies
- Efficient management of application of nitrogen fertilizer on cultivated fields
- And reducing of treated municipal wastewater for aquifer recharge and irrigation.

❖ Sequestering carbon.

Examples are:

➢ Through improving soil organic matter management with techniques such as:

14

Best practices continued.

- Conservation agriculture, Involving permanent organic soil cover
- Minimum mechanical soil disturbance and crop rotation (also saves on fossil fuel usage)

❖ **Improved management of pastures and grazing practices on natural grasslands,** Including:

- optimising stock numbers,
- Rotational grazing

❖ **Introduction of integrated agro-forestry systems that combine crops, gazing lands and trees in ecologically sustainable ways**

- **carbon sink tree planting.**

15

ADAPTATION TO CLIMATE CHANGE IN FOOD AND AGRICULTURAL SECTOR

❖ **Adaptation to climate change involves adjustments in natural or human system and behaviours that reduce the risks posed by climate change to people's lives and livelihoods.**

Best practices include:

❖ **Protecting local food supplies, assets and livelihoods against the effects of increasing weather variability and increased frequency and intensity of extreme events through**:

- Risk management in general and for risks specific to different ecosystems (marine, coastal, inland water and floodplain, forest, dryland, island, mountain, polar, cultivated)
- Through research and dissemination of crop varieties and breeds adapted to changing climatic conditions, and
- Through introduction of tree crops to provide food, fodder and energy and enhance cash income.

16

❖ **Avoiding disruption or declines in global and local food supplies due to changes in temperature and precipitation regimes through:**

- More efficient agricultural water management in general
- More efficient management of irrigation water on rice paddies
- Improved management of cultivated land
- Improved livestock management and
- Use of new more energy-efficient technologies by agro-industries

❖ **Protecting ecosystems through provision of environmental services. Examples include**

- Use of degraded or marginal lands for productive planted forests or other cellulose biomass for alternative fuels.
- CDM carbon sink tree plantings,
- Watershed protection

17

Protecting ecosystems through provision of environmental services continued.

- Prevention of land degradation
- Protection of coastal areas from cyclones and other coastal hazards
- Preservation of mangroves and their contribution to coastal fisheries
- And biodiversity conservation

18

INCENTIVES FOR FARMERS, AGRO-INDUSTIALISTS AND ECOSYSTEM MANAGERS FOR ADOPTION OF GOOD PRACTICES FOR MITIGATING AND ADAPTING TO CLIMATE CHANGE .

- Information dissemination
- Technology transfer
- Regulations
- Positive and negative monetary incentives e.g. polluter and users pays principles
- Cancellation of perverse incentives e.g. subsidies
-

19

RELATIVELY NEW INCENTIVE MECHANISMS

❖**Payments for environmental services where farmers and communities are compensated for climate change mitigation benefit they generate through:**

- changes in upper water management,
- management of protected areas,
- rehabilitation and sustainable management of grassland and reforestation and aforestation.

20

CONCLUSION

THANK YOU FOR YOUR ATTENTION

ANNEX 1

23

EXAMPLE OF A NATIONAL FOOD SECURITY PROGRAMME

FEDERAL REPUBLIC OF NIGERIA: NATIONAL PROGRAMME FOR FOOD SECURITY (NPFS).

OBJECTIVES:

•to improve national food security and reduce poverty on an economically and environmentally sustainable basis.

Related objectives would be to:

•Improve household food security and incomes through increase in productivity, diversification and sustainable use of natural resources.

•Enhance food security of consumers through improved access to and availability of food and also increase income of producers through more efficient marketing

•Enhance farmers and consumers access to support services such as extension, credit, nutrition and health education; and

•Foster participation of the poorer section of the population in the development of the community.

24

FEDERAL REPUBLIC OF NIGERIA: NATIONAL PROGRAMME FOR FOOD SECURITY (NPFS). Continued

STRATEGIES FOR ATTAINING THE OBJECTIVES

The objectives would be achieved by a programme that establishes production/demonstration sites focusing on rural areas with high agricultural production potential to serve as models for a LGA wide outreach programme. In addition, the project would introduce a real time marketing information service and improve linkages between the rural communities and the formal banking sector. The required support services would be strengthened at all three tiers of government, involving the private sector including NGOs to a maximum extent possible. The project would also foster the community empowerment process through a wide ranging community driven-development programme.

CORE ACTIVITIES IN EACH SITE

- Crop productivity
- Production diversification
- Agro-processing and on-farm storage

25

FEDERAL REPUBLIC OF NIGERIA: NATIONAL PROGRAMME FOR FOOD SECURITY (NPFS). Continued

OUTREACH COMPONENT

Aims at establishing an environment that is conductive for farmers to adopt on-site promoted production technologies and management practices well beyond the project sites to ensure longer-term sustainability of the food security programme. The outreach component consequently consists of the following clusters of core activities:

- Agricultural inputs and commodity marketing
- Rural finance
- Strengthening research-extension-farmer-linkage
- Health and nutrition, and
- Expansion: water use and control, soil fertility management, agro forestry crop intensification, animal production and health, aquaculture and artisanal fisheries, agro-processing and on-farm storage.

26

27

Climate Change, Forestry and Food Security: Prospects For REDD

Stephen Mutimba
Managing Director
Camco, Nairobi

About Camco (formerly ESD)

- The Camco Group is a pioneering business with an outstanding track record creating value in the sustainable energy and low carbon markets.
- The Group works closely with organizations worldwide, establishing partnerships to turn our clients' climate change liabilities into economic, social and environmental assets.

Integrated Business Model

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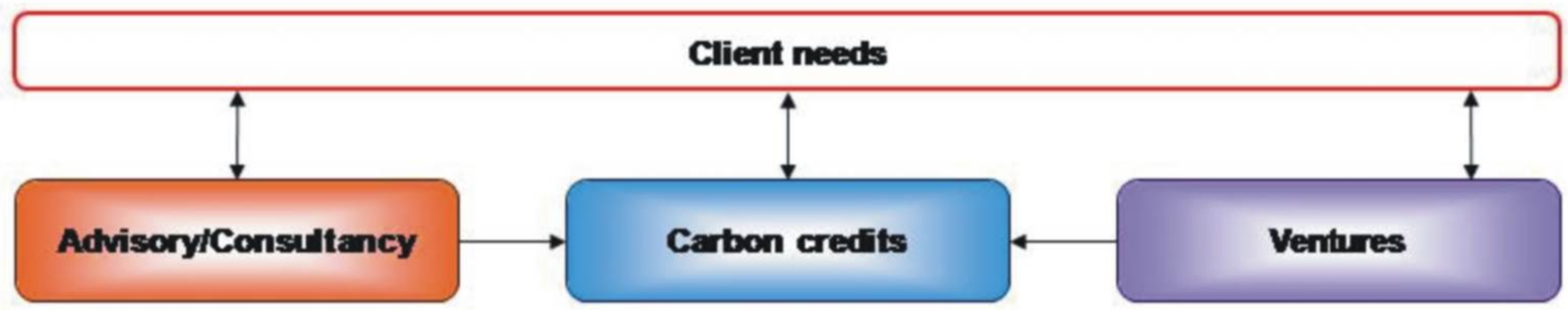

Carbon foot printing carbon policy & strategy – sustainable buildings – low carbon project development – finance – technology innovation – land use – carbon labelling – rural development

Asset development, carbon project origination, regulatory qualification, deal structuring, asset placement and ongoing operational monitoring management

Equity Fund, Venture Capital Fund, Earth Carbon, Bradshaw Software, Energy Labelling, Fuel Cells, Biomass, Wind

Working Terms

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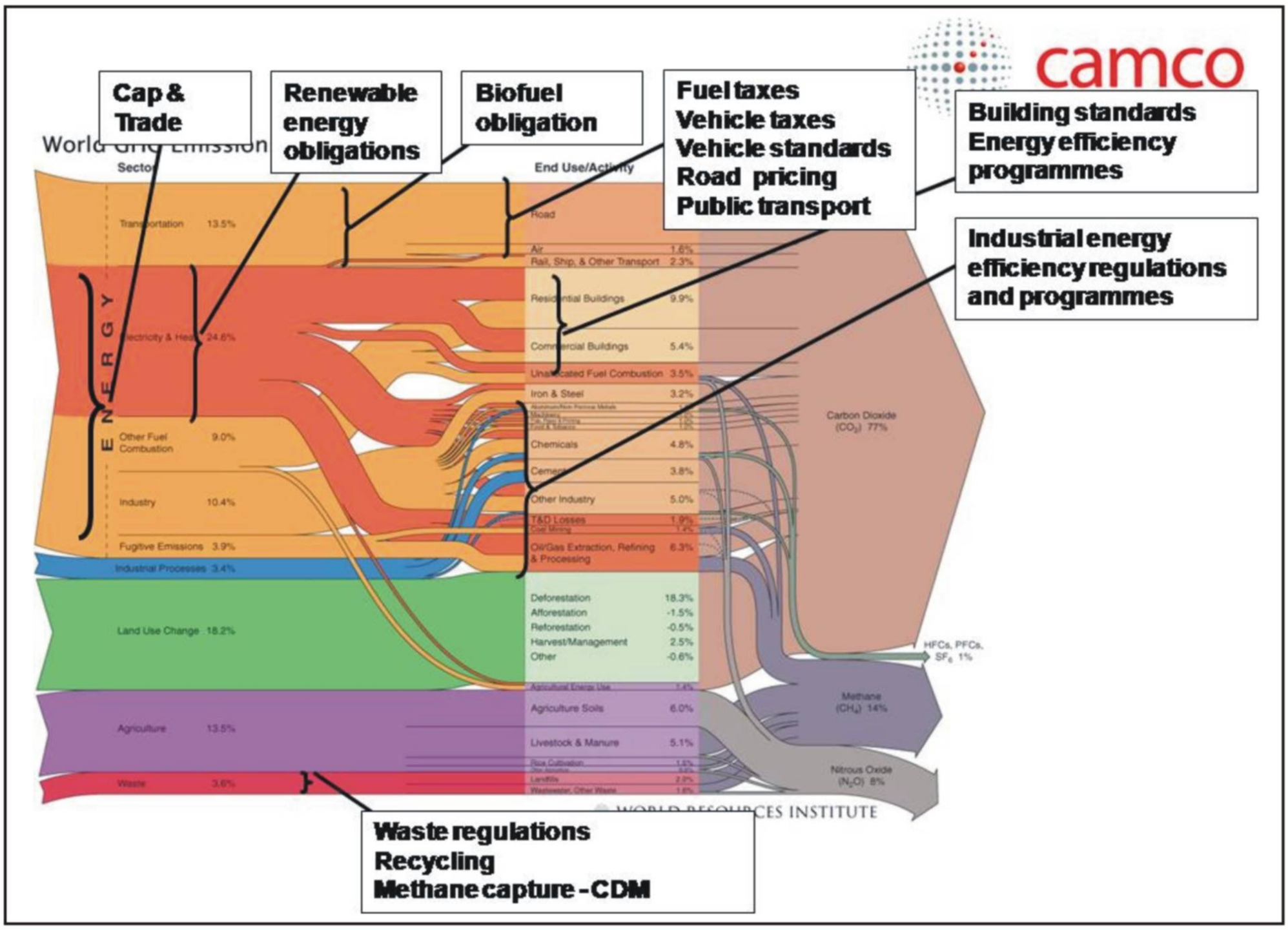
- **REDD** - **R**educing **E**missions from **D**eforestation and Forest **D**egradation

- **CDM**- Clean Development Mechanisms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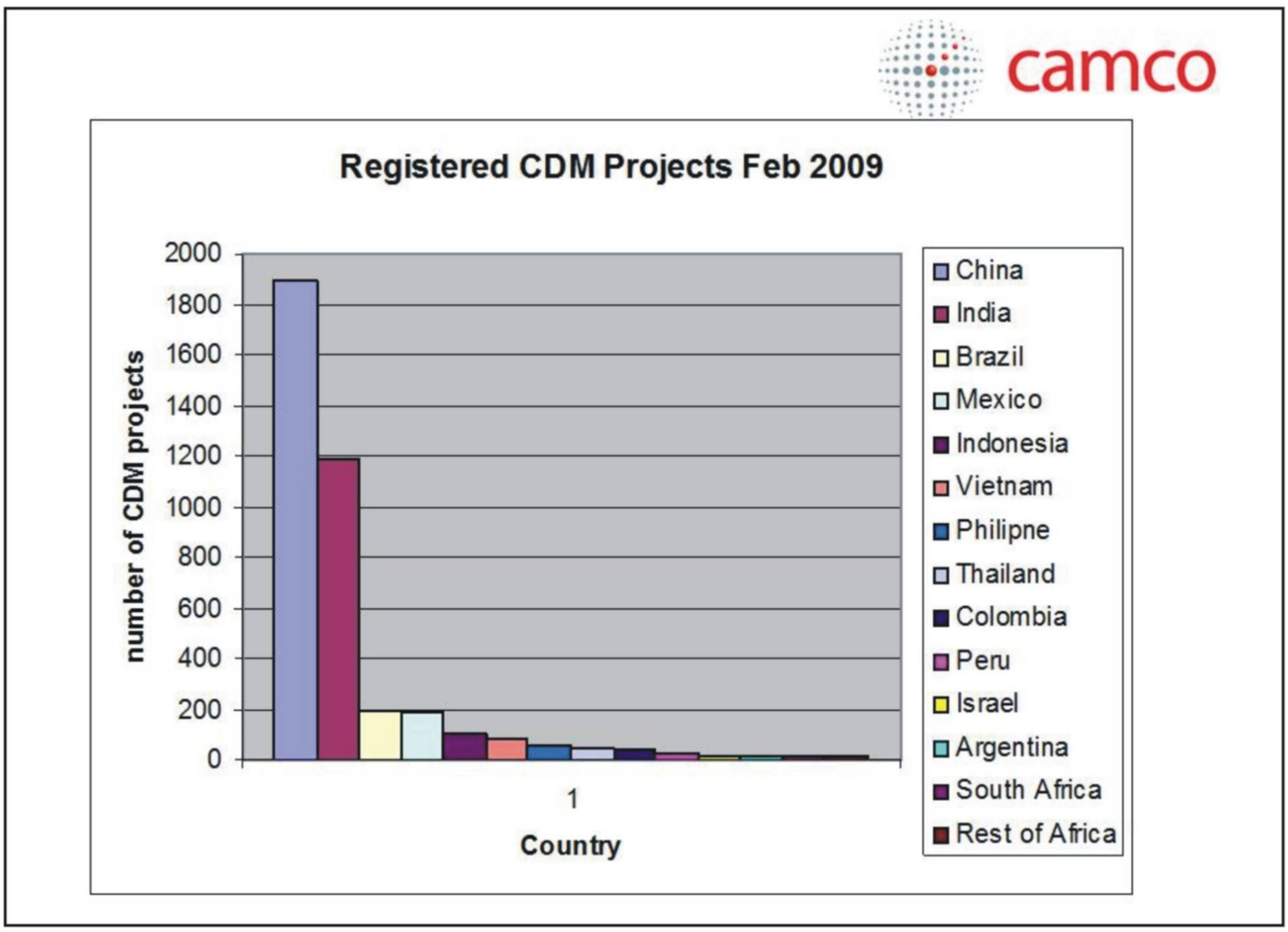
Cap & Trade
Renewable energy obligations
Biofuel obligation
Fuel taxes
Vehicle taxes
Vehicle standards
Road pricing
Public transport
Building standards
Energy efficiency programmes
Industrial energy efficiency regulations and programmes
Waste regulations
Recycling
Methane capture - CDM
End Use/Activity
Transportation 13.5%
Electricity & Heat 24.6%
Other Fuel Combustion 9.0%
Industry 10.4%
Fugitive Emissions 3.9%
Industrial Processes 3.4%
Land Use Change 18.2%
Agriculture 13.5%
Waste 3.6%
Road
Air 1.6%
Rail, Ship, & Other Transport 2.3%
Residential Buildings 9.9%
Commercial Buildings 5.4%
Unallocated Fuel Combustion 3.5%
Iron & Steel 3.2%
Chemicals 4.8%
Cement 3.8%
Other Industry 5.0%
T&D Losses 1.9%
Oil/Gas Extraction, Refining & Processing 6.3%
Deforestation 18.3%
Afforestation -1.5%
Reforestation -0.5%
Harvest/Management 2.5%
Other -0.6%
Agriculture Soils 6.0%
Livestock & Manure 5.1%
Landfills 2.0%
Carbon Dioxide (CO_2) 77%
HFCs, PFCs, SF_6 1%
Methane (CH_4) 14%
Nitrous Oxide (N_2O) 8%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Registered CDM Projects Feb 2009
number of CDM projects
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1
Country
China
India
Brazil
Mexico
Indonesia
Vietnam
Philipne
Thailand
Colombia
Peru
Israel
Argentina
South Africa
Rest of Africa

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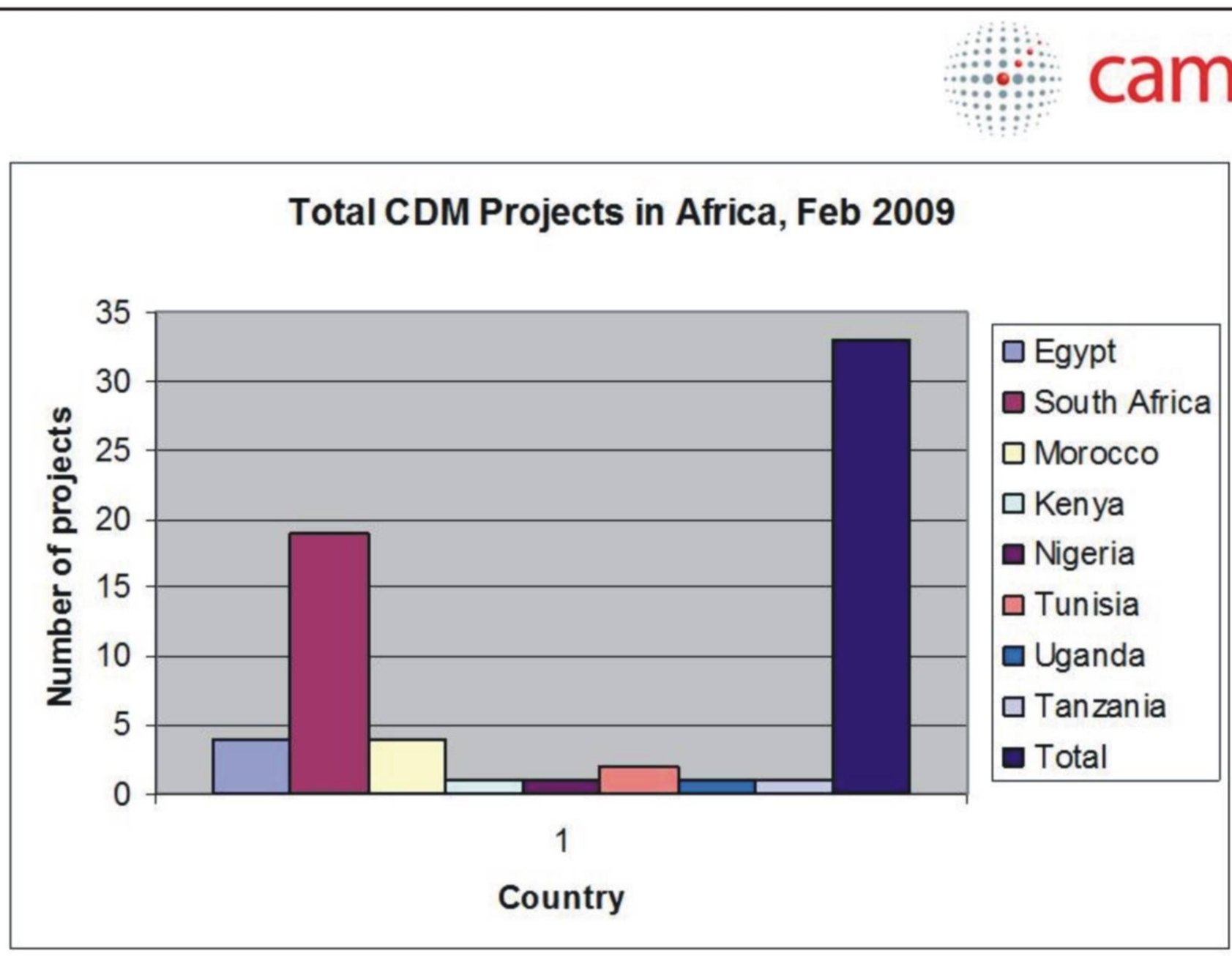
Total CDM Projects in Africa, Feb 2009
Number of projects
35
30
25
20
15
10
5
0
1
Country
Egypt
South Africa
Morocco
Kenya
Nigeria
Tunisia
Uganda
Tanzania
Total

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OF COURSE IF WE LEFT THE LAND TO ITSELF IT WOULD REVERT TO WOODLAND ANYWAY, BUT WHERE'S THE PROFIT IN THAT?
CARBON OFFSETTING CO
www.chrismadden.co.uk

Background and Definition

- Land use change, including deforestation, accounts for about 20% of global greenhouse gas (GHG) emissions.
- Africa's share of global emissions from land use change was 17% emissions from fossil fuels was 3.7% Africa accounted for a third of tropical deforestation. (Biogeosciences, March 2009)
- Forests and woodlands play many roles in climate change mitigation through emission reductions, carbon sequestration, and carbon substitution.
- Forest restoration can help remove GHGs from the atmosphere (carbon sequestration) and also has many co-benefits, including **enhancing food security**, biodiversity conservation and the provision of other ecosystem services.
- **R**educing **E**missions from **D**eforestation and Forest **D**egradation (**REDD**) arose out of the fact that forests – tropical forests in particular – In addition, influence livelihoods both at local and global level.

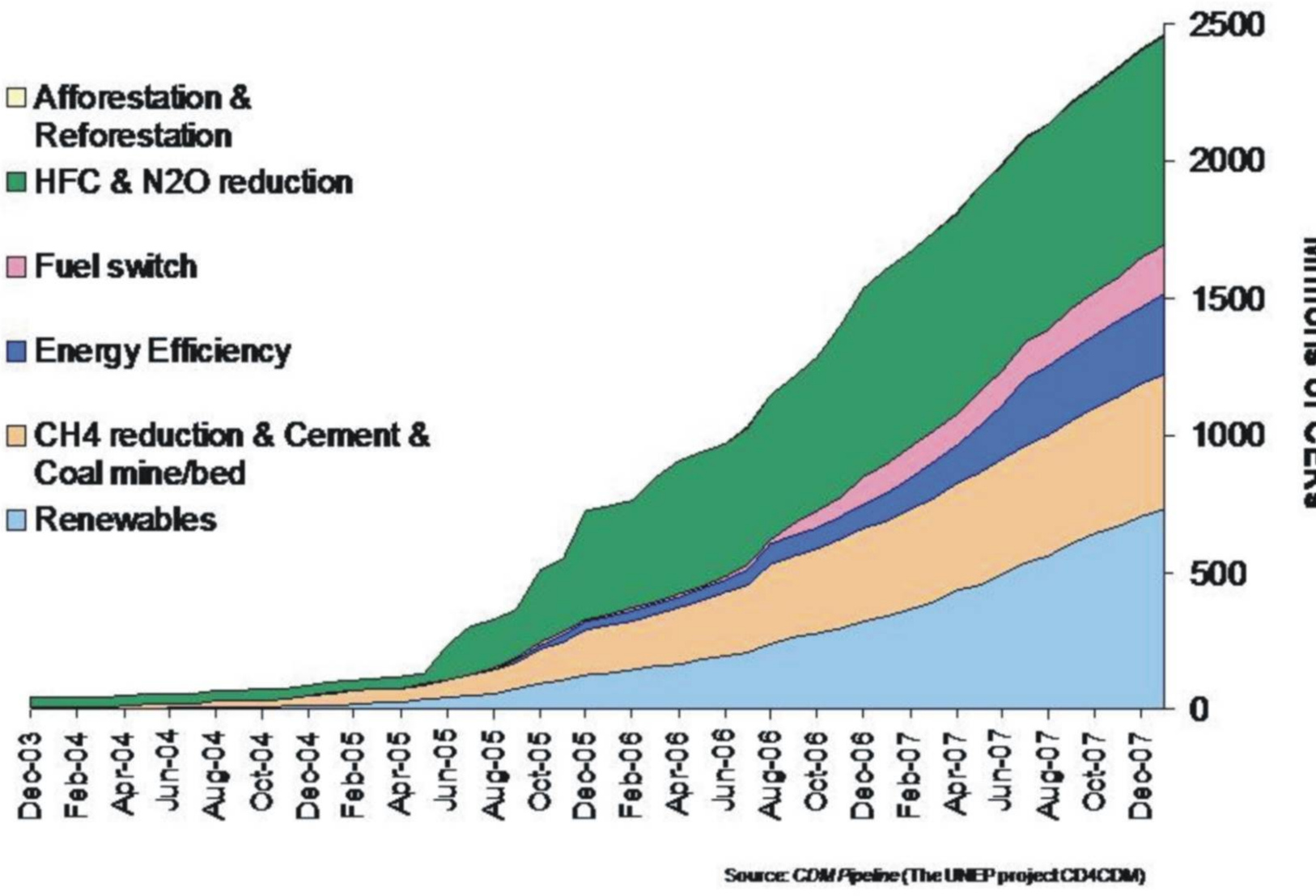
Evolution of REDD

- REDD was first mooted at COP 11 in Montreal in December 2005 by the Govts of Papua New Guinea and Costa Rica
- Followed up by the Bali Plan of Action which stated at COP 13 that a comprehensive approach to mitigate climate change should include policy approaches and positive incentives on issues relating to REDD in developing countries.
- The Main outcome of Bali was the achievement of consensus that REDD will be part of a post-2012 Protocol
- There is still vigorous debate over the elements to be included in REDD under UNFCCC (i.e. its scope, methodologies, funding, and reference level).
- Several countries and organizations have to date presented proposals on how REDD ought to work.
- General consensus that:
  - a future mechanism for REDD should include both **D**eforestation and forest **D**egradation
  - REDD should be complementary to, rather than a substitute for, deep emission reduction commitments from industrialized countries

Why REDD and Not CDM?

- Sustainable forest management is not yet defined in the United Nations Framework Convention on Climate Change (UNFCCC)
- To date, the Clean Development Mechanism (CDM) has not sufficiently encouraged afforestation and reforestation (as defined by the Marrakesh Accords of the Kyoto Protocol).
- Unless procedures are improved and transaction costs reduced, it is unlikely that the A/R CDM will contribute substantially to the enhancement of carbon sinks.
- Only one forestry CDM project is registered, based in China

CERs Issued by Sector



Source: CDM Pipeline (The UNEP project CD4CDM)

%age of CDM Projects by Sector

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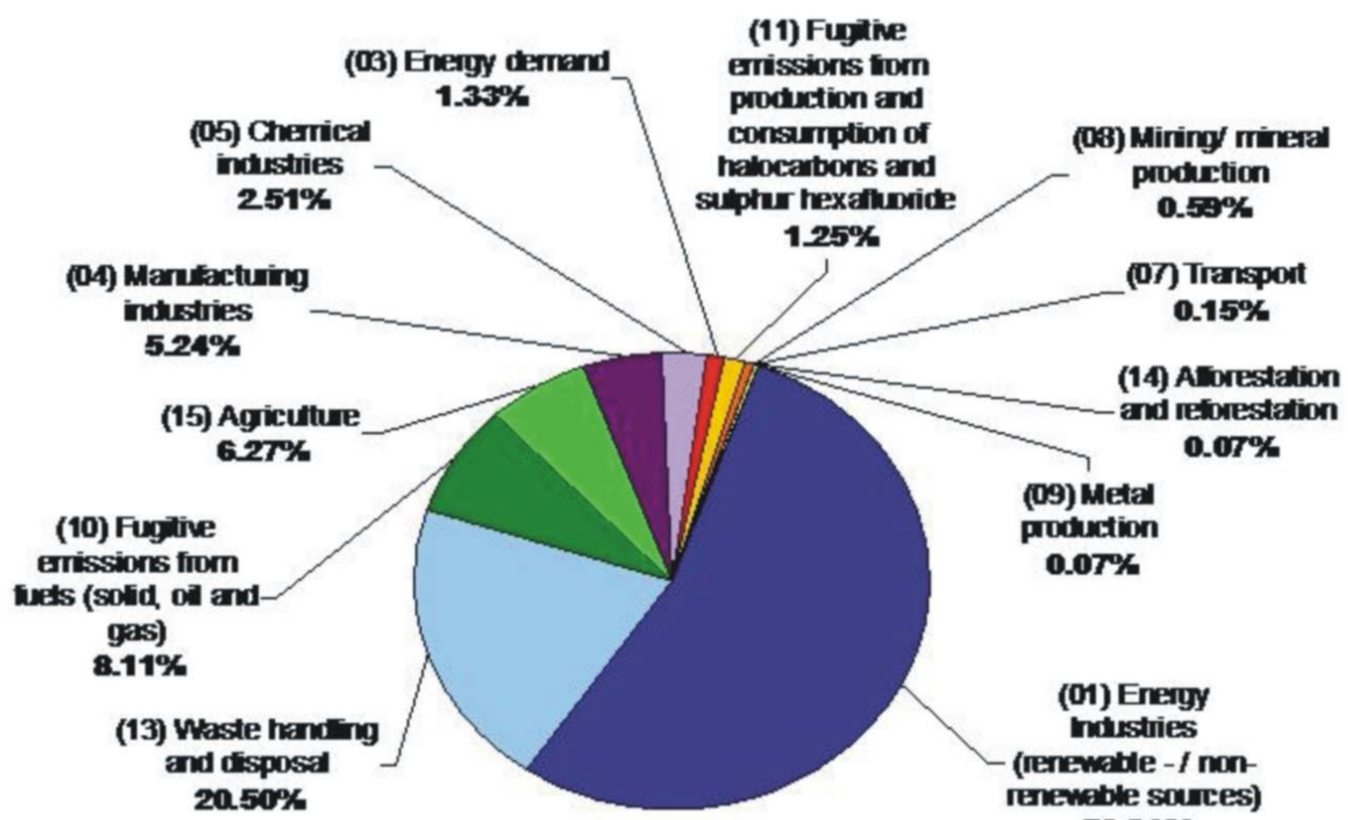
***A project activity can be linked to more than one sectoral scope**



Source: *UNFCCC*

REDD and GHG Emissions

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- Forests offer one of the biggest opportunities for cost-effective and immediate reduction of carbon emissions.
- Policymakers and environmentalists find the idea attractive because it could help fight climate change at a low cost while improving living standards for some of the world's poorest people, safeguarding biodiversity, and preserving other ecosystem services.
- As an example of carbon impact, FAO estimates that each hectare of Bolivian forest stores an average of **67** metric tons of carbon in above-ground biomass and another **33** tons in below-ground biomass, dead wood, vegetation litter, and soil, yet Bolivia lost an average of 270, 200 hectares of forest per year between 2000 and 2005 alone.
- African countries particularly vulnerable

REDD and Food Security

- Land use and management systems that are accelerating GHG emissions are also undermining the ecosystem services upon which long-term food security depend
- REDD encourages **Mitigation Options** involving agriculture and agroforestry as long as they show, reduction in deforestation and forest degradation, and managing conservation areas as carbon sinks
- Such mitigation would also provide access by local communities to sustainable supply food, medicines and raw materials
- Agroforestry and small scale agriculture are some of the attractive options – can be linked with energy crops:
  - Fast-growing woody food crops for energy production offer a major carbon opportunity, i.e. the wood will reduce fossil fuel combustion.
  - Energy crops produce a large carbon increase on an area basis; even small areas can produce significant carbon credits.

Local communities depend on forests for livelihoods,

Shea nut tree, protected by locals in Arua, Uganda, because of the multiple benefits derived from it.

REDD in Africa

- Africa held a number of REDD events in 2008:
  - **Africa: the Ready for REDD Forum** at the UNFCCC Climate Change talks in Accra (21-27 August)
  - **A Special Ministerial Session on REDD and Climate Change during the Ministerial Council of the Central African Forest Commission – COMIFAC** in Bangui (9-11 September)
  - The **Katoomba Group meeting for East and Southern Africa** in Dar es Salaam (15-18 September);
  - Main outcome of these meetings was consensus on the need for African countries to adopt a common position given the stakes of the upcoming negotiations
- Members were cautioned that the common position should adequately recognize the diversity of interests in the region with respect to humid forests, dry forests and woodlands.
- The Congo Basin group in particular emerged as the most advanced in developing a common position through its REDD submissions to the UNFCCC process.

Examples of REDD Projects

- World Bank BioCarbon Fund (worth $91.9 billion) – financing afforestation, reforestation and REDD, agroforestry and agriculture and ecosystem-based projects that promote biodiversity, alleviate poverty and sequester carbon.
- REDD payments for Avoided Deforestation in Brazil are worth $388 million annually
- CARE International is working with communities in several parts of the world and so far is reporting good results, viz:
  - using carbon finance in Guatemala to plant trees and stabilize steep slopes prone to catastrophic landslides
  - working with communities in Vietnam and Tanzania to re-establish mangrove forests that act as living storm barriers
  - working with ICRAF in Kenya to re-establish trees on degraded lands and improve degraded soils

All the projects provide an array of additional livelihood and food security benefits.

Some Concerns

- Concerns about additionality and leakage: it is feared that emission leakage can occur if carbon sequestered in one location (e.g., by avoided deforestation) leads to carbon release (e.g., from increased harvesting) in another location.
  - Product leakage could occur if forest carbon sequestration encourages use of more carbon-intensive substitutes (e.g., cement or steel).
- Concerns about verification and monitoring: methodologies yet to be agreed in full, queries on scope
- REDD activities are complex, because they are necessarily large-scale.

Conclusions

- Trees and forests can enhance people's resilience to the impacts of climate change and increase their adaptive capacity.
- REDD can be used to promote sustainable forest use, pay for proper land use practices and extend forests across landscapes while increasing food production
- Standards and safeguards are essential to minimize the risk of social harm from REDD activities.

Recommendations and way forward

- According to the International Tropical Timber Council (ITTC), there's need for:
  - Development studies, covering guidelines, methods, strategies and approaches to REDD, etc.
  - Capacity building by helping member countries to build forest-sector capacity to mitigate and adapt to climate change
  - Knowledge management and information sharing
  - Governments to be proactive

Specific recommendations (cont'd)

- Ensure that forest-based approaches to climate change mitigation and adaptation fully consider the need for **good governance, equity, civil society involvement, and local communities, respect for human rights, and poverty reduction.**
- Develop public awareness programmes on the important and dynamic relationship between forests and climate change.
- Study the feasibility of wood-based biofuels that be intercropped with food in climate change mitigation.
- Where appropriate, encourage the development of community-based food and wood energy programmes.
- Develop policies and guidelines to promote sustainable food/wood-based biofuels in a way that does not jeopardize food security and is consistent sustainable forest management.

Thank you

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WORKING PAPER

ON

CLIMATE CHANGE AND FOOD SECURITY

A NIGERIA PERSPECTIVE

BY

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1. INTRODUCTION

1.1 Food Security and the natural Environment

Food shortage in Nigeria resulted in massive imports of raw and processed food items before1999/2000. The free market approach of the World Trade Organization (WTO) led to so much influx of imported fruits and their byproducts, cereals including rice, beans beverages and vegetables that foreign exchange available for technological adaption in the food production chain was drastically affected. Inflation due to scarcity of essential food items at the wake of the 2000 dry spell in the north would have taken Nigeria back to mid-70s and early 80s but for the quick implement6ation of a national policy termed, National Economic Empowerment and Development Strategy, (NEEDS). Before then, drastic reforms on IMPORTATION of finished agricultural products (essentially ban on canned fruits and food items) were affected.

The various activity Nodes under NEEDS (with indirect impacts of NEPAD and FAO) have resulted in impressive performance in agricultural sector. The FAO (in 2003) even declared that Nigeria's Agricultural grew by an unprecedented 7% leading to a 3.6% increase in income level as against 2.8% in the 90s. Rate of inflation dropped from 18% to 10.8%. The GDP did not however benefit much from the early initiatives (3.6% which is less than the 5% set target to alleviate poverty and far below the 7% to meet the Millennium Development Goal (MDG) target set against 2015. From these early gains, it is an unequivocal statement of fact that to meet the MDG by 2015 (or earlier), the priority to improve agricultural production of peasant farmers MUST BE ANCHORED ON functional advisories based on sound scientific and technological FACTS as key to realistic and actual reduction of poverty.

Of over 70% of Nigerians living in rural communities, 90-95% live on the land. But many rural dweller now look at Government initiatives in Agriculture with suspicion. The failures of past initiatives on rice and poultry in the 1970s and 80s did not help matters. What was not clear then (but clearer now) is that successive Governments did not (or refused to) reckon with vagaries of weather and climate in making projections that were never realized and climate change was not a major issue before INCED-92 in Rio de Janeiro, Brazil. I recall my experience with the Big-Boss of the DFFRI (aka Deep Fridge) in 1989 who rebuffed our overture to carry out Assessment of Climate-Crop study on the excuse that the Agency had piles of Reports which were yet to be digested. Where is DFFRI TODAY? The lessons to be learnt from the failure of past thrusts include lack of:-

- Recognition of the natural environment in which Action is taking place
- and build implementation plans with known facts of climate.
- Realization that climate is a Good servant but a Bad master
- Will to act transparently in food production
- Adopting integrated approach in dealing with agricultural issues.

A good reference case is the current Rice Processing initiative that is to gulp over N16 Billion. Thought should be given to the fact that 'You can only Process what you produce". What are the steps taken to ensure that the elements of Climate, especially effects of Climate change are factored into the Rice Revolution? It must be said once again that the Agricultural Development Projects (ADPs) nation-wide did it in 1976-80. What was the outcome?

The same International Agencies which canvassed for Rice, Poultry and Livestock etc as the panacea for solving Nigeria's food problems in the seventies are at it again. But this time, FORA like the Lagos SUMMIT on Climate change MUST sound the note of WARNING that stampeding Nigerians to misadventures cannot be accepted in view of modern – day realities of CLIMATE CHANGE

2. Global and regional dimensions to issues of climate change

Climate Change has been one of the most engaging environmental subjects of debate in recent times. Indeed, the environmental problems associated with the potential impact of expected

climate change may prove to be among the major environmental problems likely to arise in association with the anticipated global warming. The most critical is lower food production and associated poverty implications.

Most ecosystems are sensitive to humanity's unsustainable management practices' and increasing demands for resources. For example human agricultural activities can fragment lightly managed and unmanaged ecosystem" limiting their potential for adapting naturally to climate change. Fragmentation of agricultural lands will also complicate efforts to increase production and sustain the carrying capacities of arable lands, especially in semi-arid/fragile ecosystems considered to be most sensitive to impact of climate change.

Adapting to Climate change can be a spontaneous or planned act. In many cases however, people will need to plan how to minimize negative impact or benefit from positive ones. Planned adaption can be Nigeria launched prior to, during and after the onset of the consequences. In the case of the Agricultural sector of Nigeria, the impact is already on-going and should be contemplated now. This is a process whereby adaption will be based on application of research products and systematic monitoring. Present-day climatic variability including extreme climate events such as drought and floods/already causes a great deal of de-stabilization in the Country's economy. Greater efforts to adapt to these events could help to reduce damage in the short term regardless of any longer term changes in climate. Knowledge has increased dramatically in recent years and it has been reiterates that research and monitoring remain essential for gaining a better understanding of potential impacts and the adaptation strategies needed to deal with them.

2.1. Agriculture and Food Security (Brief Review)

Global expectations suggest that while food shortages in one region may be neutralized by surplus in others, the sub-regional impact of climate change on crop yields and productivity will vary considerably. Seasonal heat stress, shifting monsoons and drier soils WILL reduce yields in Nigeria and other countries in sub-Saharan Africa where projections of regional climate change and resulting agricultural impact as suggest a – 65% to +5% yield variations in maize crop which is the worst in the World. (PEW 2005)

While southern parts of Nigeria may become wetter, the drought-prone north will suffer loss of soil moisture. Soil moisture will decline in all northern states during the rainy season while some areas will be so dry that effective infiltration will be too low leading to higher rates of surface run-off which will add to wash-off of top soils. Crop yield will be reduced drastically during droughts as it was the case during the celebrated Global Drought of 1969-73 when, as shown in Tables 1 & 2 affected both crops and animal husbandry. Cost of some commodities reflecting scarcity is given in Table 2.3a.

Plant growth and health may benefit from fewer chilly nights/but many crops will be damaged by higher temperatures, particularly if combined with water shortages. Certain weeds may expand their range into hitherto NO-GO habitats. There is also some evidence that the expansion of insects and plant diseases will add to the risk of crop loss. The menace of migratory birds, locusts, army worms and termites in the sahelian north Africa. From Senegal to Ethiopia) will affect northern Nigeria.

In principle, higher levels of CO2 should stimulate photosynthesis in certain plants. This is particularly true for so-called C3 plants because increased carbon dioxide tends to suppressthe ir photo spiration, making them more water efficient. C3 plants make up the majority of species globally, especially in cooler and wetter habitats and include most crop species such as wheat, rice, barley, cassava and potato. The response of C4 plants would not be as dramatic. C4 plants include such tropical crops as maize sugar cane, sorghum and millet

which are important for the food security of many developing Countries including Nigeria. (PEW. 2005).

Livestock production of rangelands and pastures will decline. especially as was the case after the 1969-73. Drought (see Table 2) and they will become costlier due to disruption of the agriculture system (see Tables 3 a &b) Intensive indoor managed livestock systems will more easily adapt to climate change than will out-door systems, especially characteristic of the pastoral systems in Nigeria where communities tend to adopt new methods and technologies more slowly (if at all).

A more serious problem relates to livestock health hazards in particular poultry with higher than normal carcinogenic pathogens in dust laden air. Respiratory ailments are becoming 'lethal'. (Adefolalu et al 2001; 2005). Tendency to be committed to unnecessarily expensive treatments through imported vaccines will take precedence over preventive or pro-active measures. The 'hue and cry' over avian flu in Africa may just be the beginning of the demise of local fowls similar to the invasion of the continent by imported ;one –ear-per-stalk maize or corn that replaced 2-3 ears per stalk in maize since 1970. In fact, the door is indirectly being thrown open to genetically developed hybrids of plants and animals.

The global yield from marine fisheries should remain unchanged by global warming. The principal effects will be felt at the national and local levels as the mix of species changed and people respond by relocating fisheries. These possible local effects could threat3n the food security of countries that are highly dependent on fish. In general/ some of the positive effects of climate change are longer culturing seasons accompanied by lower natural dry-season mortality and faster spurning periods of freshwater species. The negative one could include upsets in established reproductive patterns/migration routes and ecosystem relationships which will be more pronounced in coastal areas where saline water intrusion increase due to ocean surges and tidal waves under severe storm conditions.

In essence, food security RISKS will be local and natural. These will be most pronounced in developing countries which and cannot adapt or adjust and lacks the will to undertake research and monitoring and creates disincentives for local communities to acquire more land and practice policies that 'hold down' the populace. For examples, Governments in quest to modernize suburban areas by acquiring FARMLANDS for State Urban or Capital Territories will KILL the rural WILL and DRIVE to produce more food in otherwise agrarian settlements in southern Nigeria known to depend on agriculture both subsistence and cash-crop for times past..

Table 1: Drought effect on crop yield-Kaduna State (Apeldoorn 1977 P.77)

Administrative Areas	Crop	Acreage	Estimated% loss in yield	Estimated yield loss in tons
Daura	Millet Guinea Corn Groundnut	98737 65825 32912	75% 90 80	16.530 21.180 5,875

	Cowpea	10971	50	489
Dustin-ma	Guinea Corn	190766	40	27.220
	Millet	174068	25	19.440
	Groundnut	127177	40	11.275
	Cowpea	15897	40	567.4
	Cotton	63589	50	7.952
Kastina North	Guinea Corn	2870004	50	51,200
	Millet		75	22,600
	Groundnut	135060	70	17,420
	Cowpea	111425	50	1,130
		25324		

Table 2: Percentage of Herd size reductions in 4 northern villages, 1971-74 (Apeldorn, 1977, P. 109).

Stock	Village Study: Nomads	sedentary	Daura Sadamu	Riiva-T	Hadejia Mungurum
	percentage loses				
Cattle	71	63	67	65	70
Sheep	64	69	75	62	82
Goats	56	71	75	63	66

Table 1: Drought effect on crop yield-Kaduna State (Apeldoorn 1977 P.77)

Commodity	Price /Ton In Nigeria(₦)	

	July1969	March 1974	% rise
Fish meal Maize Guinea	156	170	355
Corn Ground nut cake	70	150	114
	70	140	100
	65	130	100

Table 3b: Average market prices of livestock in former North Eastern State (from Appeldoorn 1997 P 114)

Stock	Pre-drought (₦)	During drought(₦)	Post drought (₦)
Cattle	90	30	180
Sheep	15	10	30
Goats	7	4	20

3. Doubting Thomases are Changing

There is now a sense of urgency in the world to solve the climate change course and return planet earth to the human race. It has not been easy convincing the Doubting Thomases. But when a Nation's course of changing Democracy was rested on one (out of many issues) and the under-dog was victorious, then a change of HEART is taking place.It took over 1,365 scientists on field surveys, experiments, expeditions etc to classify the 'other' minor losses accountable to climate change to convince THE BIG WORLD LOADERS.

One such finding was that the pollinating Butterflies, Birds and Bees are migrating to warmer, higher latitudes. It was reveated that 'ROSE GARDENS' of palatial edificies and masions in the United States will disappear into oblivion as a result of climate change. What Americans prize most (not so in Africa) is the environment and their immediate surroundings. Take away his liberty but leave him with him well tendered and managed garden and the American will be glad you DID. That was what did the magic. In 2005 I visited the USA and even though it was near pick summer, blossoming flower gardens were bereft of their glamour and beauty. You JUST see shrubs and shrubs and shrubs"

It will take the goddess of Beauty many years to convince the Nigerian to keep his environment inviting and smelling like hot baked break sweet with freshness. But one thing in clear, whether or not we care about flowers and green, beautiful environment, the change into dryness by imperatives of climate change leave us with no choice than a dry, dreadful landscape – for the Pride of Burbados, the Adam's Robe, Ice plant and their insects are going, so also will be our quest for FOOD self sufficiency!

4. CLIMATE AND FOOD SECURITY

4.1 Agriculture climate and food security

Agriculture is important for food security in two ways: it produces the food people eat and (perhaps even more important) it provides the primary source of livelihood for 36 percent of the world's total workforce. In the heavily populated countries of Asia and the pacific, this share

Ranges from 40 to 50 percent, and in sub-Saharan Africa, two-thirds of the working population still make their living from agriculture (ILO, 2007). If agricultural production in the low-income developing countries of Asia and Africa is adversely affected by climate change, the livelihoods of large numbers of the rural poor will be put at risk and their vulnerability to food insecurity increased.

Agriculture, forestry and fisheries are all sensitive to climate. Their production processes are therefore likely to be positive in temperate regions and negative in tropical ones, but there is still uncertainly about how projected changes will play out at the local level, and potential impacts may be altered by the adoption of risk management measures and adaptation strategies that strengthen preparedness and resilience.

The food security implications of changes in agricultural production patterns and performance are of two kinds. Impact on all forms of agricultural production will affect livelihoods and access to food producer groups that are less able to deal with climate change, such as the rural poor in developing countries, risk having their safety and welfare compromised.

Other food system processes, such as food processing, distribution, acquisition, preparation and consumption, are as important for food security as food and agricultural production are. Technological advances and the development of long-distance marketing chains that move produce and packaged foods throughout the world at high speed and relatively low cost have made overall food system performance far less dependent climate than it was 200 years ago.

However, as the frequency and intensity of severe weather increase, there is a growing risk of storm damage to transport distribution infrastructure, with consequent disruption of food supply chains. The rising cost of energy and the need to reduce fossil fuel usage to reduce emissions are economic 'cost' that will rub off on production. These factors could result in more local responsibility for food security, which needs to be considered in the formulation of adaptation strategies for people who are currently vulnerable or who could become so within the foreseeable future.

4.2 Food security and climate change

Food systems exist in the biosphere, along with all other manifestations of human activity. Some of the significant changes in the biosphere that are expected to result from global warming will occur in the more distant future, as a consequence of changes in average weather conditions. The most likely scenarios of climate change indicate that increases in weather variability the incidence of extreme weather events will be particularly significant now and in the immediate future.

The projected increases in mean temperatures and precipitation will not manifest through constant gradual change, but will instead be experienced as increased frequency, duration and intensity of hot spells and precipitation events. Whereas the annual occurrence of hot days, and maximum temperatures are expected to increase in all parts of the globe, the mean global increase in precipitation is not expected to be uniformly distributed around the world.

In general, it is projected that wet regions will become wetter and dry regions dryer. For this analysis, a conceptual framework on climate change and food security interactions was developed to highlight the variables defining the food and climate systems. The climate change and food security (CCFS) framework (Table 1) shows how climate change affects food security outcomes for the four components of food security – food availability, food accessibility, food utilization and food system stability – in various direct and indirect ways.

Table 1

Potential impacts of climate change on food systems and food security, and possible adaptive responses

A CO2 fertilization effects				
Impact on food system assets	Impact on food system activities	Impact on food security outcomes	Impact on other human well being outcomes	Possible adaptive responses
Production assets: * Increase in availability of atmospheric carbon dioxide for plant growth	**Producing food** • More luxuriant biomass • Higher yields of food and cash crops, mainly in temperate regions	**Food availability (production, distribution, exchange):** " Increased food production in major exporting countries would contribute to global food supply but diversion of land from food to more economically attractive cash crops could negate this benefit **Food accessibility (allocation, affordabilitypreference):** • Increases in food production would limit price increases on world markets, but diversion of productive assets to other cash crops could cause food prices to rise	**Livelihoods** * Increased income from improved food and cash crop performance would benefit commercial farmers in developed countries but not in developing countries	**Policies and regulations** • Avoidance of subsidies or other monetary or non monetary incentives for diversion of food production assets to other uses

B. Increase in global mean temperatures

Impact on food system assets	Impact on food system activities	Impact on food security outcomes	Impact on other human well being outcomes	Possible adaptive responses
Production assets:. • Trend changes in suitability of land for crop and livestock production • Gradual loss of biodiversity • Trend changes in vectors and natural habitats of plant and animal pests and diseases Storage, transport and marketing infrastructure: • Strain on electricity grids, air conditioning and cold storage capacity	**Producing food:** • Immediate crop and livestock losses due to heat and water stress • Lower yields from dairy animals • Reduced labour productivity due to heat stress • Trend impacts uncertain, conditional on location, availability of water and adoption of new cropping patterns by farmers **Storing and processing of food:** • Upgrade in cooling and storage facilities required to maintain food quality at higher temperatures • Increasing energy requirements for cooling **Consuming food:** • Higher intake of liquids • Lower intake of cooked food • Perishable products have shorter shelf life • More need for refrigeration • Heat stress may negatively affect people's ability to access food (no energy to shop or do productive work)	**Food availability (production, distribution, exchange):** • Reduced production of food crops and livestock products in affected areas • Local losses could have temporary effect on local markets, • Reduction in global supplies likely to cause market prices to rise Food accessibility (allocation, affordability, preference): • Impacts on incomes, prices and affordability uncertain • Changes in preference uncertain **Food utilization (nutritional value, social value, food safety):** • Risk of dehydration • Risk of ill health from eating food that is spoiled • Ability of body to process food reduced due to heat stress or diseases Food system stability: • Higher cost for storing grain and perishable products	**Livelihoods:** • Trend changes in vectors and natural habitats of pests and diseases that affect human health and productivity Social values and behaviours: • Acceptance of a greater degree of risk and uncertainty as a natural condition of life National and global economies: • Reorientation of public and private sector investments towards mitigating and adapting to climate change	**Policies and regulations** • Greater reliance on weather-related insurance Development of risk management frameworks Farming, forestry and fishery practices • Trend changes in cropping patterns • Development and dissemination of more heat tolerant varieties and species Food processing, distribution and marketing practices • Greater use of alternative fuels for generating electricity Food preparation practices • Greater use of alternative fuels for home cooking

C.1. Gradual changes in precipitation (increase in the frequency, duration and intensity of dry spells and droughts)				
Impact on food system assets	Impact on food system activities	Impact on food security outcomes	Impact on other human well being outcomes	Possible adaptive responses
Production assets:. • Loss of perennial crops and vegetative cover for grazing and fuel wood due to water stress and increasing fire hazard • Loss of livestock due to water stress and lack of feed • Loss of productive assets due to hardship sales • Loss of buildings, equipment and vehicles and other productive assets due to fire • Changes in rates of soil moisture retention and aquifer recharge Trend changes in suitability of land for crop and livestock production • Gradual loss of biodiversity • Trend changes in vectors and natural habitats of plant and animal pests and diseases Food preparation assets • Lack of water for cooking • Lack of vegetation for fuel	**Producing food:** • Immediate crop and livestock losses due to water stress • Trend declines in yields • Change in irrigation requirements Storing/processing of food: • Less need for chemicals to preserve stored grain • Scarcity of water for food processing Distributing food: • Easier movement of vehicles on dry land Consuming food: • May not be possible to continue growing preferred foods • May be necessary to purchase a larger proportion of foods consumed • Diet may become less varied and / or less nutritious	**Food a vailability (production, distribution, exchange):** • Declines in production • Wild foods less available • Pressure on grain reserves • Decrease in food exports / increase in food imports • Increased need for food aid Food accessibility (allocation, affordability, preference:) • Local increase in food prices in drought-affected areas • Loss of farm income and non-farm employment • Preferred foods not available or too costly Food utilization: • Risk of dehydration • Ability of body to process food reduced due to diseases • Dietary adjustments with different nutritional content Food system stability: • Greater instability of food supply, food prices and agriculturally-based incomes	**Livelihoods:** • Decline in expenditure for other basic needs, e.g. clothing, shelter, health, education • Trend changes in vectors and natural habitats of pests and diseases that affect human health and productivity Social values and behaviours: * Food scarcity strains ability to meet reciprocal food-sharing obligations National and global economies: * Strain on national budgets and aid resources due to increased need for food safety nets	**Policies and regulations** • Greater reliance on weather-related insurance • Development of risk management frameworks Infrastructure investments • New investment in irrigation for intensive agriculture where water resources permit Farming, forestry and fishery practices • Trend changes in cropping patterns • Development and dissemination of more drought-tolerant varieties and species • Use of moisture-retaining land management practices • Use of recycled wastewater for irrigation Food processing practices: • Use of recycled wastewater • Use of dry processing and packaging methods Food preparation practices • Use of dry cooking methods

C.2. Gradual changes in precipitation (changes in timing, location and amounts of rain and snowfall)

Impact on food system assets	Impact on food system activities	Impact on food security outcomes	Impact on other human well being outcomes	Possible adaptive responses
Production assets: • Changes in rates of soil moisture retention and aquifer recharge • Increase in proportion of global population exposed to water scarcities • Changes in locations where investment in irrigation is economically feasible • Trend changes in suitability of land for crop and livestock production • Trend changes in vectors and natural habitats of plant and animal pests and diseases	***Producing food:*** • Trend impacts on yields uncertain, conditional on location, availability of water and adoption of new cropping patterns by farmers ***Consuming food:*** • Changes in consumption patterns may occur, in response to changes in relative prices	***Food availability (production, distribution, exchange):*** • Some local losses virtually certain, but their likely geographic distribution is not known • Likely impact on global supplies, trade and world market prices is not known Food accessibility (allocation, affordability, preference): • Full-cost pricing for water may cause food prices to rise ***Food system stability:*** • Greater instability of food supply, food prices and agriculturally-based incomes is likely	***Livelihoods:*** • Changes in geographic distribution of vulnerability Social values and behaviours: • Acceptance of a greater degree of risk and uncertainty as a natural condition of life ***National and global economies:*** • Reorientation of public and private sector investments towards mitigating and adapting to climate change	***Policies and regulations*** • More aggressive support for efficient water management policies and water use regulations • Full-cost pricing for water Infrastructure investments: • New investment in irrigation for expanding intensive agriculture where available water resources permit Farming, forestry and fishery practices • Use of moisture-retaining land management practices • Use of recycled wastewater for irrigation Food processing practices: • Use of recycled wastewater for plant hygiene Food safety and preventive healthcare practices: • Use of recycled wastewater for home hygiene

D. Impacts of increase in the frequency and intensity of extreme weather events

(increase in annual occurrence of high winds, heavy rains, storm surges, flash floods and rising water levels associated with tropical storms, and prolonged heavy rains)

Impact on food system assets	Impact on food system activities	Impact on food security outcomes	Impact on other human well being outcomes	Possible adaptive responses
Production assets: Damage to standing crops Animals stranded • Increase in waterborne livestock diseases • Damage to buildings and equipment • Loss of stored crops ***Storage, transport and marketing infrastructure:*** • Damage to roads, bridges, storage structures, processing plants and electricity grids ***Non-farm livelihood assets*** • Damage to trade goods ***Food preparation assets*** • Loss of household food supplies	***Producing food*** Possibility of lower yields in flooded agricultural areas Increased soil erosion reducing future yields Processing food: Pollution of water supply used in processing food ***Distributing food:*** Disruptions in food supply chains and increase in marketing and distribution costs ***Consuming food:*** Reliance on emergency rations Possibility that preferred foods will be loess available in emergency situations and food variety will decrease Increased health risks from water-borne diseases may negatively affect people's ability to access food (no energy to shop or do productive work)	***Food availability (production, distribution, exchange):*** Possible decrease in surplus production in flooded agricultural areas Increased need for emergency distribution of food rations ***Food accessibility (allocation, affordability, preference):*** Possible increase in food prices Possible loss of farm income and non-farm employment, depending on extent of asset loss ***Food utilization (nutritional value, social value, food safety):*** Food safety is compromised by water pollution and damage to stored food Ability of body to process food reduced due to diseases	***Livelihoods:*** Decline in expenditure for other basic needs, e.g., clothing, shelter, health education Trend changes in vectors and natural habitats of pests and diseases that affect human health and productivity Changes in geographic distribution of vulnerability ***Social values and behaviours*** Acceptance of a grater degree of risk and Uncertainty as a natural condition of life ***National and global economies*** Reorientation of public and private sector investments towards mitigating and adaption to climate change	***Policies and regulations*** Development of weather related insurance schemes for storms and floods Development of risk management frameworks Support for resettlement schemes in low-risk areas ***Infrastructure investment:*** Useof practices that create more dense root mass to hold soil in place Development and dissemination of more flood tolerant varieties and species ***Food safety and preventive healthcare practices*** Provision for emergency water supplies

E. Impacts of greater w eather variability				
Impact on food system assets	**Impact on food system activities**	**Impact on food security outcomes**	Impact on other human well being outcomes	**Possible adaptive responses**
Production assets: • change in frequency and extent of pests and diseases	***Producing food:*** Increasing uncertainty Changing yields Changing land use patterns Viability of production systems may be undermined	***Food availability (production, distribution, exchange):*** Some local losses virtually certain, but their likely geographic distribution is not known Likely impact on global supplies, trade and world market prices is not known ***Food accessibility:*** Reduced yields may lead to loss of farm income, but this depends on market conditions ***Food system stability*** Greater instability of food supply, food prices and agriculturally-based incomes is likely	***Livelihoods:*** Decline in expenditure for other basic needs, e.g., clothing, shelter, health education Trend changes in vectors and natural habitats of pests and diseases that affect human health and productivity Changes in geographic distribution of vulnerability ***Social values and behaviours*** Acceptance of a grater degree of risk and Uncertainty as a natural condition of life ***National and global economies*** Reorientation of public and private sector investments towards mitigating and adaption to climate change	***Policies and regulations*** Greater reliance on weather related insurance Development of risk management frameworks ***Faming, forestry and fishery practices*** Trend changes in cropping patterns Changes in water management regimes

PLENARY SESSION 6

LAGOS STATE SUMMIT ON CLIMATE CHANGE

ENERGY IN AFRICA
Prospects for Sustainability

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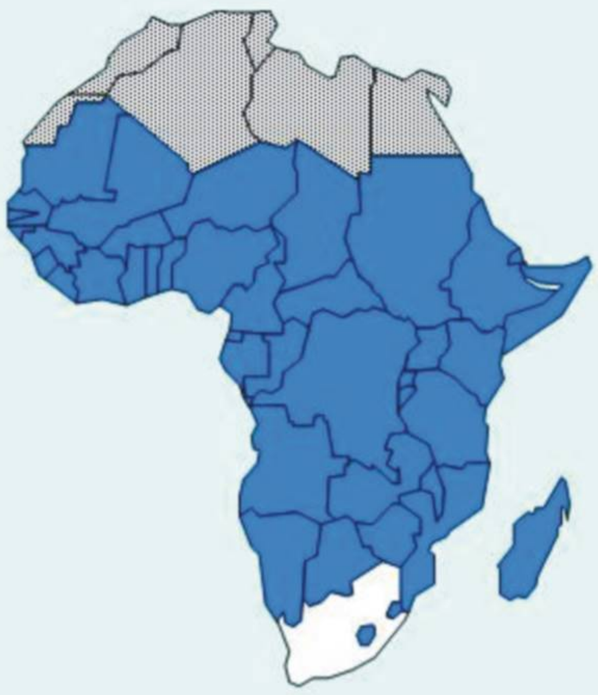
24-26 March 2009
Lagos, Nigeria
Lagos Maiden Summit on Climate Change

Outline

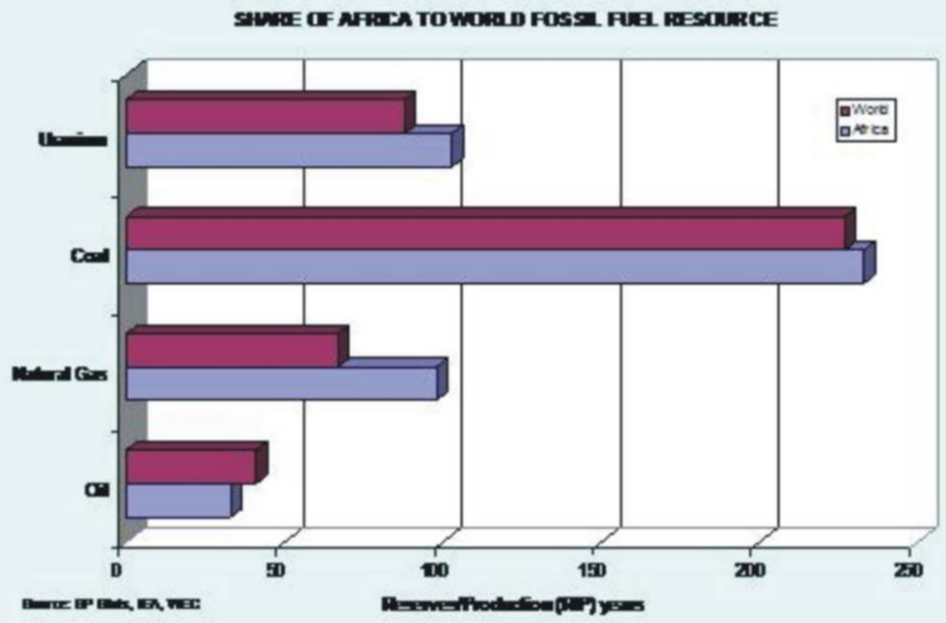


- Introduction
- Energy Sources
- Energy Demand
- Key energy challenges issues
- Existing Energy Projects
- Future Energy Projects
- Prospects for the Energy sector
- Conclusions

INTRODUCTION

- Africa's economy has been growing between 4-6% since the year 2000
- Energy provision has not kept pace with this economic growth
- Only few countries in the continent can satisfy their energy demand
- Hence, the energy supplies needed is massive if the continent should compete with other developing regions
- The continent has different fossil and renewable energy resources
- Developing all its energy resources including renewable energy will require overcoming major constraints and challenges

Substantial Energy Resources, but large Share remain unexploited



Growing Reserves of Oil and Gas in Africa

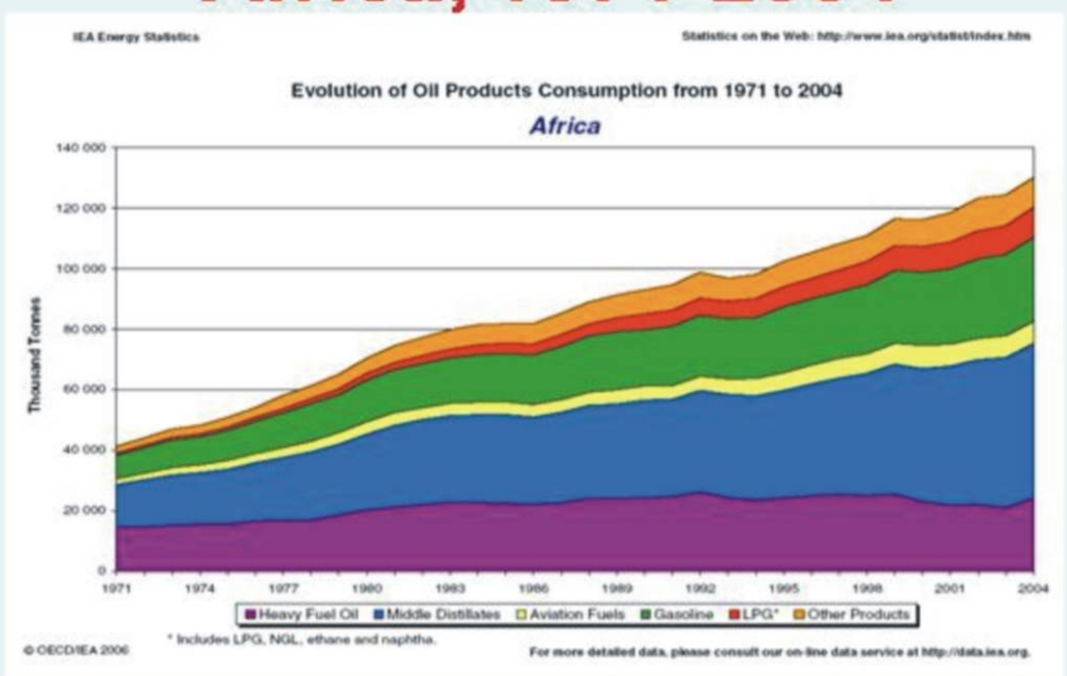
Fuel Source	1985 = 1.0	1995	2004	2005
Oil	1.0	1.28	2.0	2.01
Natural Gas	1.0	1.61	2.32	2.34

- Africa has about 9% of uranium, oil, gas and coal resources and significant renewable energy sources, the challenge is to exploit them for the benefit of Africans
- On an average, almost 70% produced is exported
- Energy sources largely skewed: Oil & Gas –West, Coal –South, Hydro& Geothermal-East and biomass and hydro- Central

Oil and Gas Proven Reserves in Africa

Country	Oil Reserves (billion barrels)	Oil Production (mb/d)	R/P (years)	Gas Reserves (tcu.m)	Gas Production (bcu.m)	R/P (years)
Algeria	12.2	2.015	16.6	4.58	87.8	52.2
Egypt	3.7	0.696	14.6	1.89	34.7	54.4
Libya	39.1	1.702	63.0	1.49	11.7	n.a
Tunisia	0.7	0.074	25.2	-	-	-
Nigeria	35.9	2.58	38.1	5.23	21.8	n.a
Angola	5.4	1.242	19.9	0.31	0.93	n.a
Equatorial Guinea	1.765	0.355	13.6	0.04	1.4	n.a
Sudan	0.6	0.379	46.3	0.09	0	-
Gabon	2.5	0.234	25.8	0.034	0	-
Congo-Brazzaville	1.5	0.253	19.3	0.091	0	-
Cameroon	0.4	0.06	n.a	0.11	0	-
Chad	0.9	0.173	14.3	0	0	-
South Africa	0.157	0.2308	n.a	0.037	3.11	n.a
Cote d'Ivoire	0.1	0.0538	n.a	0.03	1.43	n.a
Other Africa	0.4	0.07	12.0	0.46	0.13	n.a
Total	114.3	9.835	31.8	14.39	163.3	88.3

Consumption of Petroleum Products in Africa, 1971-2004



- Petroleum products consumption more than tripled between 1971 and 2004
- The use of LPG by both household and commercial sectors increasing
- Diesel grew far faster than petrol, while moderate growth for other fuels

Geothermal Resources in Africa

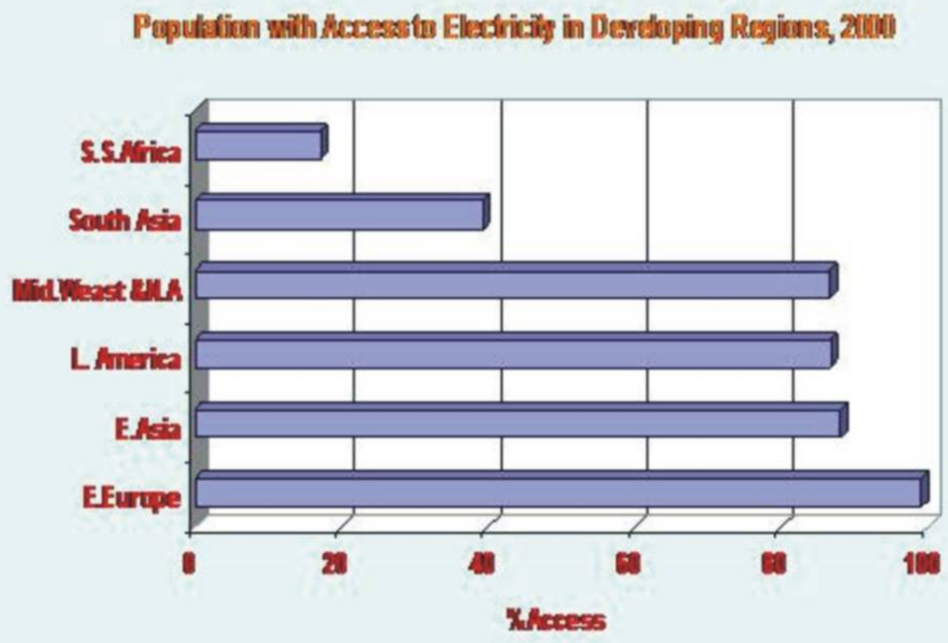
- **Significant potential along Rift Valley- 9,000MW in Kenya, Ethiopia, Tanzania, Uganda & other Rift Valley countries**
- **Less than 10% of geothermal resources exploited – huge potential for growth**
- **Kenya has installed geothermal power - KenGen 115 MW and IPPs 15 MW.**
- **Ethiopia has installed only 7 MW**

Electricity Production in Afica

- **80%** of electricity generation is from **fossil fuel** (mainly coal in S. Africa & Oil and gas in N. Africa)
- **17%** is from **hydropower** (7% of continent's potential)
- **2.5%** is from **nuclear** (S. Africa)
- **0.5%** is from non-hydro **renewable energy** (geothermal, biomass, solar, etc)

Electricity Access in Africa is very low

- **Electricity is crucial to the overall economic and social development of any region/country, but access in Africa is the least among developing regions, under 25%**
- **Average annual consumption lowest in the world, 515 kWh, while world average is 2326 kWh**
- **40% of electricity is used each by North & South, while the remaining 46 countries uses 20%**
- **Electricity access to rural areas is 9%**



Performance at the Power Sector

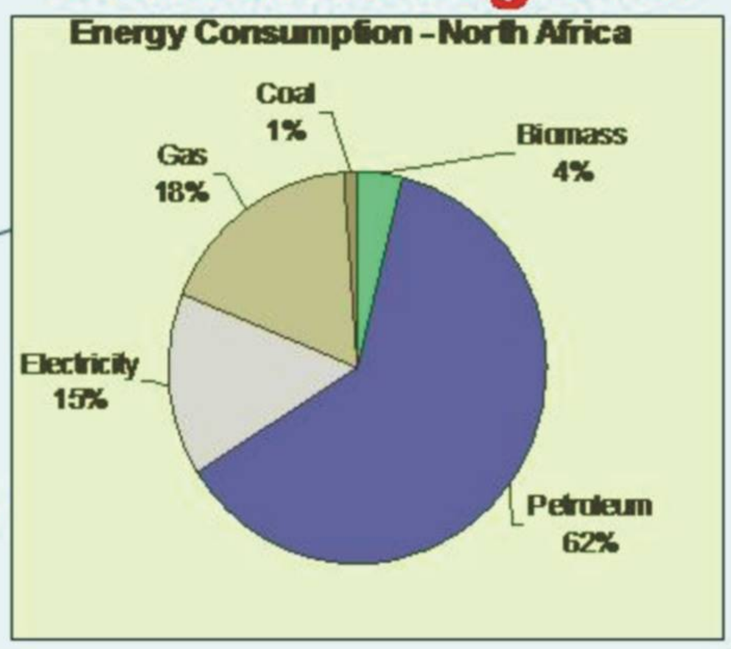
- **Poor financial performance**
  - ➢ Outdated or non-existent accounts (making it difficult for investors and lenders to establish if it is possible to make and collect money)
  - ➢ Negligible or negative rates of return
  - ➢ Poor cash collection; revenue outstanding of long periods
  - ➢ Outdated or non-existent accounts

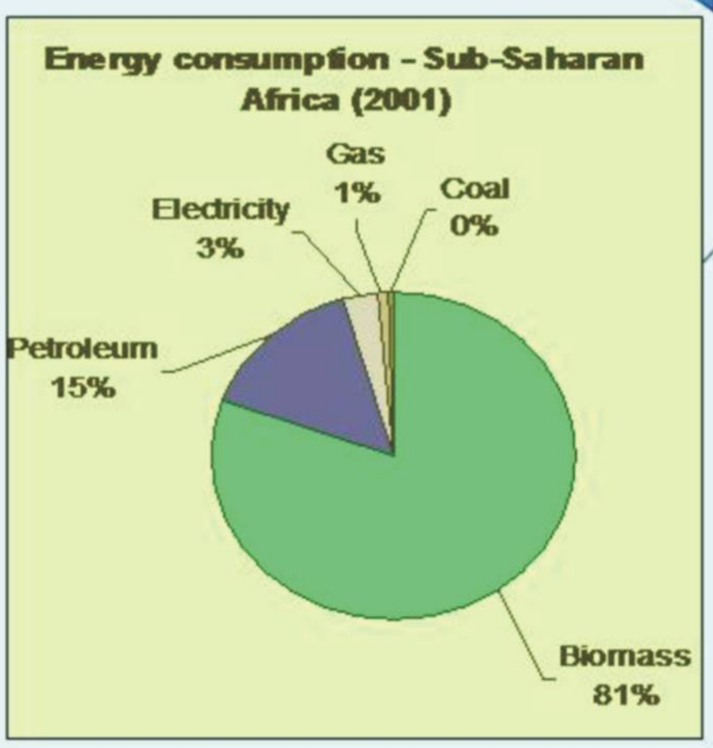
Power Sector Reforms in Africa

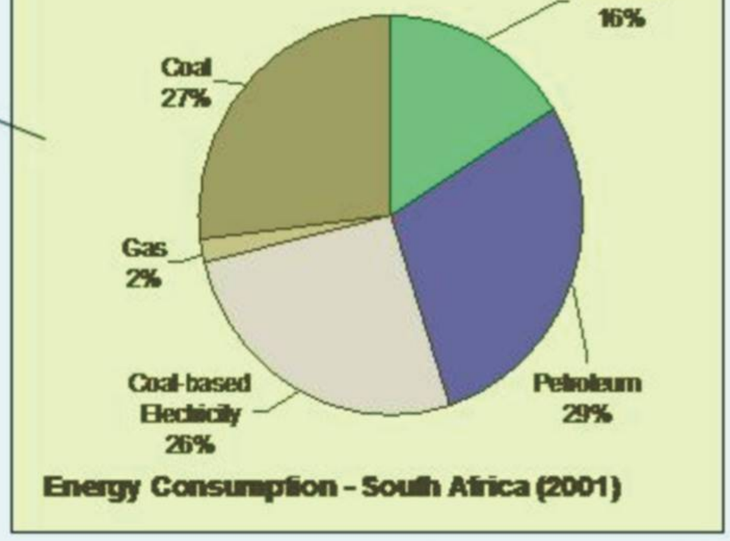
- **Impact of power sector reforms**
  - ➢ Have provided emergency and expensive generation
  - ➢ Not priority of electrification for the poor
  - ➢ Established weak regulatory agencies
  - ➢ Marginalised local private sector and yet failed to attract adequate foreign private sector investment (between 1990 and 2005 Africa attracted only 2% of global power sector investment finance with private participation)

African Energy Demand Sector – 3 distinct regions

- **North Africa – oil and gas sub-region**
- **South Africa – coal sub-region**
- **Sub-Saharan Africa – biomass region**
  - West – Oil & Gas
  - East - Geothermal, Hydro
  - Central – Hydro
  - South - Coal

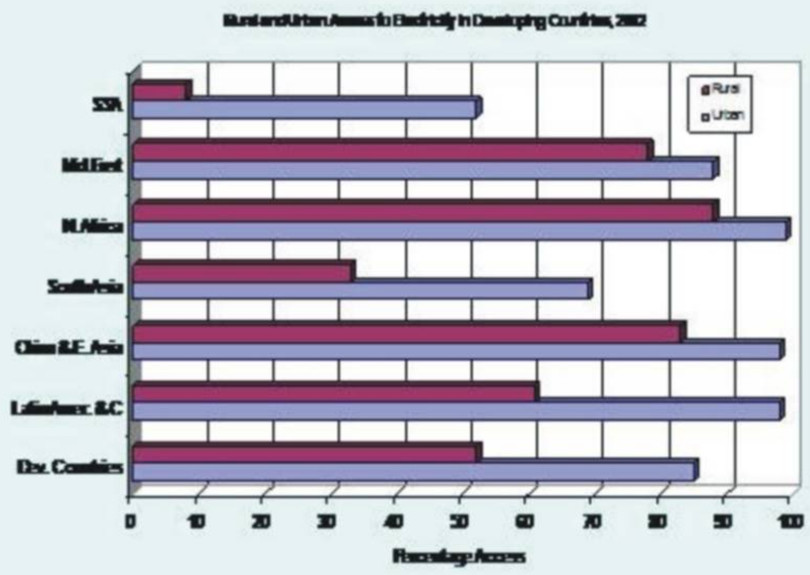


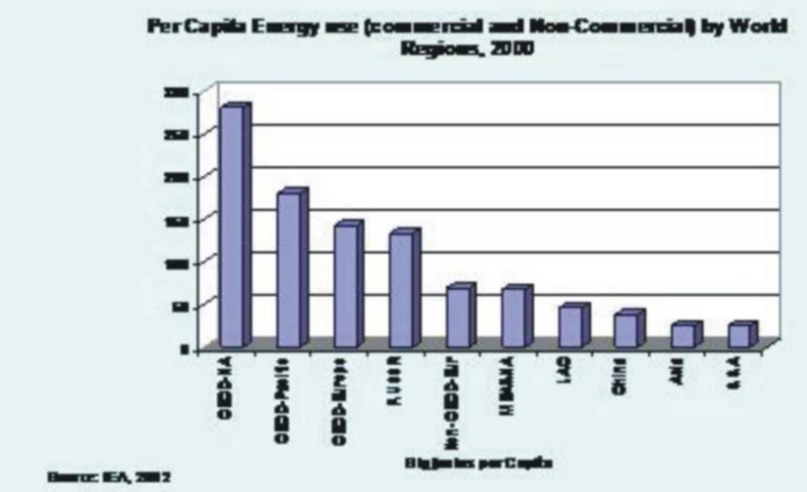




Energy Access in Urban and Rural Areas

- Use of energy sources in urban and rural areas not satisfactory
- Increase energy access is urgent for both areas, but more for rural
- Energy for production/enterprise (incl. SMEs)
- Stimulation of energy demand





Key Challenging issues for Energy Development in Africa 1

- **Reducing upfront cost of Renewable Energy systems**
  - Dedicated funding for poor and vulnerable that leave in remote areas
  - Reducing transaction cost in energy projects
- **Energy Infrastructure for viable energy sector**
  - Weak national and regional institutional capacity
  - Inadequate human resource
  - Poor information base
- **Energy RD&D**
  - Poor integration between energy R&D agenda and development objectives
  - Inadequate interests in fossil fuels

Key Challenging Issues for Energy Development in Africa 11

- **Linking global and local environmental issues**
  - Search for win-win solutions
  - Search for trade-offs
  - Climate change related problems
- **Substantial increase in energy access**
  - Abundant proven economic reserves
  - Search for technologies appropriate to local conditions
  - Search for financial investments
- **Energy security**
  - Control outside interests
  - Inadequate regional systems
  - Linking to environmental security

Energy Projects in the Region Continent-wide

- **African Union/NEPAD**
  - AFREC- Energy Information base with WEO and IEA
  - Energy policy
  - Power projects – Regional power projects
  - Gas and oil regional projects
- **Forum for energy ministers in Africa (FEMA)**
  - Advocacy for energy investments
  - Energy and MDGs
  - Energy security
- **AMCEN African Ministerial Conference on the Environment**
  - Energy and environment
  - Environmental challenges

Energy Projects: Sub Regional

- **ECCAS (Economic community of Central African States)**
  - PEAC Pool Energétique d'Afrique Centrale
  - Sinelac (Eastern DRC, Rwanda and Burundi mini pool)
- **COMESA (East Africa**
  - East Africa Power Pool (EAPP)
  - Tanzania-Zambia pipeline project
- **SADC**
  - Southern African Pool (SAPP)
  - Bio-fuels projects
  - Gas pipeline projects
  - Energy efficiency projects
- **ECOWAS (Economic community for W African States)**
  - WAPP (West African Power pool)
  - WAGP (West Africa Gas Pipeline)
  - WAOP (West African Oil Pipe line)
  - IEPF Institut de l'Energie des Pays Francophones
  - ABN- Niger basin authority
  - CILES (West African Solar energy system)
- **Nile Basin Initiative NBI (Egypt, Ethiopia, Kenya, Tanzania, Sudan, DRC, Rwanda, Eritrea, Uganda, Burundi)**
- **Many national projects**
  - Capacity building
  - Policies and strategies

Energy Projects – Multi/bi-laterals

- **United Nations Programmes**
  - UNDP – LPG, Bio-fuels, Capacity building
  - UNEP – Energy and Environment
  - UNECA – ADB/NEPAD –Energy planning
- **World Bank**
  - Energy reform
  - Energy infrastructure
  - Energy and Poverty:
- **Bilateral Programs**
  - France with former colonies
  - Denmark – Renewable and fossil fuel power projects
  - Norway-oil projects
  - Sweden-Renewable and energy planning
  - Burkina Faso - Priority Actions Program (PAP)
- **International Networks**
  - Global Network on Energy for Sustainable Development (GNESD
  - Global Village Energy Network (GVEP)
  - African Rural Energy Enterprise Development Training Programme (AREED)
  - Biomass Users Network
- **Régional R&D Centres**
  - Environnement et Développement du Tiers Monde (ENDA-TM), Sénégal.
  - The African Energy Policy Research Network/Foundation for Woodstove Dissemination (AFREPREN/FWD), Kenya

PROSPECTS IN THE ENERGY SECTOR 1

- **Provision of energy for cooking in urban areas**
  - LPG as an option (distributed and centralised) – Botswana, Sudan, Egypt
  - High quality kerosene stoves – South Africa
- **Development of Bio-fuels for power production and transportation**
  - Byproducts of sugar-Mauritius, Malawi, Zimbabwe, Kenya
  - Byproducts of agricultural products –palm products, coconut, etc
  - Constraints – competition with food, land and environmental issues
- **Development of Energy infrastructure**
  - Adequate regulatory system
  - Suitable toll road system
  - Energy efficiency centers

PROSPECTS IN THE ENERGY SECTOR 11

- **Renewable energy development**
  - Solar and wind system in Egypt
  - Rural electrification in Morocco
  - Solar system for flour industry in Kenya
- **Hydropower Development**
  - Development of Hinga dam in Congo – 100 GW
  - Completion of existing projects – 10,000 MW
- **Development of Fossil fuels**
  - Inter-country Pipeline projects
  - LNG projects in Angola, Nigeria, Egypt
  - Small production projects in emerging countries
  - Refinery developments projects – Sudan, Angola, Libya
  - Coal plants with CCS
- **Development of nuclear energy**
  - The small scale development in South Africa
  - Recent discussions by some countries – Namibia, Algeria, Egypt, Nigeria

PROSPECTS IN THE ENERGY SECTOR 111

- **Capacity development- Human resource**
  - Adequate skilled human resource
  - Suitable R&D and D personnel
- **Capacity Development – Institutions**
  - Energy negotiations
  - Oil and gas development
  - Training institutions
- **Energizing rural areas**
  - LPG programs
  - Rural electrification
  - Rural industries
- **Promoting Energy Investments**
  - Mobilising local investments –Equity development through shares and bonds
  - Improved co-ordination of external investments
  - Improved quality of aid

Mobilisation of Local Capital: Kenya

- **Government offered 30% to the public in 2006 of** about US$110million
- **Offer very successful, over-subscribed by** over US$200million
- **Finance raised without Government losing control of national asset**

Conclusions

- The increased economic growth in Africa, above 4% since 2000, 5.5% in 2006 and 6.2% expected for 2007 should be utilised effectively by improving the energy sector
- Increased attention by G8, China and India should be exploited for energy sector development
- Strengthening of the downstream end of the energy sector will fuel industrialisation and beneficiation from other commodities
- Policy concerns must be given a priority
- Rural areas development need special attention

Thank you for Listening

Further Contact:

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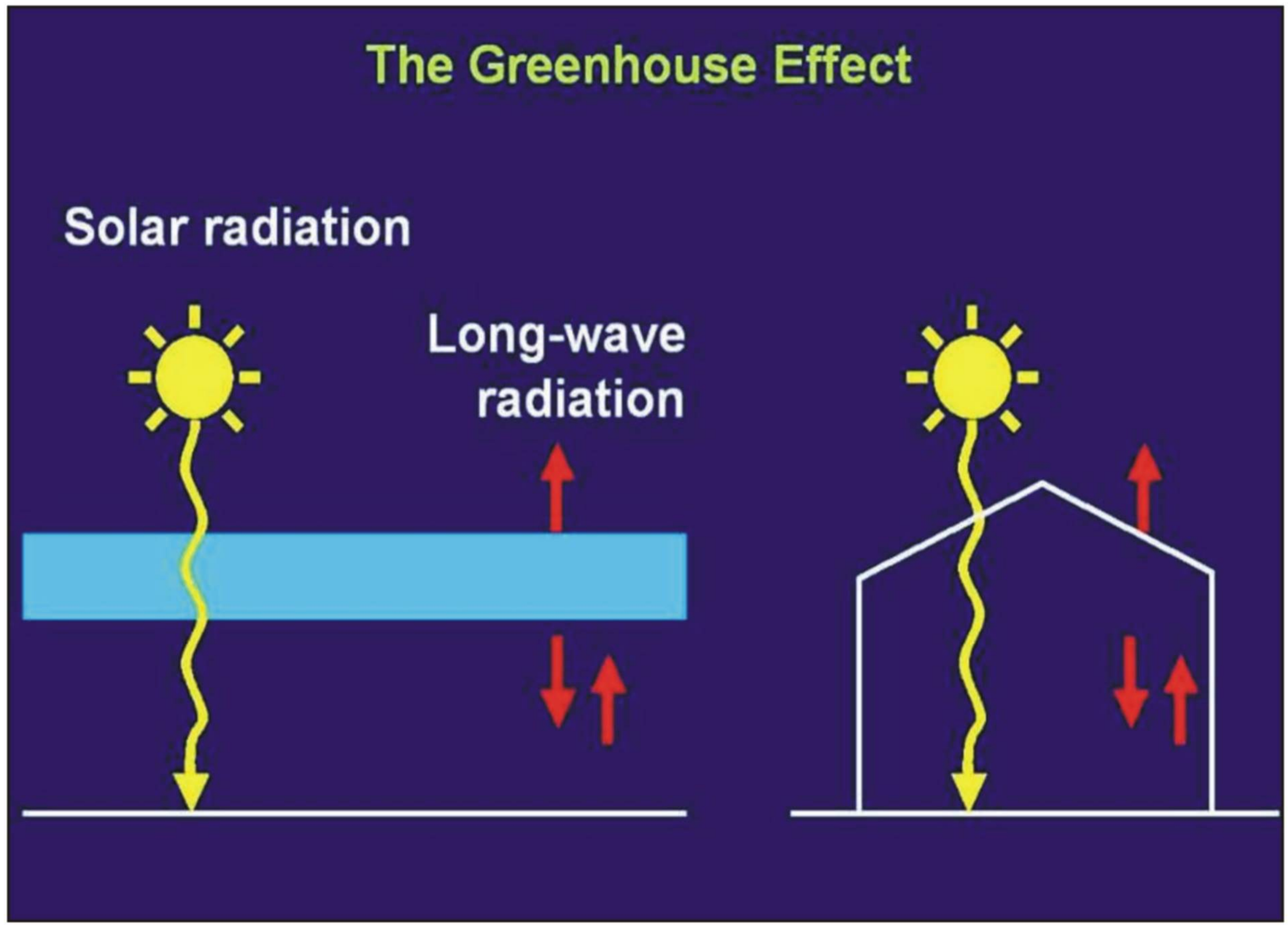
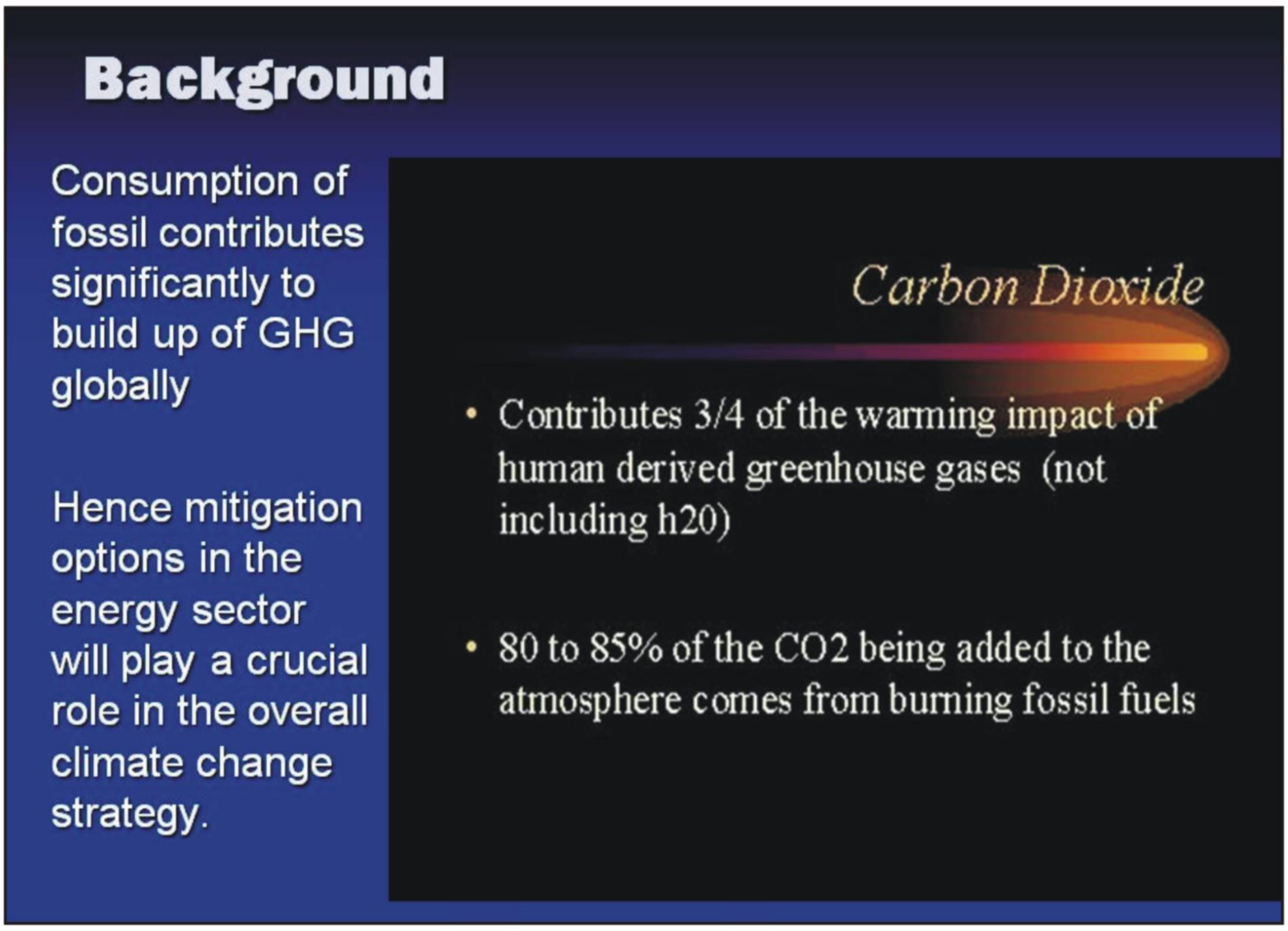
Climate Change and Energy: Issues and Prospect for Sustainable Development in Nigeria

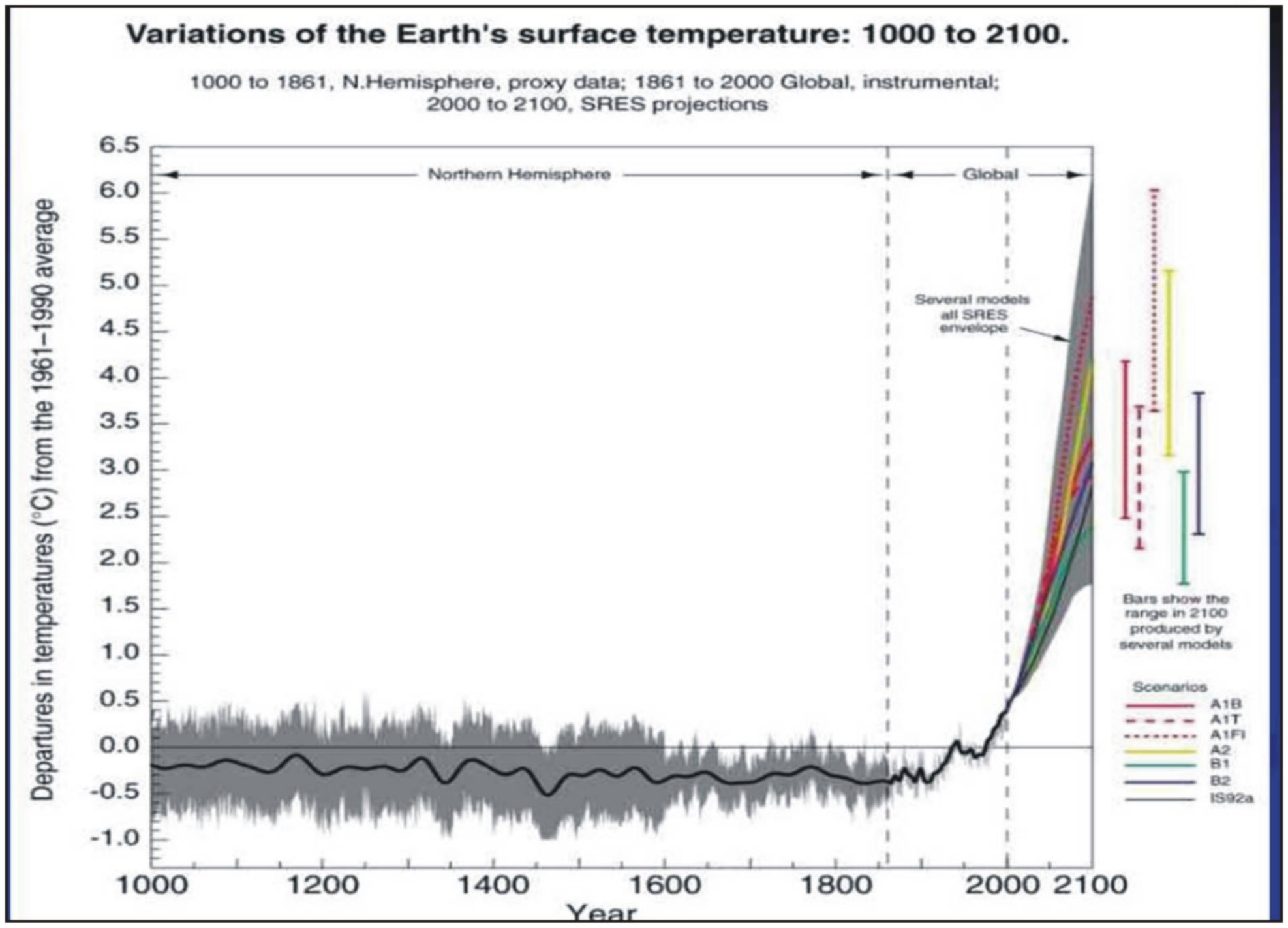
By

Professor Olusegun Adegbulugbe

Centre for Energy Research and Development
Obafemi Awolowo University, Ile-Ife, Nigeria


The Greenhouse Effect
Solar radiation
Long-wave radiation


Background
Consumption of fossil contributes significantly to build up of GHG globally
Hence mitigation options in the energy sector will play a crucial role in the overall climate change strategy.
Carbon Dioxide
• Contributes 3/4 of the warming impact of human derived greenhouse gases (not including h20)
• 80 to 85% of the CO2 being added to the atmosphere comes from burning fossil fuels



Two-Way Relationship between Mitigation and Sustainable Development

A. **Climate policy can have positive or negative effects on other factors**
   - –Ancillary benefits of co-benefits
   - CC → SD

B. **Non-climate policies can influence GHG emissions as much as specific climate policies**
   - –Requires mainstreaming climate change in decision-making.
   - SD → CC

Effects of Climate Policy on other Factors

CC → SD

Sustainable Development

- **Co-benefits of Climate Action (Country-specific)**
  - Reduced local air pollution
  - Better housing
  - Greater energy security
  - Energy access
  - Balance of trade benefits
  - Biodiversity benefits – with good forestry policy.

Energy and Climate Change

- Two levels
  - Energy Generation and Transportation
  - Energy Utilization
- The solutions should be addressed to both levels

Key Mitigation Technologies and Practices

- **Currently commercially available**
  - Energy Utilization efficiency
  - Energy supply and distribution efficiency
  - Fuel switching from coal to gas
  - Nuclear power
  - Renewable heat and power (hydropower, solar, wind, geothermal and bio-energy

Key Mitigation Technologies and Practices contd...

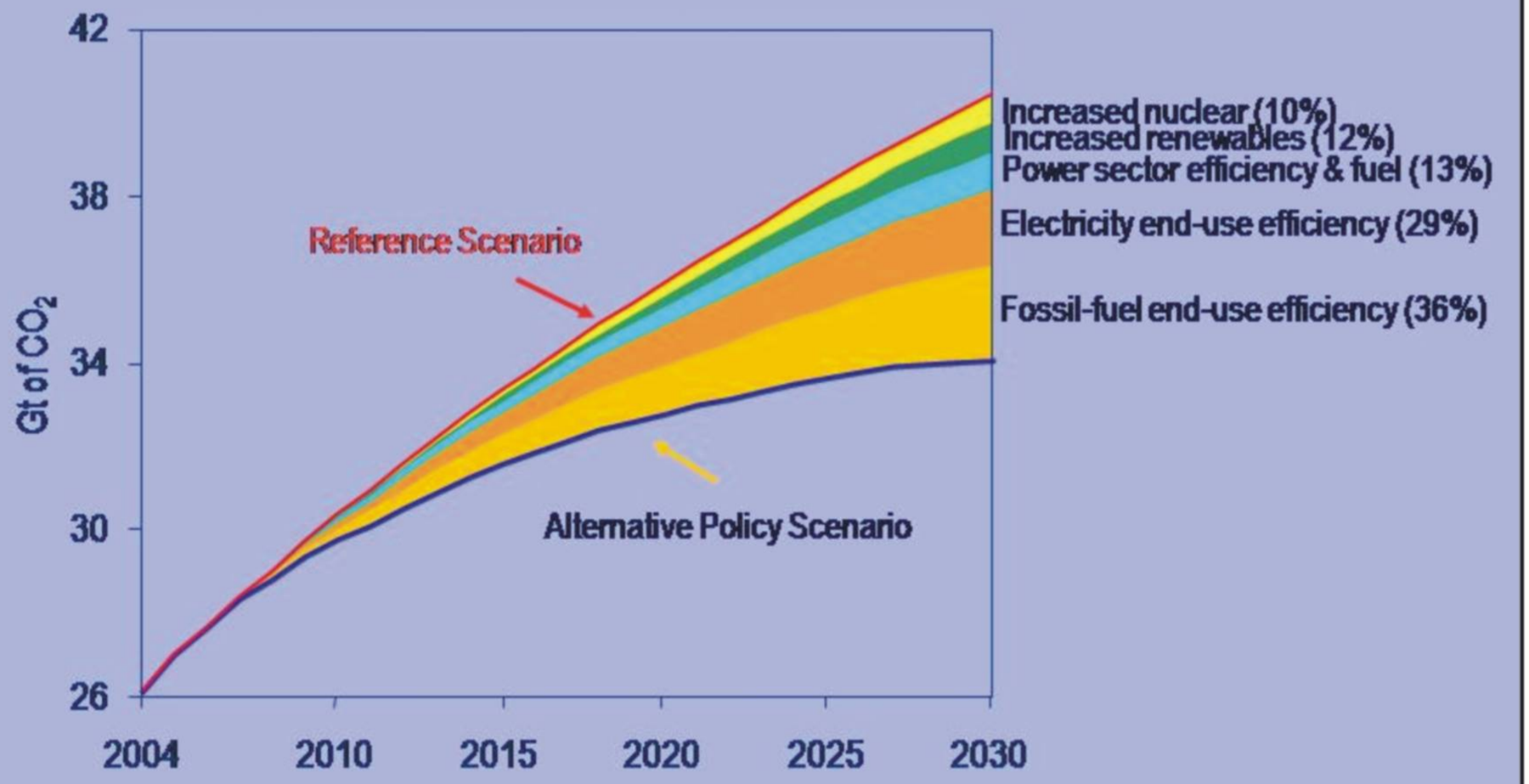
- **Projected to be commercialized by 2030**
  - Carbon capture and storage (CCS) for gas
  - Biomass and coal-fired electricity
  - Advanced nuclear power
  - Advanced renewable energy, including ocean energy, concentrating solar and solar PV.

Examples of options for Climate Mitigation

OPTIONS	SYNERGIES	TRADEOFFS
Energy: efficiency, renewables, fuel-switching	• air quality • supply security • employment • costs (efficiency)	• particulate emissions (diesel) • biodiversity (biofuels) • costs (renewables)
Forestry: reduce deforestation, plant trees	• soil protection • water management • employment • biodiversity (deforest.)	• biodiversity (plantations) • competition food production
waste: landfill gas capture, incineration	• health & safety • employment • energy advantages	• ground water pollution • costs

Alternative Policy Scenario:

Global Savings in Energy-Related CO_2 Emissions



Improved end-use efficiency of electricity & fossil fuels accounts for two-thirds of avoided emissions in 2030

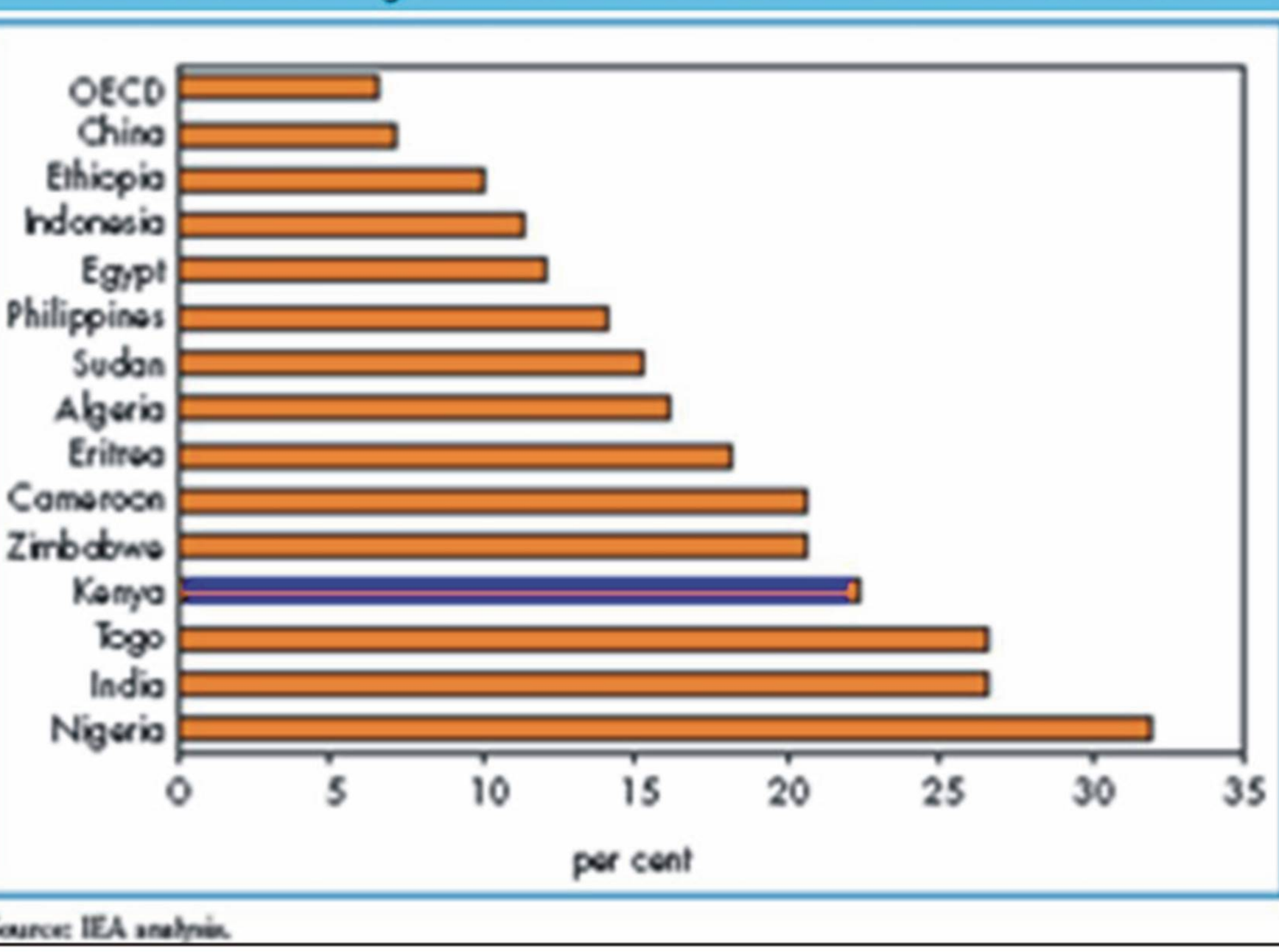
Opportunities for Mitigation Technologies in Nigeria

1. Energy Efficiency

- Considerable scope for more rational energy use in Nigeria

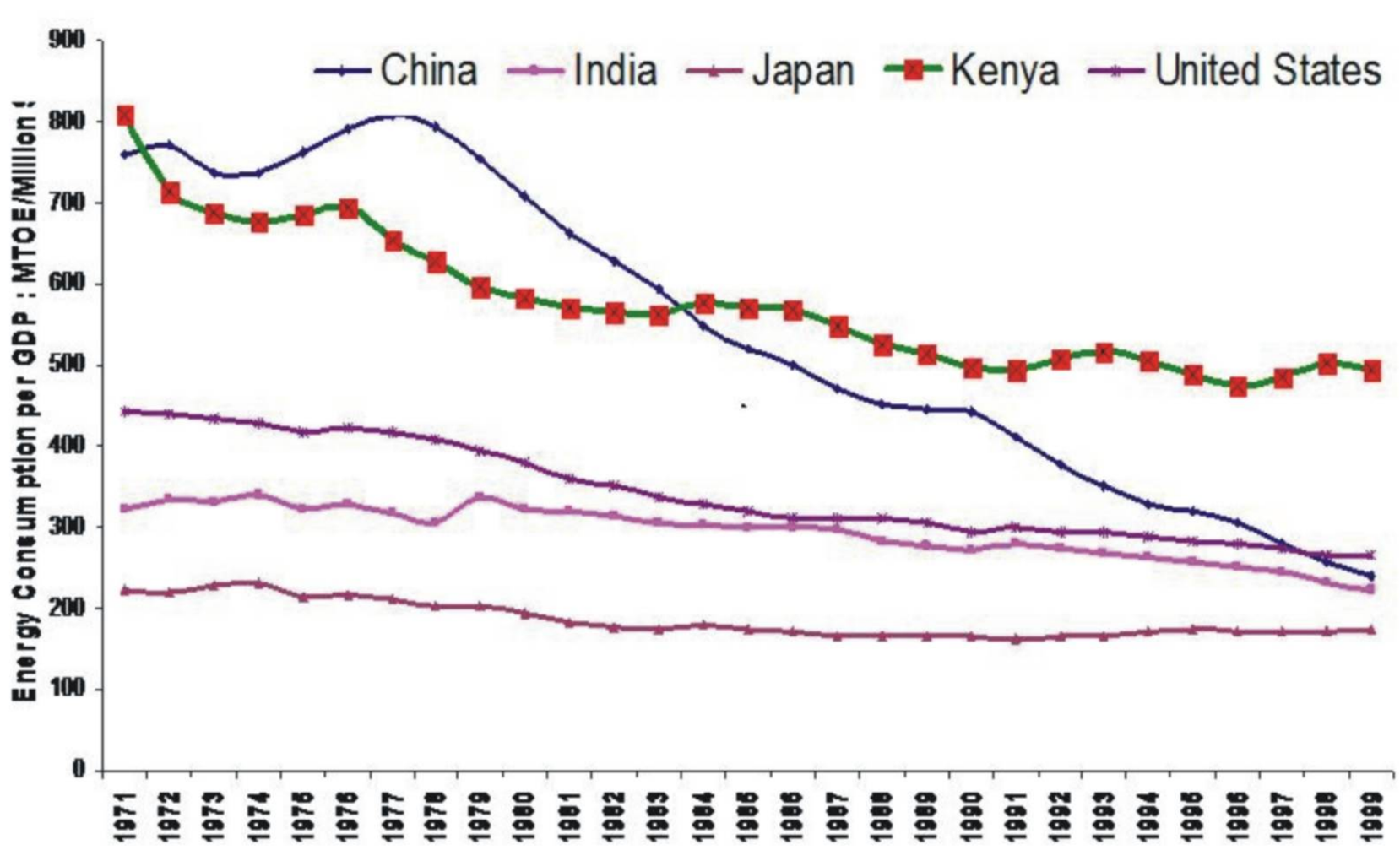
- Both supply side and demand side efficiency is low, e.g.
  - Supply side: High T & D losses >30%
  - Demand side: Boiler efficiencies in most industries are low

Electricity Losses across Africa



Source: IEA analysis.

Energy Intensity Vs GDP



Opportunities for Mitigation Technologies in Nigeria (contd.)

2. **Fuel switching**
   - Huge gas reserve provides ample opportunity to switch to lower carbon fuel
   - Challenges are:
     - the investment needed for gas infrastructure
     - institutional framework for the industry
     - pricing of gas, etc.

Opportunities for Mitigation Technologies in Nigeria (contd.)

3. Renewable Energy

- Opportunity for decentralized energy system exist e.g. Small Hydropower (SHP), Solar for water pumping, lighting etc., Wind Energy.
- Initial cost of devices is high but life cost is competitive with other energy sources.
- Integrated policy and vigorous implementation strategy is needed to facilitate rapid diffusion of RE in the nation's energy mix.

Other Consideration- Energy Resilience

- How is the Energy System organized to withstand Climate Change – or Shocks
  - Energy Mix – where are the dams
  - Where are the thermal generators
  - The energy transport system?
  - Where is the biomass? Crop resistance
- A need to review the entire energy policy..
- Ensure a strategic energy system

Strategic Initiatives to Mitigate Greenhouse Gas Emissions in Nigeria

Jerome Weingart

March 25, 2009

Lagos State Maiden Summit on Climate Change

jmweingart@aol.com

1

Strategic Initiatives

- End Niger Delta gas flaring and use the captured gas productively *This requires a political solution*
- Relamp the country with compact fluorescent lamps (CFLs) and LED lighting
- Create the enabling environment, tools, and capacity for energy-efficient retrofit of buildings and design of new buildings.

2

Dimensions of Niger Delta Gas Flaring

- 13% of the gas flared in the world comes from Nigeria
- 23 billion cubic meters / year
- Sufficient to meet Nigeria's energy needs and leave a healthy balance for export

Dimensions of Niger Delta Gas Flaring

- Life expectancy (40 years) in the Niger Delta is markedly lower than elsewhere in Nigeria.
- This is not surprising because of the toxic elements (including benzene) being released regularly into the atmosphere.
- Diseases related to gas flaring include asthma, bronchitis, cancers, blood disorders and skin diseases.

5

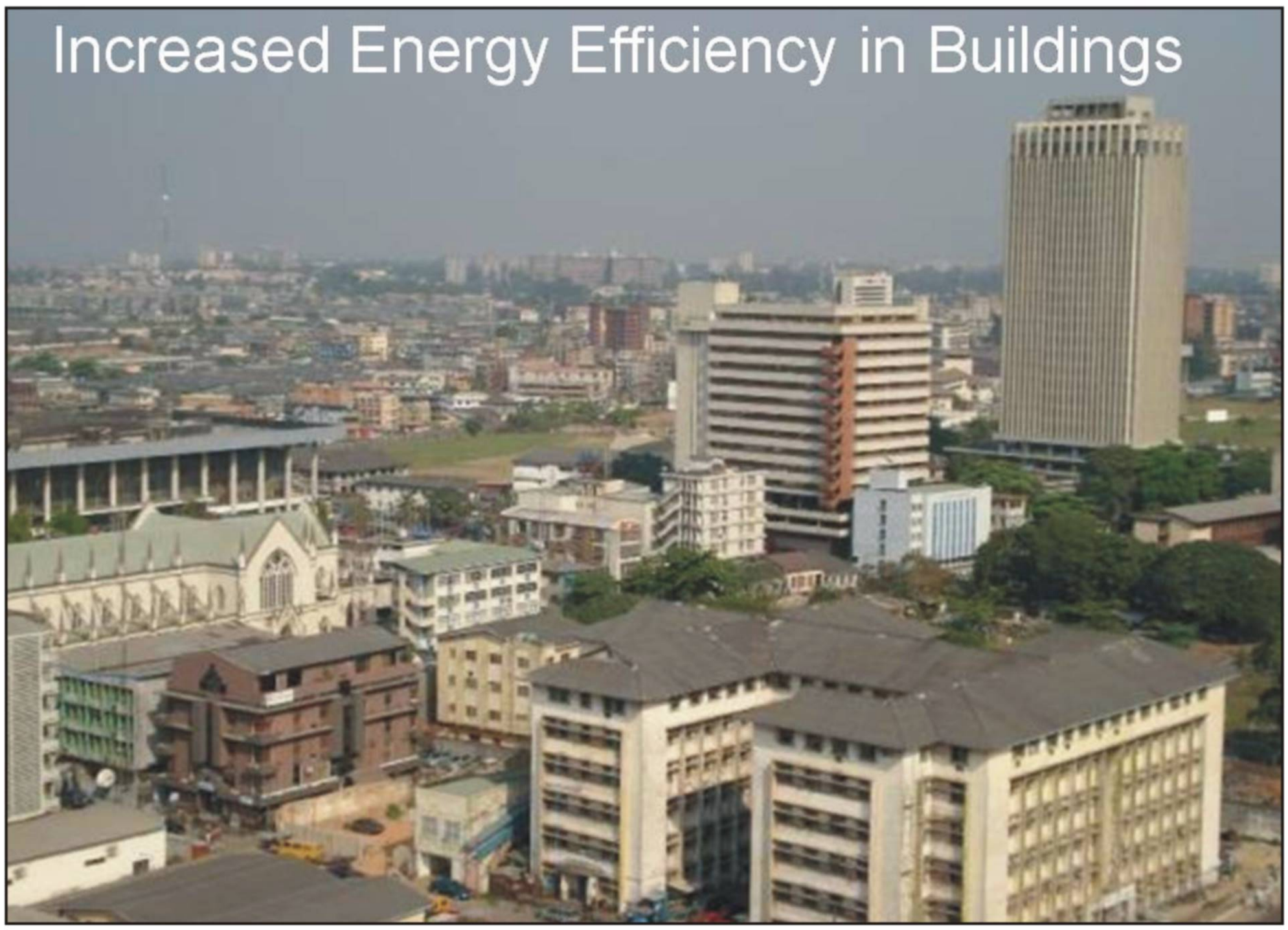
Dimensions of Niger Delta Gas Flaring

- Nitrogen and sulphur oxides from flares + atmospheric moisture ➔ acid rain.
- Acid rains wreak havoc on the environment – destroying crops and impacting human health.
- Continued degradation from oil spills and gas flares render the Niger Delta extremely vulnerable to the impacts of climate change:
- Projected loss of 50% ability to produce cereals by the year 2020 that would rise to 80% loss by 2050.

6

In the Warri North district of the Niger Delta, local Urohobo people bake "krokpo-garri" (tapioca) in the heat of a gas flare. Since 1961, when Shell opened this flow station, local residents have worked this way. Life span is short as pollutants from the flare cause serious health problems. From Curse of the Black Gold, by photojournalist Ed Kashi

7



Increased energy efficiency and peak demand management in buildings

- *Retrofit:* Annual energy demand reduction of 10 – 30% possible with attractive ROI
- *Retrofit:* Peak demand management saves expensive peak power generation (20 – 50%)

9

Increased energy efficiency and peak demand management in buildings

- *New buildings*: An energy-efficiency building code was developed for West Africa (UNDP/GEF project) and it is available for Nigeria.
- *New buildings*: 20 - 50% reductions in annual energy demand and in peak power demand

10

Increased energy efficiency and peak demand management in buildings

- Create enabling environment for efficiency
  - Building codes
  - Trained plan checkers and software to model energy and power in buildings
  - Capacity development for the building sector (public and private)
  - Access to capital including grant aid for true pilot projects (to lead the way)
- Collaboration with cities that have successful energy-efficient building programs (Singapore; Davis, California;…)

11

CFL- "Energy Saver Lamps" Based Demand Side Management (DSM) Programs

- Poland, Mexico (1995-1998, GEF support)
- Argentina, Czech Republic, Hungary, Latvia, Peru, Philippines, South Africa (2002-2005, GEF, ELI)
- Sri Lanka (1995), Vietnam (2001-2007, GEF)
- Uganda, Rwanda (2006-2007, WB)
- Ethiopia, Timor-Leste, Nigeria, Mali, Senegal, Burundi, Tanzania, Zambia, Morocco, Uruguay, Argentina, Mexico, Pakistan, Bangladesh...(2007-2008, WB)
- India, Indonesia, South Africa, Mauritius Ghana, China

Most large-scale CFL programs are driven by the objective of addressing peak power shortages, load shedding, etc.… Traditionally GEF support was used… more recently, Carbon Finance/CDM incentives are being considered.

Compact fluorescent lamps (CFLs)

- CFLs save consumers $30 in energy costs over the life of the bulb
- CFLs use at least 2/3 less energy than standard incandescent bulbs for the same light
- CFLs last up to 10 times longer.
- CFLs generate 70 percent less heat
  - safer to operate
  - reduce energy costs associated with cooling homes and offices.

13

Efficient Lighting in China

- China manufactures 70 % of the world's light bulbs
- Commitment (Oct 2007) to phase out incandescent light bulbs in favor CFLs
- ➔ could reduce global GHG emissions by 500 million tons annually
- Global Environment Facility (GEF) has pledged ~ $25 million for the China lighting program

14

If every U.S. household replaced one incandescent light with a CFL

- This would prevent 40 million tons of greenhouse gas emissions from power plants, equivalent to taking 7.5 million cars off the road.
- Americans would save enough energy to light more than 2.5 million homes

15

Relamp Nigeria with compact fluorescent lamps (CFLs) and LED lighting

- Emulate and improve on best practice experience in international intiatives
- Get capacity building and cofinancing from world Bank / IFC / GEF

16

Large Scale CFL Deployment Programs: Mainstreaming Carbon Finance and Clean Development Mechanism (CDM)

THE WORLD BANK

Ashok Sarkar
Energy Efficiency Thematic Leader, ESMAP
Energy, Transport and Water Department
The World Bank
Washington DC, USA.

Shanghai
May 13, 2008

PHASE-OUT 2008
Working Towards Global Phase-out of Inefficient Lighting

Key Program Features
Success Factors

- Quality/ Technical Specifications (life, voltage tolerance, lumens/watt, etc.)- international standards per ELI
- Cost of CFLs
- Warranty
- Awareness and promotion
- Collection of old incandescent lamps
- Elimination of duties and taxes
- Monitoring and Evaluation
- Sustainability- thru Private Sector participation

PHASE-OUT 2008
Working Towards Global Phase-out of Inefficient Lighting

PLENARY SESSION 7

CLIMATE CHANGE AND WASTE MANAGEMENT

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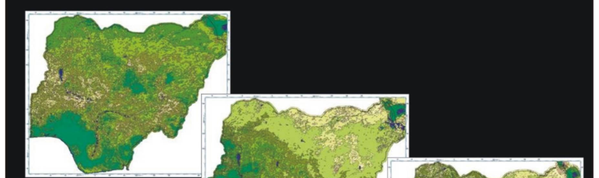
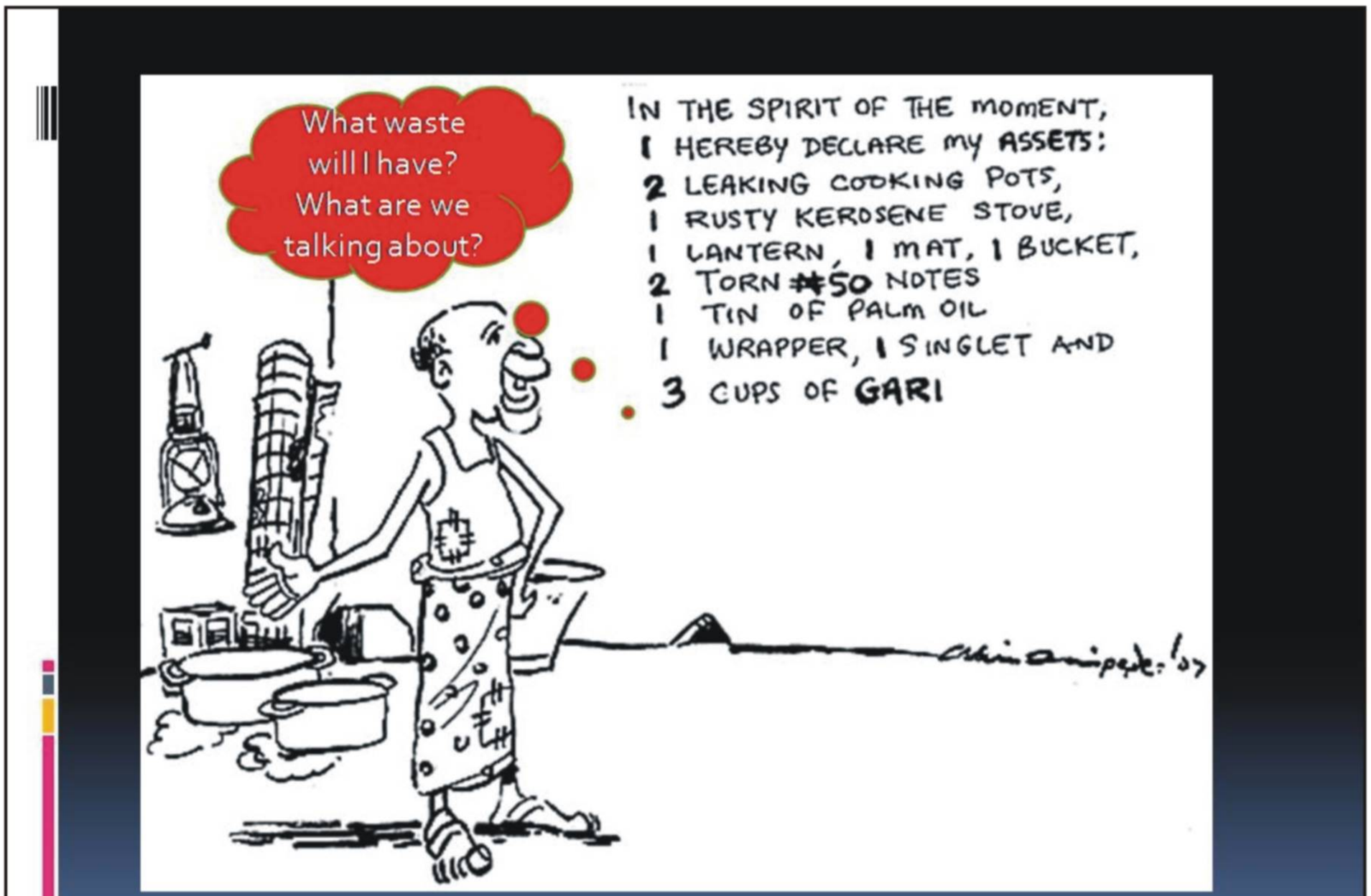
The UNFCCC sets an ultimate objective of stabilizing greenhouse gas emissions "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system".




What waste will I have? What are we talking about?
IN THE SPIRIT OF THE MOMENT,
I HEREBY DECLARE MY ASSETS:
2 LEAKING COOKING POTS,
1 RUSTY KEROSENE STOVE,
1 LANTERN, 1 MAT, 1 BUCKET,
2 TORN ₦50 NOTES
1 TIN OF PALM OIL
1 WRAPPER, 1 SINGLET AND
3 CUPS OF GARI
chinonipete '07

NIGERIA'S POVERTY LEVEL STILL HIGH DESPITE ECONOMIC GROWTH
- IMF
THE MORE MONEY WE MAKE, THE POORER THE MASSES BECOME.
$ BILLIONS
POLITICIANS
— chinonipete '08

Sewage: Activated Sludge Process,
(Guinness PLC, Lagos)

Anaerobic Digestion

Byproducts:
Biogas + Fertilizer
No Sewage for
>140 m
populations..!!!!

The Wastes: (generated @ 0.43kg/c/day)

Refuse Every Where

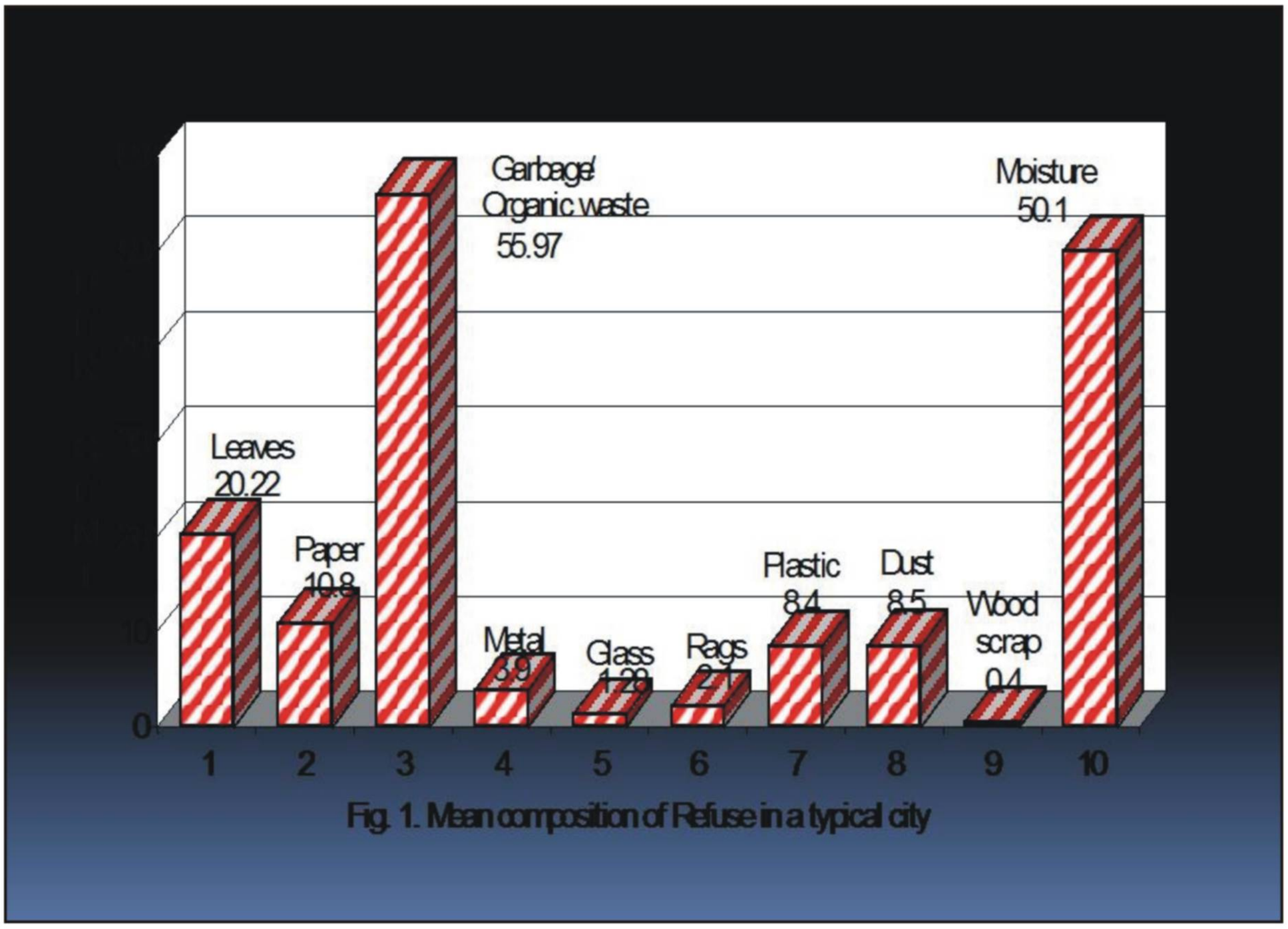
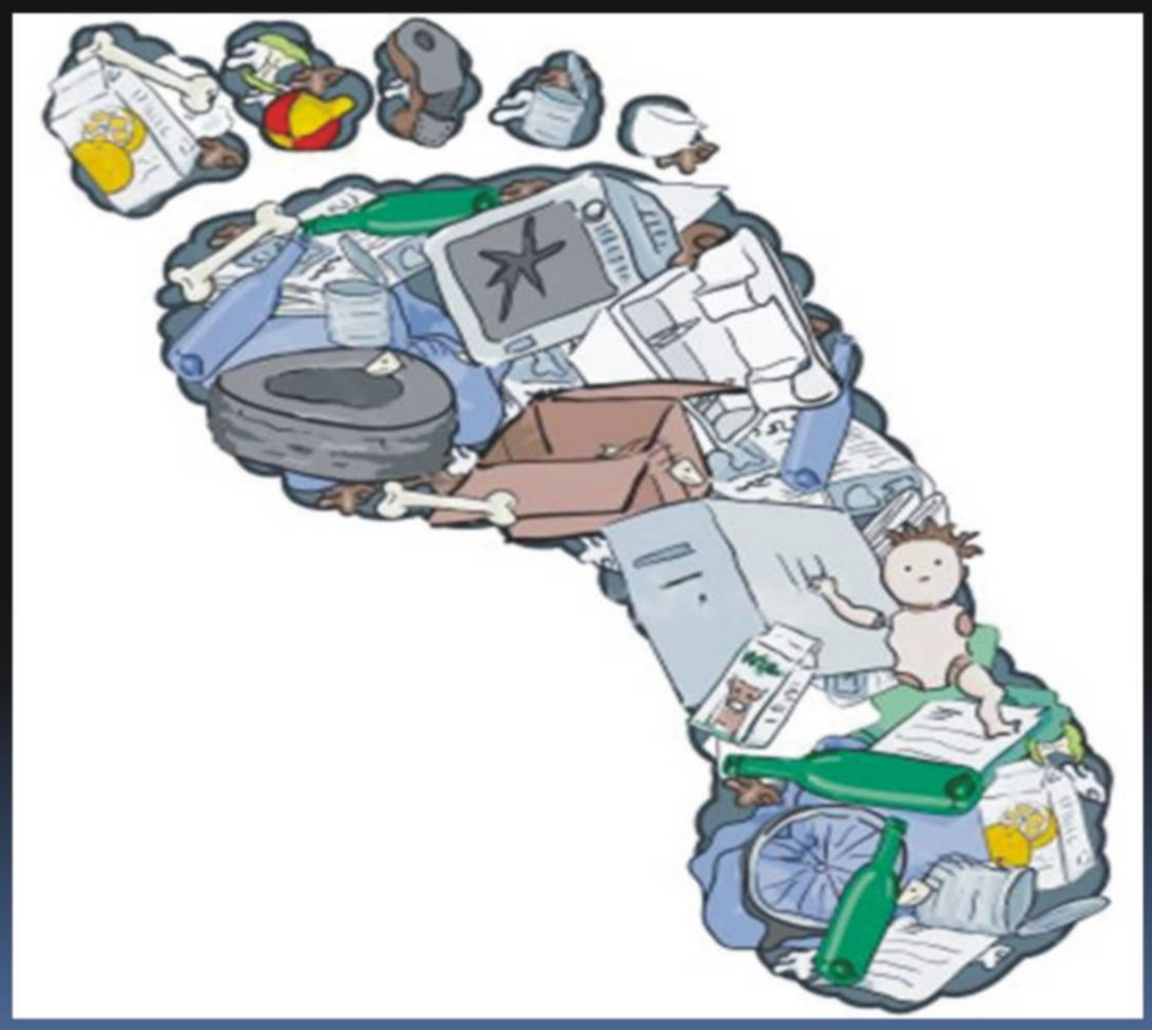


Fig. 1. Mean composition of Refuse in a typical city

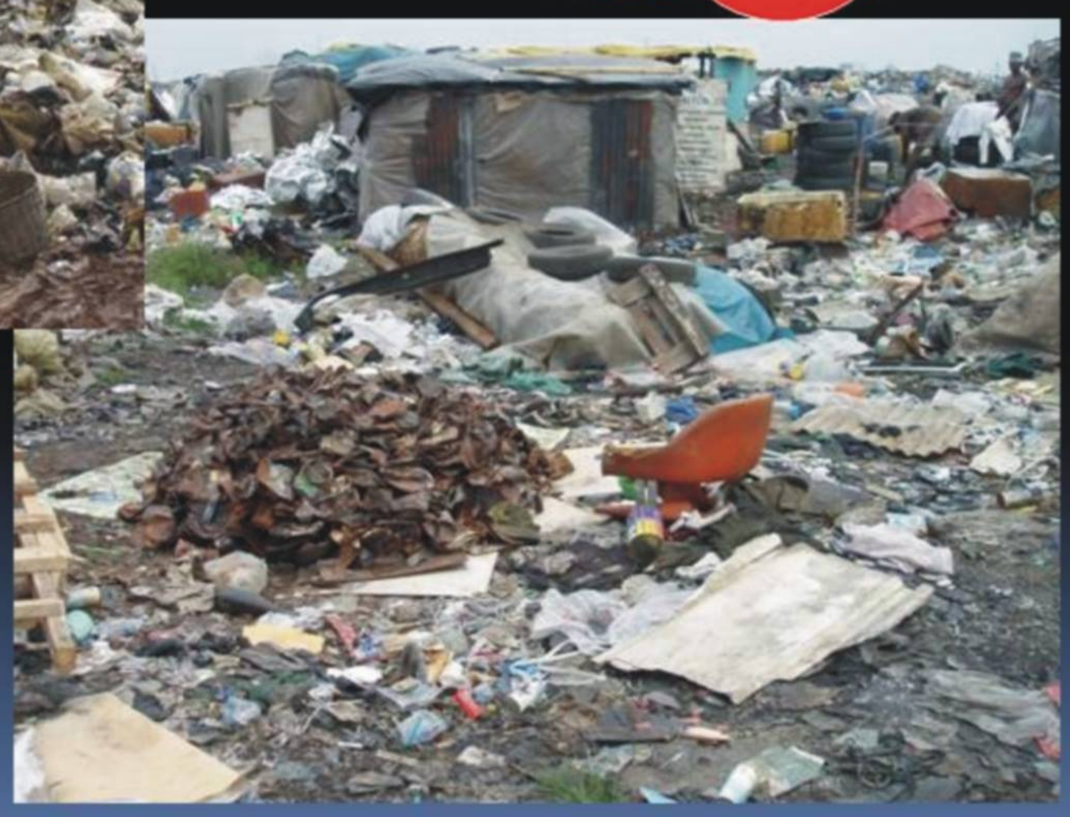
What is Nigeria's Garbage Footprint?



Many Faces of Solid Waste

Community Living + No Unemployment (Refuse Dumps, Lagos) Earn more than a Civil Servant

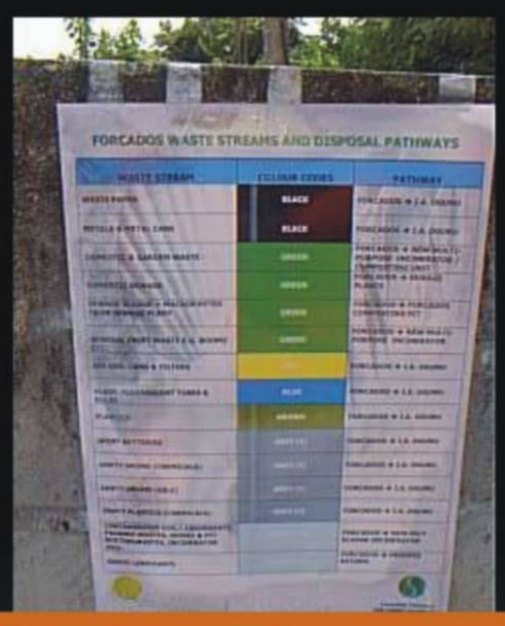
Olososun Dump Site: About 207 Trucks; 12,000 Tonnes per week; 3000 scavengers busy



Waste in Lagos: GHG Potential (May-June 2008)

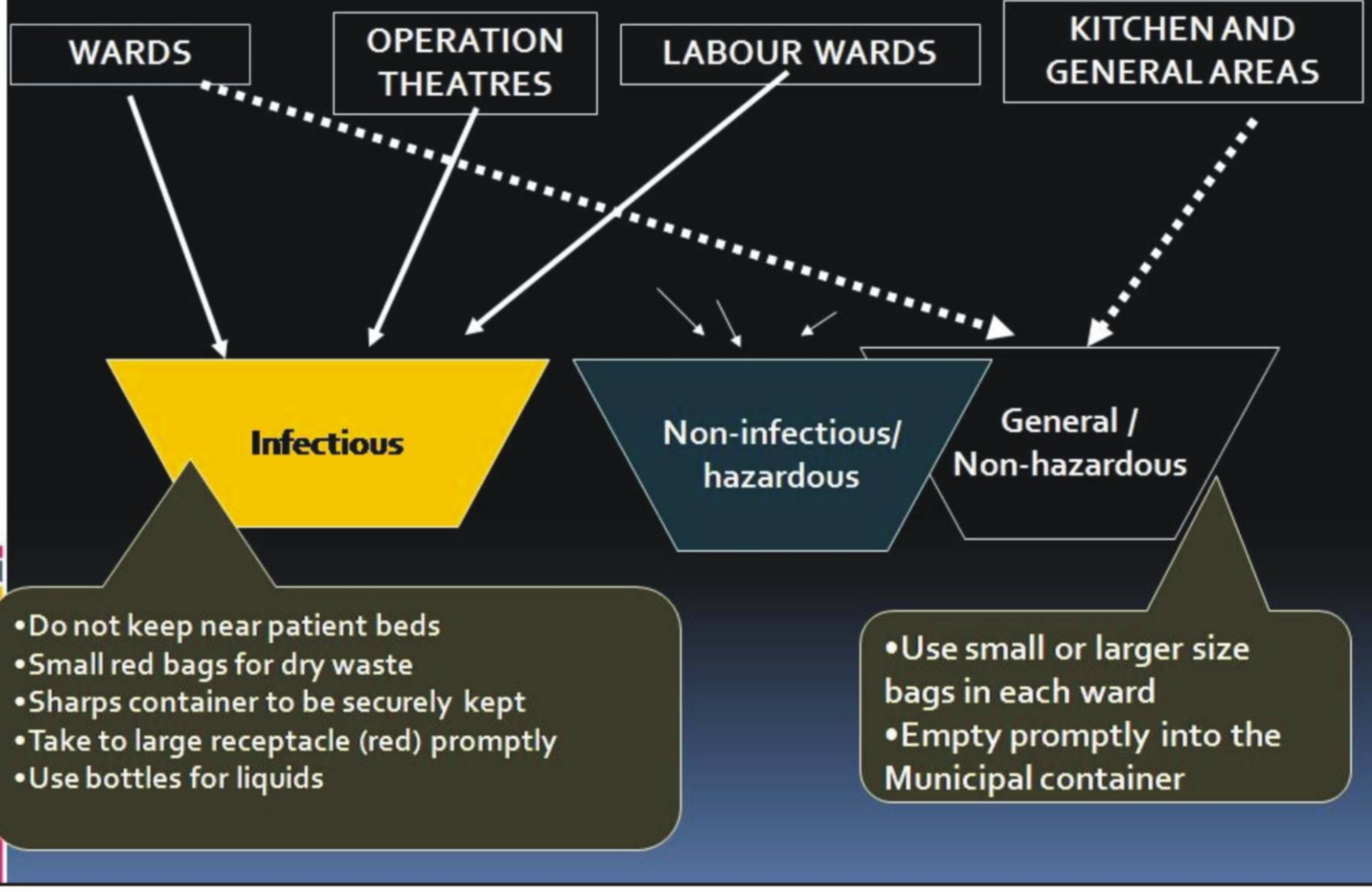
Waste Composition	Olusosun	Abule-Egba	Solous
Combustibles, %			
Textile	3	6	2
Wood	2	1	4
Plastic/Nylon	22	18	30
Rubber	18	27	25
Leather	25	23	21
Total	**70**	**75**	**82**
Non-combustibles, %			
Metal	14	18	12
Glass	5	7	5
Grit (Stone)	1	0	1
Total	**20**	**25**	**18**

Segregation of Wastes at Forcados
An Example

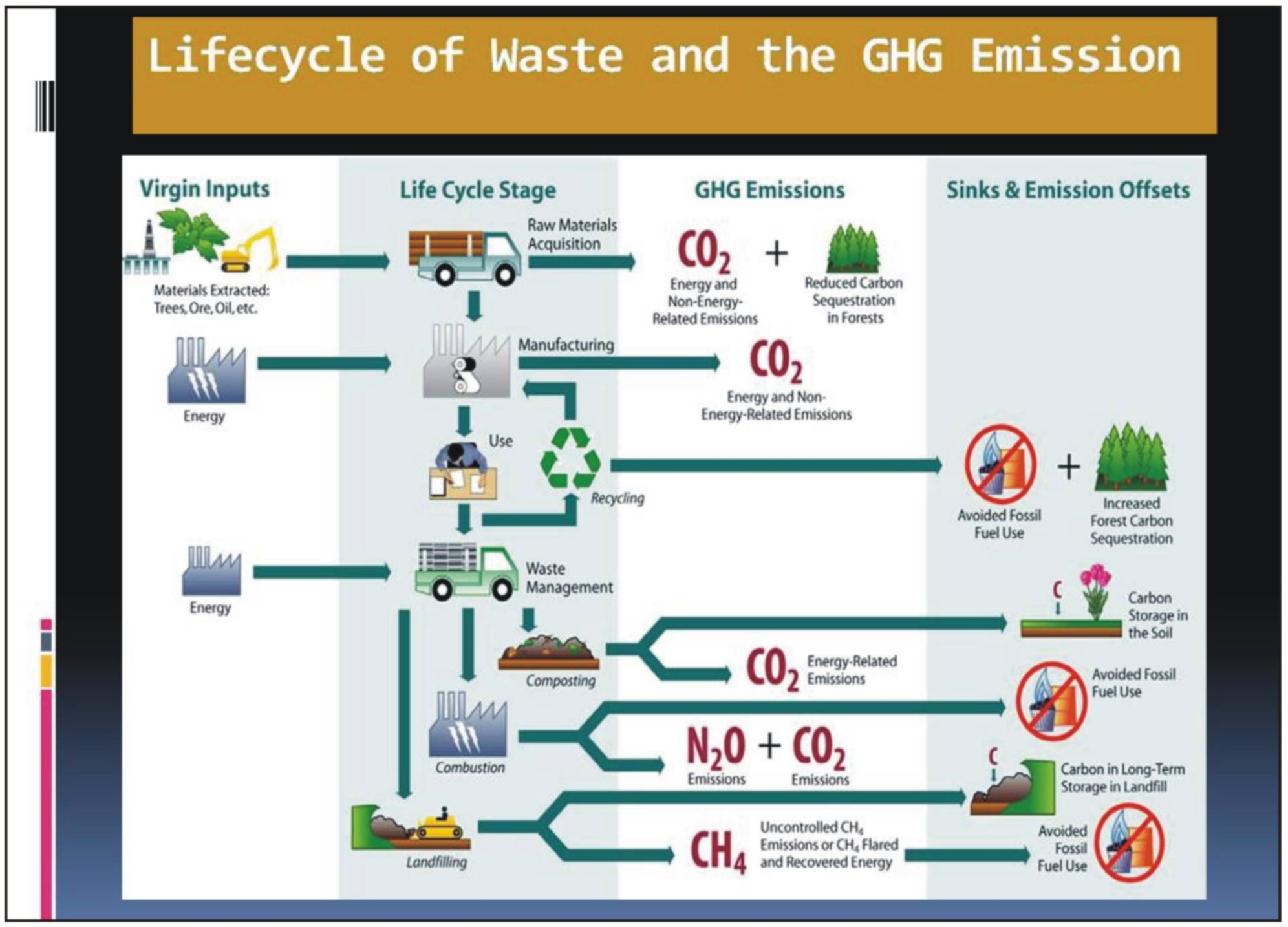


- Do you know that in Tokyo people separate recyclables into 27 categories,
- Two of which are socks that match and socks that don't?

Waste Segregation: Nigerian Colour Code for Healthcare wastes – a beginning for other wastes



Lifecycle of Waste and the GHG Emission



Waste management and the GHG emissions

Waste Reduction

- Decrease in GHG emissions
- Increase in forest carbon sequestration
- No emissions/sinks

Recycling

Decrease in GHG emissions due to lower energy requirements and avoids non-energy GHGs

- Increase in forest carbon sequestration
- Process and transportation emissions associated with recycling are counted in the manufacturing stage

Composting

- No emissions / Sinks
- Increase in soil carbon storage
- Compost machinery emissions and transportation emissions

Incineration

Non-biogenic CO2, N2O emissions, avoided utility, and transportation emissions

No change in raw material acquisition and manufacturing,

No change in soil or forest carbon storage

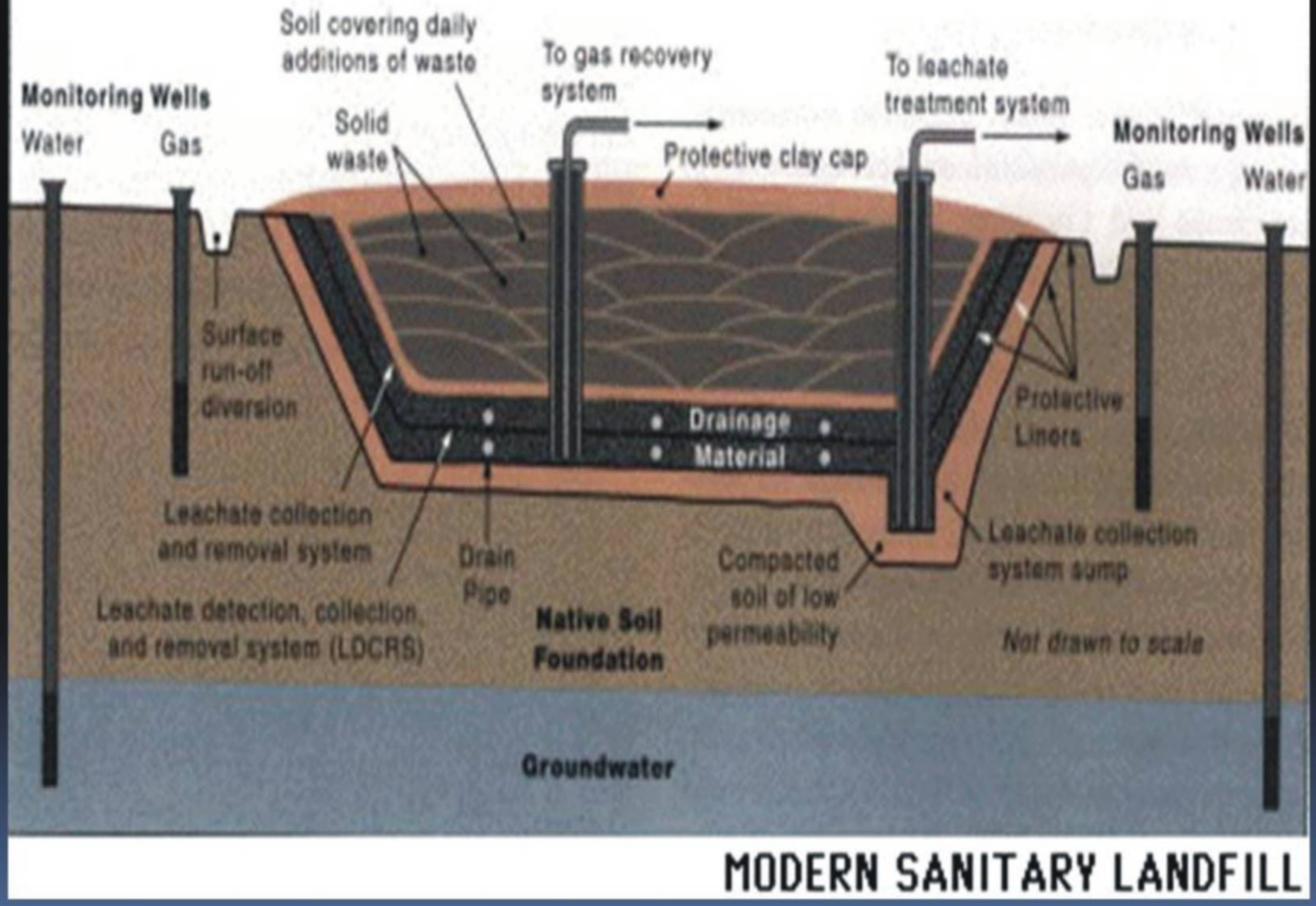
Land filling

CH_4 emissions, long-term carbon storage, avoided utility emissions, and transportation emissions

No change in raw material acquisition and manufacturing

No change in soil or forest carbon storage

To make the last option



MODERN SANITARY LANDFILL

Jobs per one million tons of waste processed

.....Ireland experience

Type of waste disposal	Number of Jobs
Landfill	40 - 60
Incineration	100 - 290
Composting	200 - 300
Recycling	400 - 590

Energy from Recycling, Not Energy from Waste Makes Sense!!

A Canadian study found the following figures for energy saved by recycling materials as opposed to burning them. The savings still apply when the energy used to transport materials for recycling is taken into account - this energy is relatively insignificant.

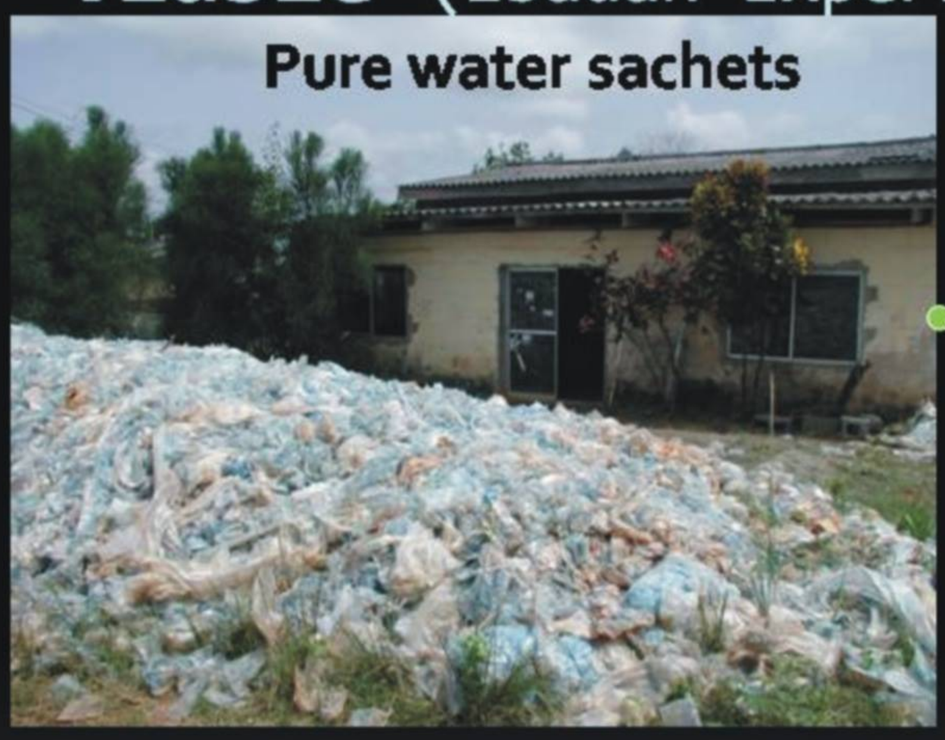
Material	Energy saved
Paper	3 times
Plastic	5 times
Textile	6 times
Food and garden waste	None

- By recycling substantial amounts of energy are saved.
- Recycling cuts out the energy consumption associated with the extraction and initial processing of raw materials.
- The recycling process itself is often more energy efficient than production from raw materials.
- Energy can be obtained from incineration, but this is less than can be saved by recycling.
- The most recent European waste strategy assumes that in general recycling is preferable to incineration in energy terms.

Urban Solid Wastes: Communities in Action

- Can communities be made to segregate into recyclables and degradables?
- Experimented with 8 communities in Lagos (Sari Iganmu and Ilaje Bariga) and Ibadan (Ayeye, Mapo, Eleta etc. 6)
- There is hope- there is money and some entrepreneurs can take up as challenge.

Plastics Recycling – Locally Viable (Ibadan Experience)



Plastics ware: plates, spoons, mugs, kegs, tubes, water pipes, ...many more

*Waste is in every urban centre

*Low Investment Technology

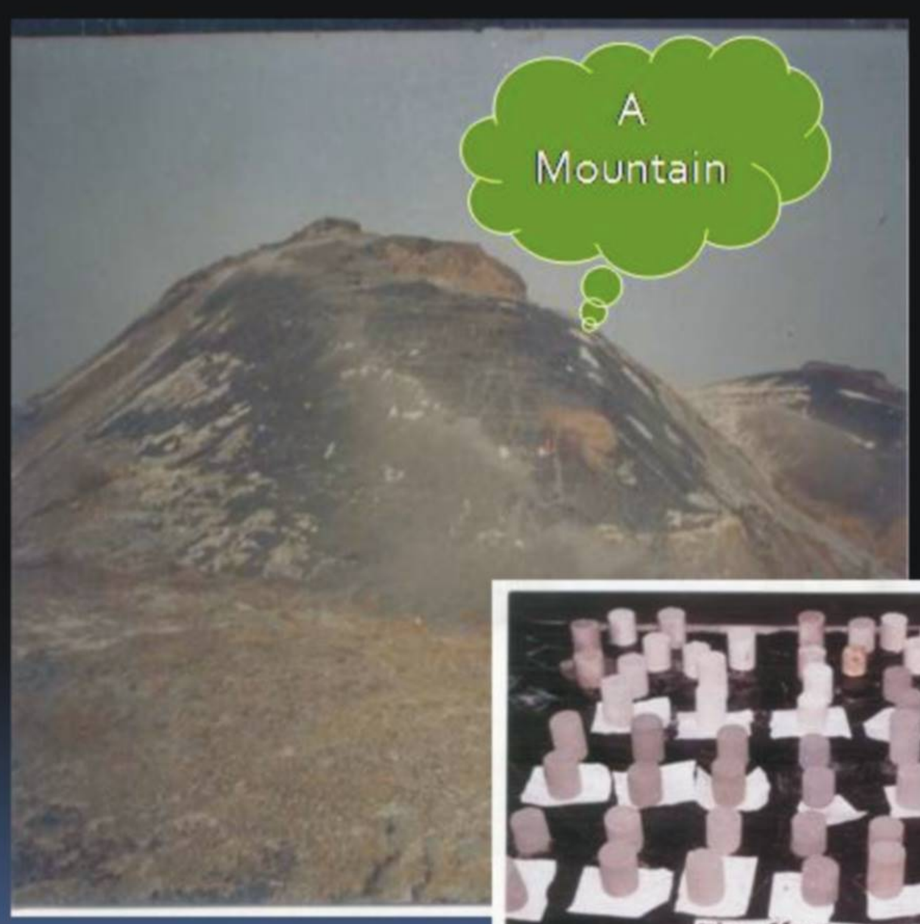
A Cheap Grinder in a Plastic Recycling Plant

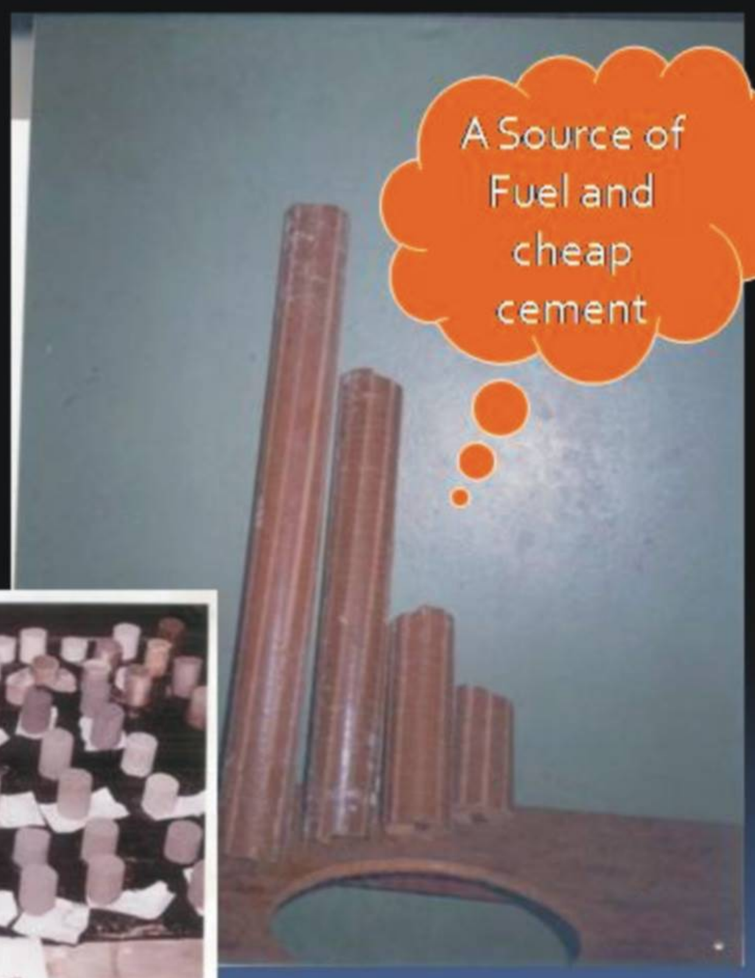
Recycling of Scrap Metal

Collaboration with WNTC, Ibadan

Rice Mill Waste!

(Problem at Abakalki, Jigawa State, etc.)





A Young Boy's Technology in Katsina

Innovative Recycling:
Used Condoms to Hair bands !!!

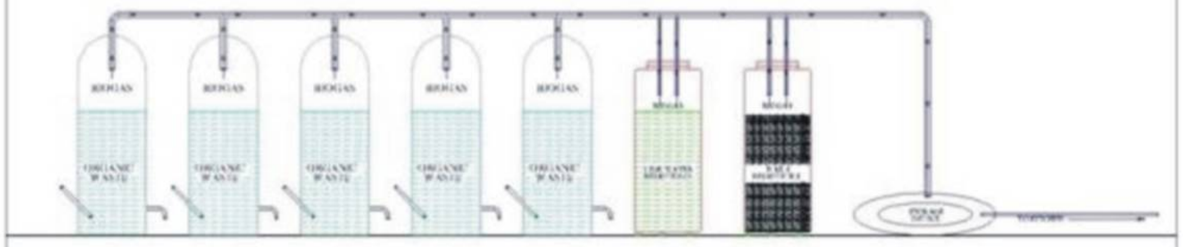
Youths Beware!!

Prevent HIV/ AIDS
Recycle Used
Condoms !!!!

Once we segregate the non-biodegradables from the Organic wastes, making Biogas or organic fertilizer is feasible

Step By Step Construction of Biogas Digester

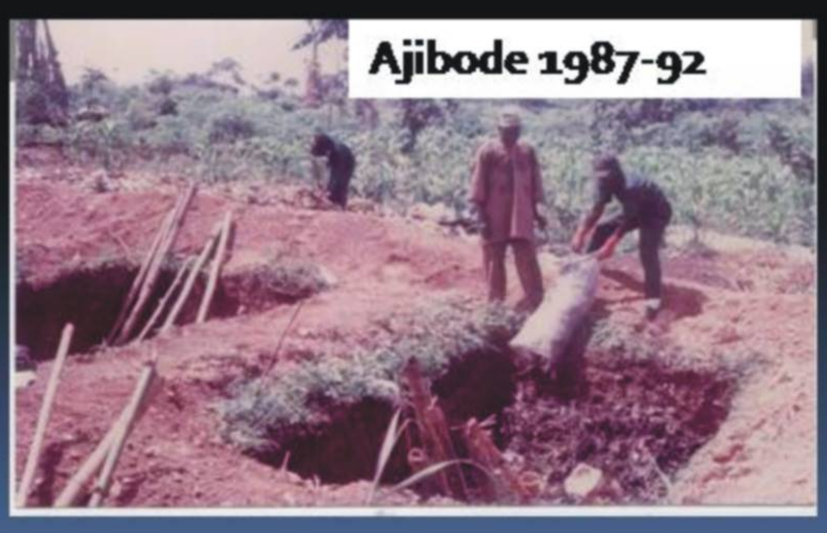
Biogas Technology: From individual to community Households – A new design being developed



THE UNIVERSITY OF IBADAN BIOGAS PLANT

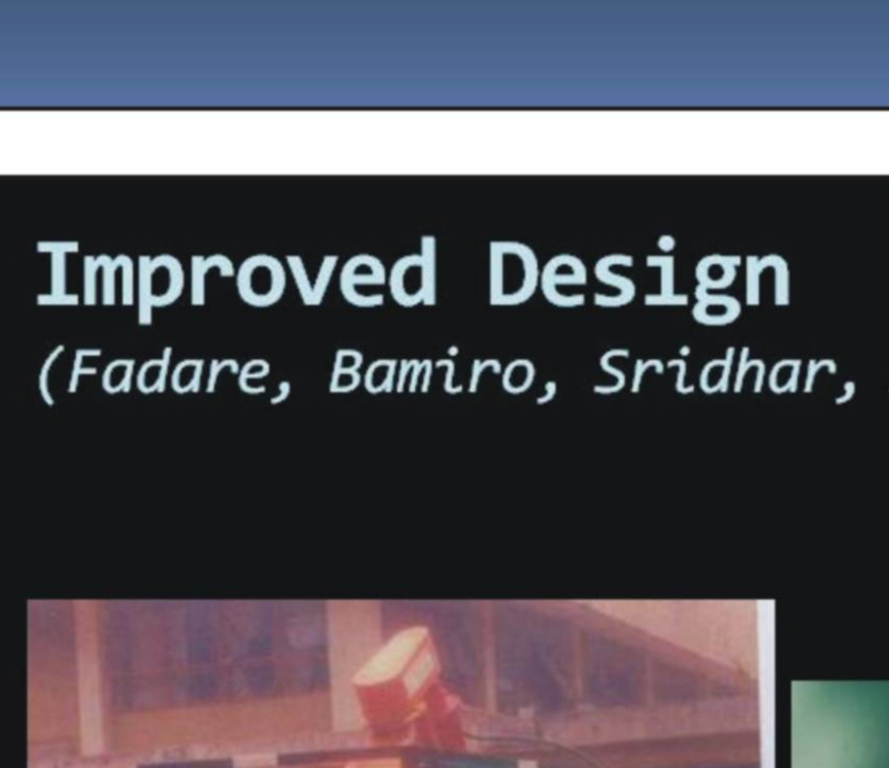
Emissions from Cooking Fuels

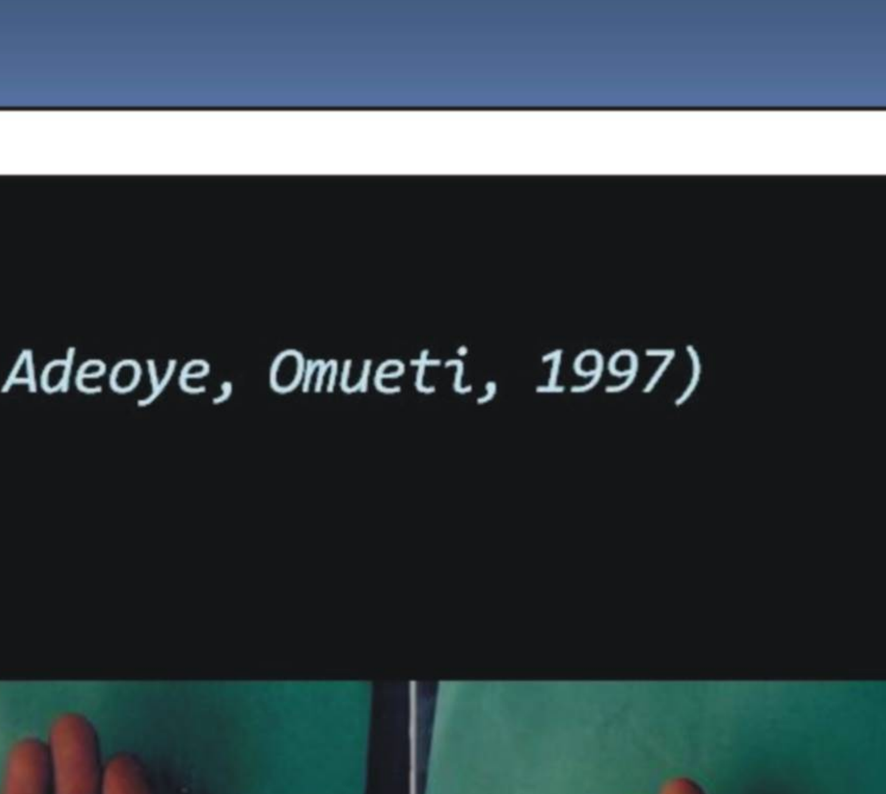
Waste to Fertilizer: Scaling Up since 1983 to date



Pace Setter Organic Fertilizer Plant (Bodija, Ibadan)

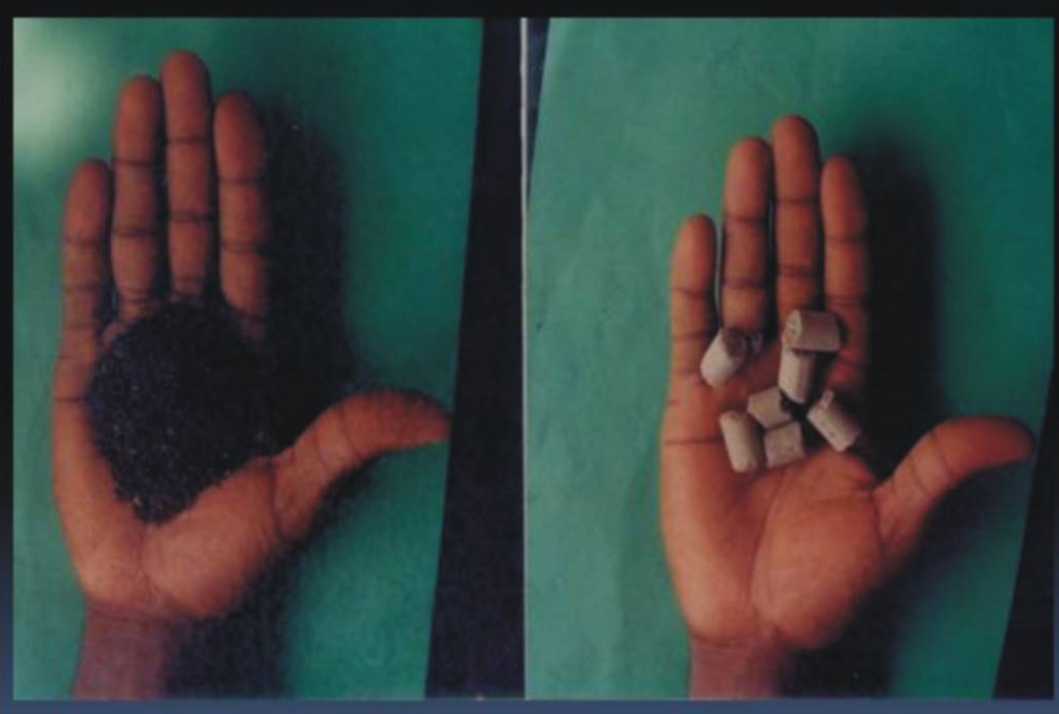
Fertilizer Pellets from Organic Wastes
-First Design 1993-1994 *(John, Adeoye and Sridhar, 1996)*



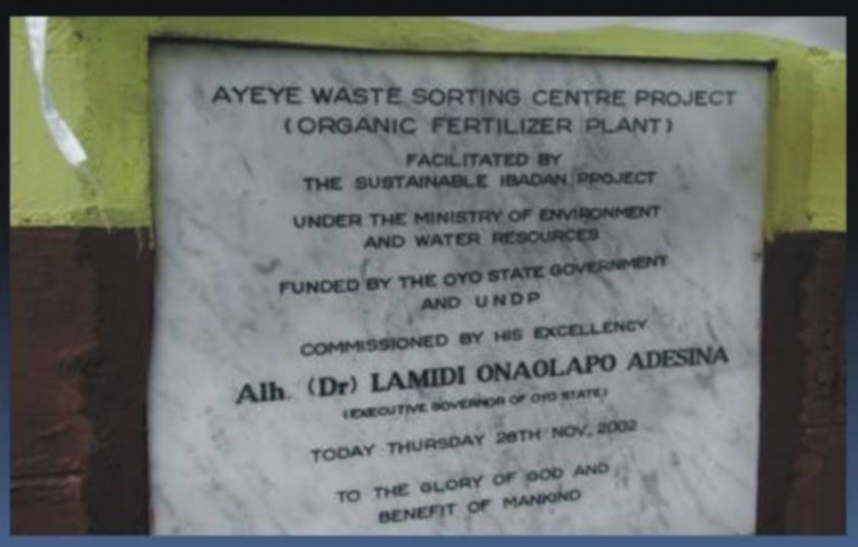


This photograph appeared on the cover page of the *Biocycle*, USA ,1996, Vol. 37.

Improved Design
(Fadare, Bamiro, Sridhar, Adeoye, Omueti, 1997)

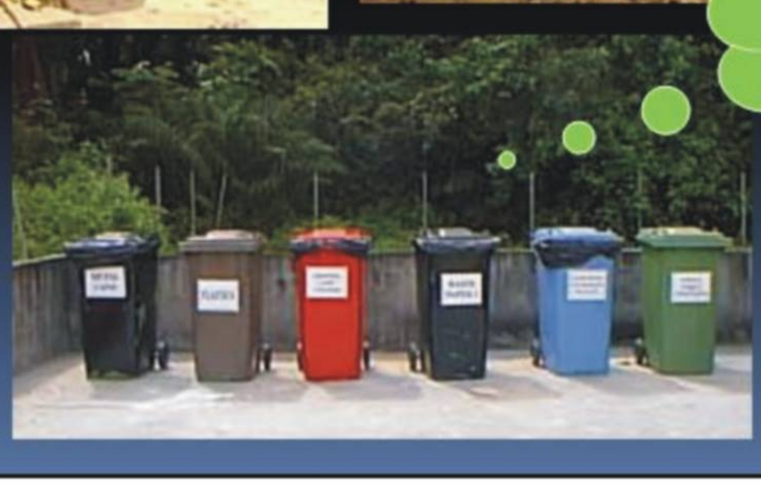


Waste Sorting Centre, Ayeye-2002



Food Waste Management

SPDC Terminal, Forcados (Sridhar and his Group 2000)



Source separation is practiced

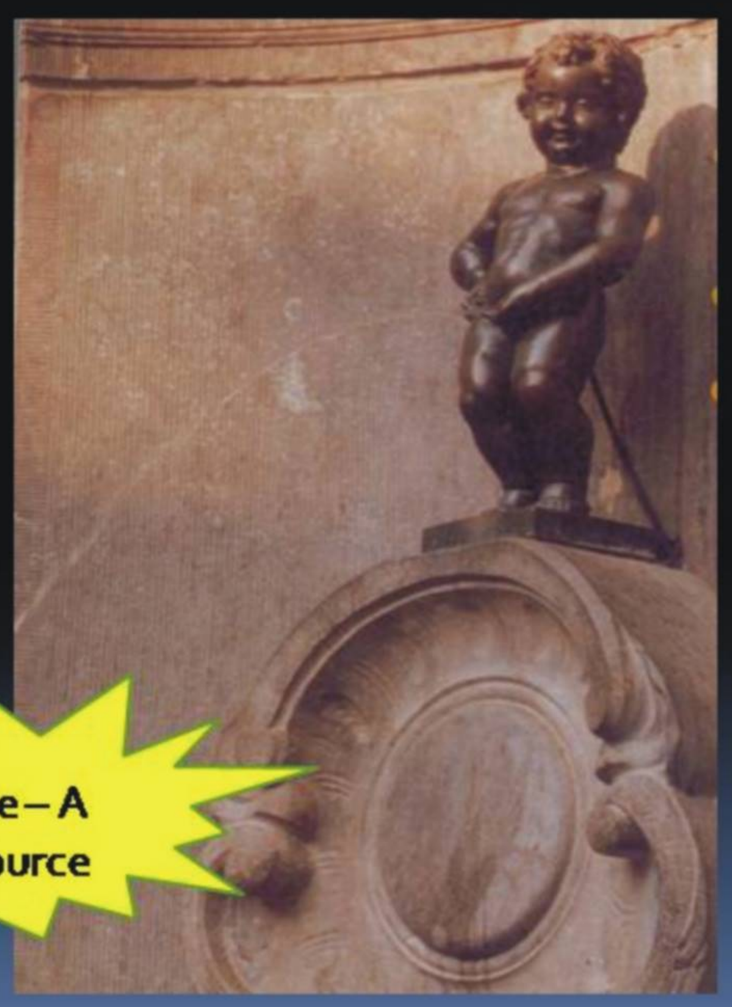
Aleshinloye Market, Ibadan, More Recent

The Evolution of the Waste Can

Management of Yellow Water- Urine

Grams/person/day

- Wet weight: 1,200
- Dry weight: 60
- Nitrogen: 11.0
- Phosphorus: 1.0
- Potassium: 2.5
- Organic carbon: 6.6



Urine – A Resource

Urine Separation Toilets

Stockholm, Sweden
Urine Storage Tank on the Farm

Urine collection in basement storage tanks for multi storeyed buildings, emptied periodically and taken to the farmers – It is fertilizer free of cost

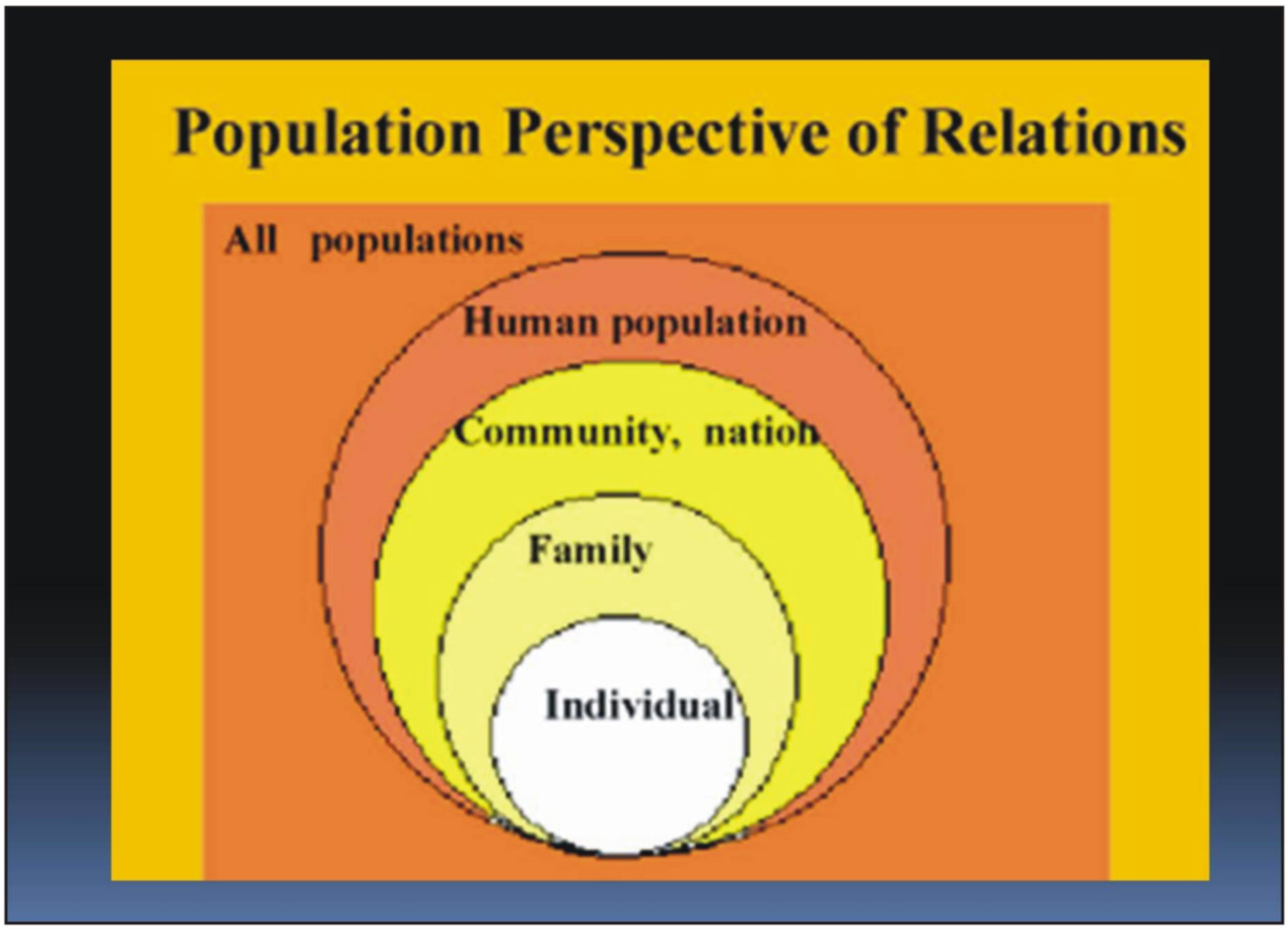
- Germany
- Denmark
- USA
- China
- South Africa
- Joining the race!

Urine Harvesting and use: Ede Polytechnic
Nigerian Experience (Sridhar, Coker, & Akingjobin)

"A new philosophy on waste must be developed, because waste is a resource out of place, and is indicative of the level of efficiency of our production process".

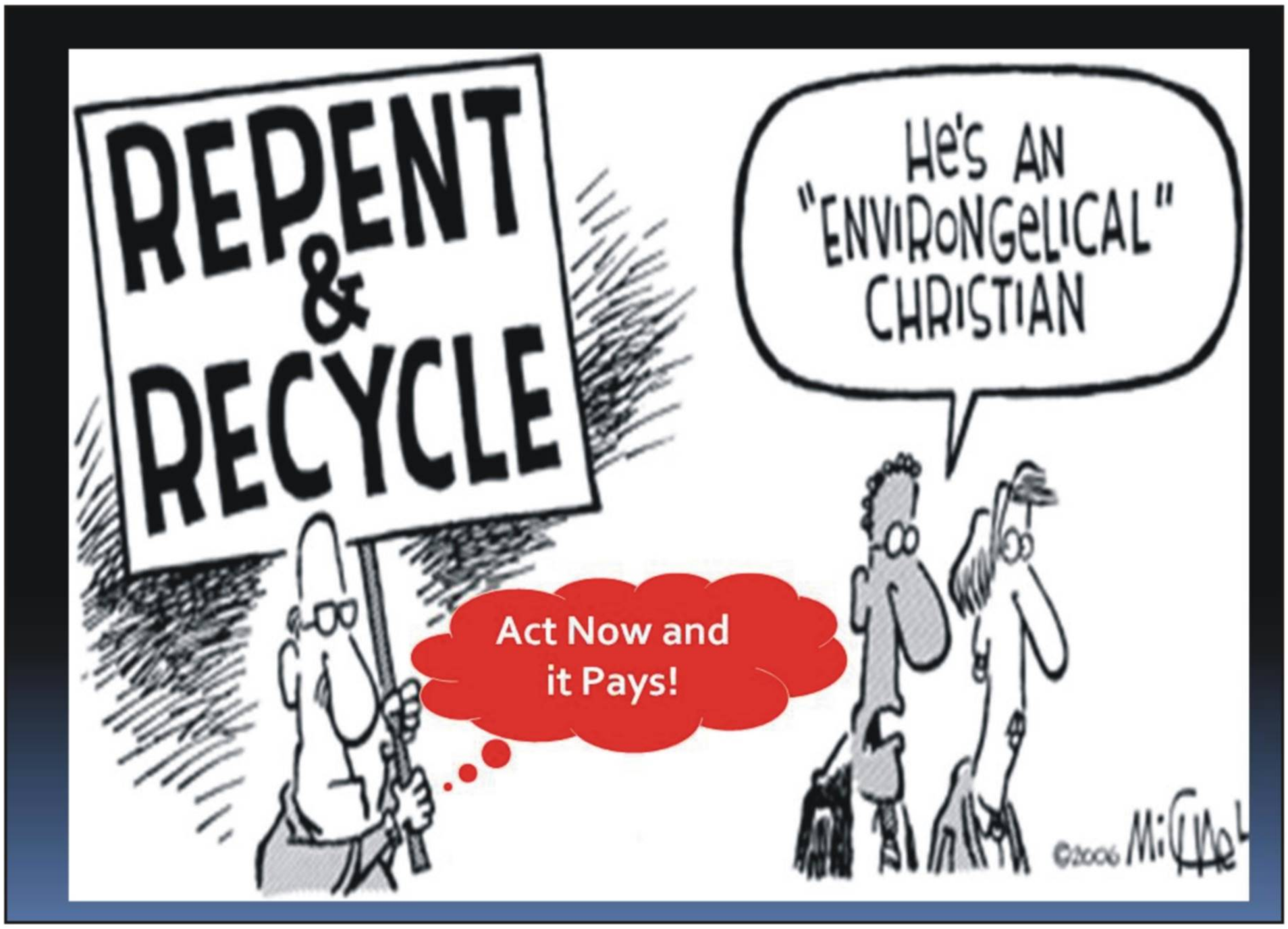
- Dr. Barry Wade

Our Options !!



Which Way Forward?

- Waste Minimization: Reduce, Reuse, Recycle
- Develop strategies on priority wastes to be recycled
- Effective management strategy involving all stakeholders
- Accountability and Transparency
- Good Record Keeping
- Think Globally and Act Locally


REPENT
&
RECYCLE
He's AN
"ENVIRONGELICAL"
CHRISTIAN
Act Now and
it Pays!
©2006 Mi

Lagos says, "The Time To Act Is Now"

Ola Oresanya
08023128099, 01 7768836

Climate Change and Waste Management

as discussed
by
Ola Oresanya
250309

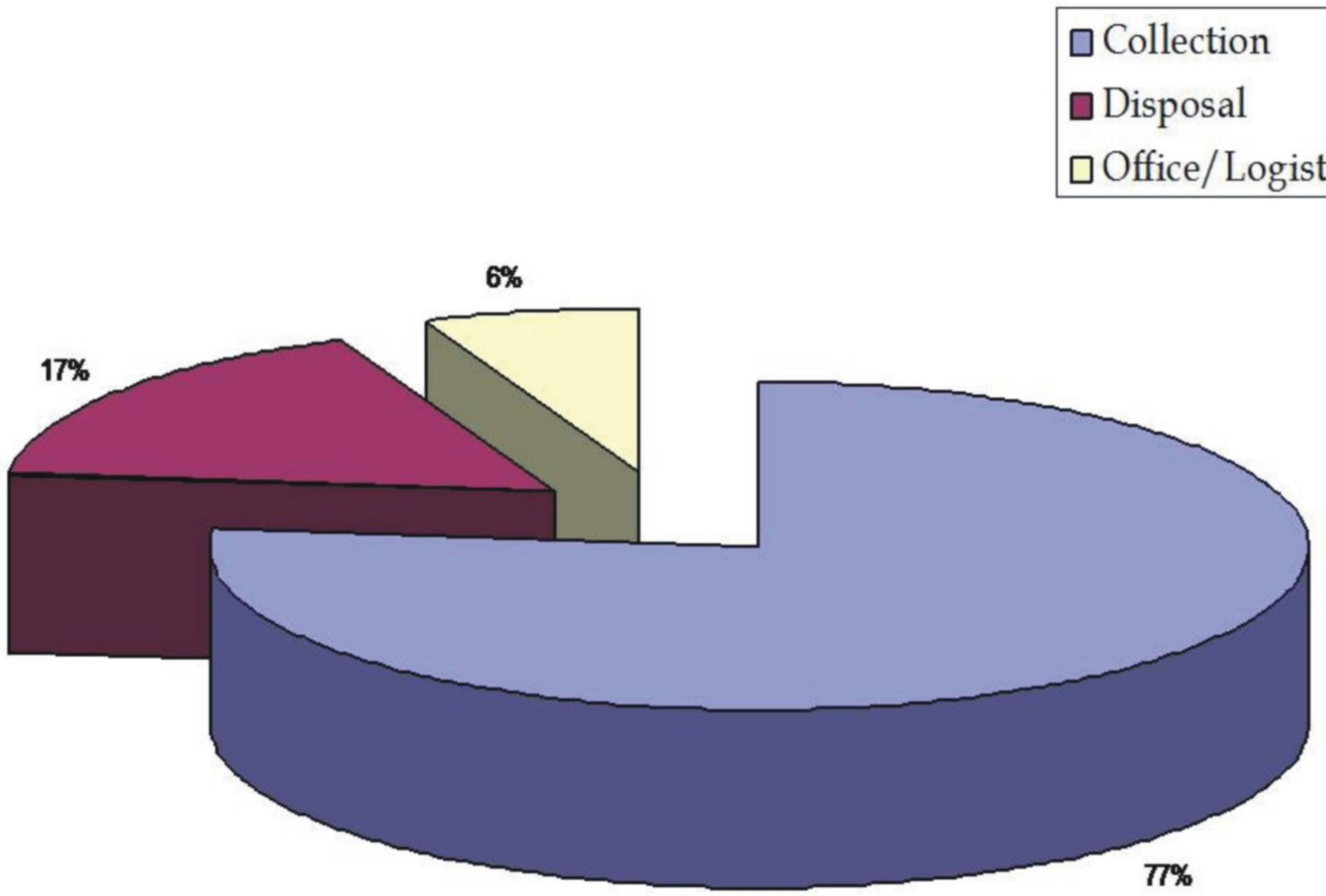
MSWM in Lagos

- Structured into public waste, household (domestic) waste, industrial (commercial), hazardous, construction and special waste.
- Collection and disposal is mechanized (80%)
- About 640 trucks (both LAWMA & PSP) collects over 9000 metric tonnes of waste daily.
- Street sweeping is largely manual (92%).

Fuel consumption per day

Collection		60,000 ltrs
Disposal		13,400 ltrs
- Olushosun (4 compactors and 6 bulldozers)	- 6,000 liters	
- Abule – Egba (1 Compactor & 2 Bulldozers)	- 1,200 liters	
- Solous (1 Compactor & 2 Bulldozers)	- 1,200 liters	
- Other sites (L/S)	- 5,000 liters	
Office/logistics		5,000 ltrs
Total FC/D		78,400 ltrs

FUEL CONSUMPTION PER DAY



- Average usage PD - 78,400 ltrs
- Projected fuel demand PD (in 2009) - 90,000 ltrs

Green House Gases (GHG)/Ozone Depletion Substance (ODS) component for Lagos MSW/annum

Methane (CH_4)	=	1,000,000mt
Carbodioxide (CO_2)	>	4,000,000mt
assorted GHGs, CFCs etc	>	1,000,000mt

Road map for reduction in Carbon emission (Lagos MSW)

- **Increase in waste collection trucks :Vs: Reduction in vehicular density = Improvement in Turn – Around – Time (TAT).**
- **Development of Transfer Loading Stations.**
- **Retrofitting waste collection trucks by replacing old trucks with modern trucks that conform with EEC emission standards. Newly acquired trucks by State Government.**
- **Redesign Landfill operation for efficiency and effective gas collection system. Lagos State certified (CER) for Carbon Emission Reduction signed for Olushosun dumpsite. (CDM project certificate yet to be issued)**
- **Construction of an Integrated Landfill Site at Epe, Ikorodu and Badagry axis.**

1824
m026-n
m026-n LAWMA
4/9/2008 11:07

LAGOS STATE GOVERNMENT
SIMPSON TRANSFER LOADING STATION

MACK
MACK

- Developing new eco – friendly Integrated Landfill Site with CCI technical support.

- Attained the 12% zero waste initiative in waste reduction, re – use or recycling i.e. daily conversion of 750metric tonnes to 200 bags of compost, plastic conversion and paper bailing.

- Initiated household storage system to promote sorting at source (household).

NEW HOLLAND
S190.B
31/10/2007 02:47

25KG
ORGANIC FERTILIZER
For best results, do not combine this product with any other chemicals including fertilizer
27 25K 2 2008

28 2 2008
28 2 2008

04/03/2008 02:18 PM

Conclusion

- Africa's contribution to the global Carbon sink is less than 3% but waste management forms over 30% of Africa's contribution.

- Focus should be given to waste management practices in African cities by adopting appropriate adaptation to mitigate the impact of Climate Change in African cities.

WASTE MANAGEMENT

Prof. Ayite -Lo Ajavon

What are we doing till now?

- Burning municipal solid waste
- Draining waste water in water bodies

WASTE MANAGEMENT

Municipal solid waste burning produces:

- Direct greenhouse gas like CO_2
- Indirect atmospheric gases such as CO, NOx which form tropospheric ozone a greenhouse gas responsible for headaches and respiratory deceases.

WASTE MANAGEMENT

The result is increase in atmospheric GHG and ambient temperature contributing to Climate Change

WASTE MANAGEMENT

Waste water in water bodies (lagoons, rivers and sea):

- Pollution of water bodies
- High Concentration of Heavy Metal in fish species
- Killing fish species

WASTE MANAGEMENT

What can we do?

- Better waste management to benefit from carbon credit
- Reduce the global carbon footprint

WASTE MANAGEMENT

What are the constraints?

- Institutional, Legal and regulatory Framework
- Sustainable capacity building
- Financial constraints

WASTE MANAGEMENT

Financial resources are available:

Do we put in place a task force to exploit the different decisions by UNFCCC and other meetings on climate change?

WASTE MANAGEMENT

We need to promote SCIENTIFIC RESEARCH AND TECHNOLOGY :

It is demonstrated now that it is possible to transform:

- Plastic waste back to crude oil (India)
- Waste water back to drinking waster (Canada)

WASTE MANAGEMENT

What is AFRICA doing?

Can Lagos State Maiden Summit on Climate Change Champion the process in AFRICA?

I want to believe.

THANK YOU.

PLENARY SESSION 8

Climate Change, Urban Planning and Sustainability of the urban built-environment

Prof Johnson Falade
Habitat Programme Manager for Nigeria

LAGOS STATE MAIDEN SUMMIT ON CLIMATE CHANGE - RECLAIMING THE ENVIRONMENT: Challenges and consequences of Climate Change, Held at Eko Hotels, Lagos, 23RD – 26TH MARCH 2009

Contents

- Introduction
- Presentation objectives
- Definition of Climate Change
- Urban indices and concern for global warming
- Global Concern
- Global warming & associated changes
- Drivers of climate change in cities
- Climate Change: The Rich V. Poor Countries
- Effects of Climate change in US by Regions
- Climate change and urban planning in Lagos
- An overview of urban planning in Lagos
- Current development efforts and climate change in Lagos
- Success factors pf current effort in urban planning in Lagos
- Climate change and urban development challenges in Lagos
- Consideration for climate change & urban planning in Nigeria
- The Role of UN-HABITAT in City Management
- Recommendations

Introduction

- The science of climate and its effects have been proven to affect cities.
- For meaningful urban planning, it is important to understand the urban activities that contribute to global warming and climate change and define how to respond.

Presentation objectives

- Sensitization on the climate change as a global phenomenon, its several consequences and its impact on urban development and management.
- Assess urban and regional planning practice and the role accorded climate change in Nigeria
- Advance urban planning and management strategies for mitigating the imminent effects of climate change in urban and rural areas.

Definition of Climate Change

- **Definition**: "Climate change" referred to long-term weather change patterns such as increased average temperatures, precipitation changes, sea-level rise, etc & associated changes.
- **Process**: Light waves from the sun are transformed into infrared radiation or heat, reradiating back toward the atmosphere. Greenhouse gases in the atmosphere trap this radiation, much like the glass roof of a greenhouse, and reradiate it back to earth's surface--resulting in increases in temperature.
- **Greenhouse gases** include Carbon Dioxide (CO2), Methane (CH4), Nitrous Oxide (N20), Chlorofluorocarbons (CFCs) & Ozone.
- Greenhouse gases are associated with climate change

Urban indices and concern for global warming

- Increasing growth in world's and nations' populations.
- Disparity between urban and rural population
- 50% of world's population now lives in urban areas
- In 2007, 50% of Nigeria's population of (140m) lives in urban areas
- 75% of Co2 emissions are from cities
- Need to cut Co2 emissions in rich country by 80-90% to combat climate change
- Global commitments: Agenda 21, Habitat Agenda & MDG Goal 7- Environmental Sustainability

Global Concern: MDGs

Goal 7: Ensure environmental sustainability.

- Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.
- Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.
- Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million-slum dwellers.

Global Concern: Habitat Agenda

- Adequate shelter for all
- Promotion of sustainable human settlements development and management in a rapidly urbanizing world.
- Both led two campaigns – Cities without slums & Good Urban Governance
- Two campaigns now fused into promoting sustainable urbanization
- Sustainable cities programme as demonstration projects

Global warming & associated changes

- Water expansion and sea-level rise
- Increase in temperatures and melting of polar ice-caps
- Increases or decreases in average precipitation
- Changes in soil moisture content associated with precipitation and evaporation
- Alterations of species make-up associated with the changing ecosystem.

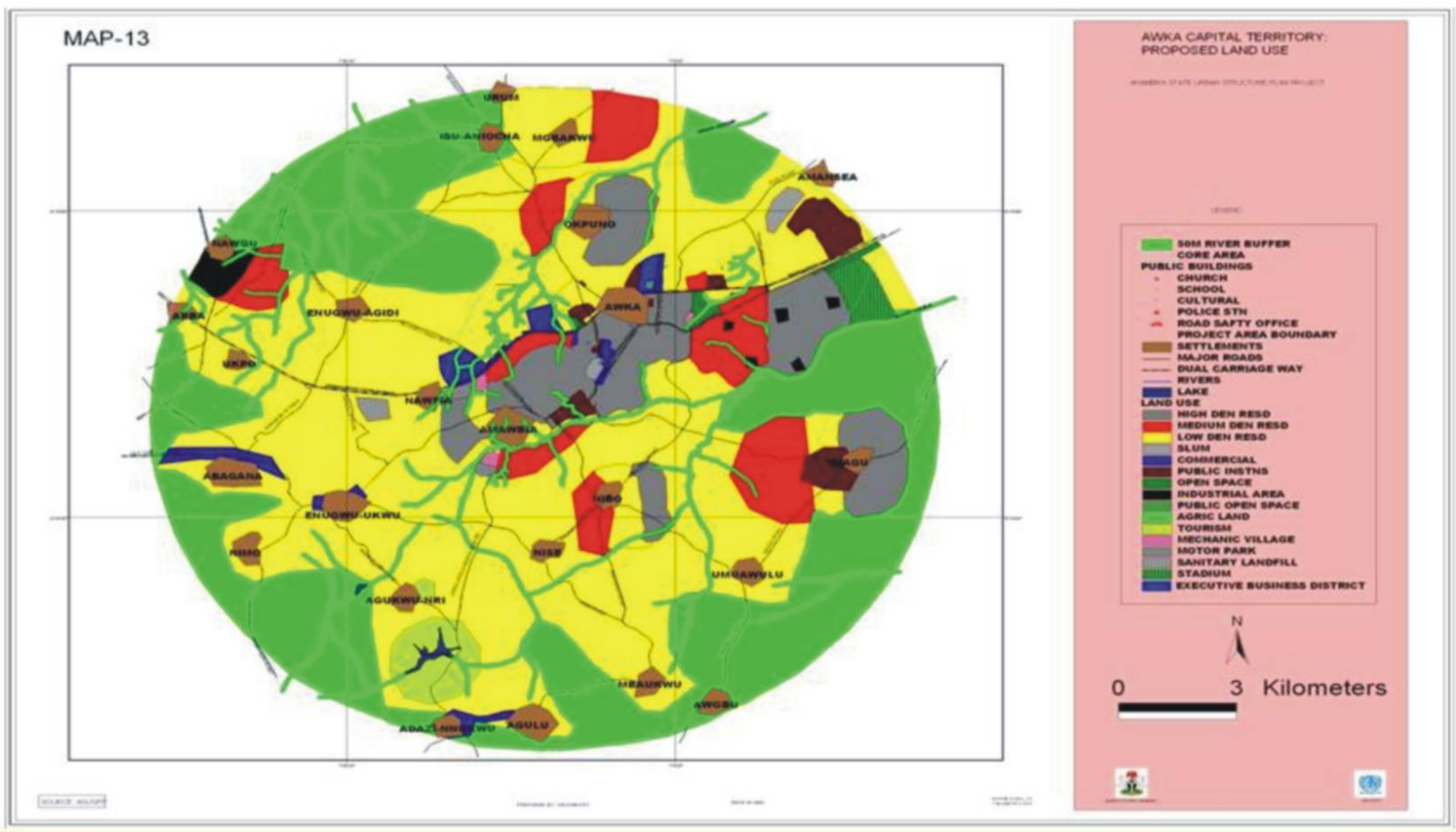
Drivers of climate change in cities

- **Human activities** – polluting industries, commercial businesses heavy traffic, dependency on cars,
- **Zoning** – leading to isolation of residential, employment and consumer services, resulting in increased use of cars and increased emission of greenhouse gases
- **Urban heat island effect** created by pavement, buildings & other structures

Drivers of climate change in cities contd.

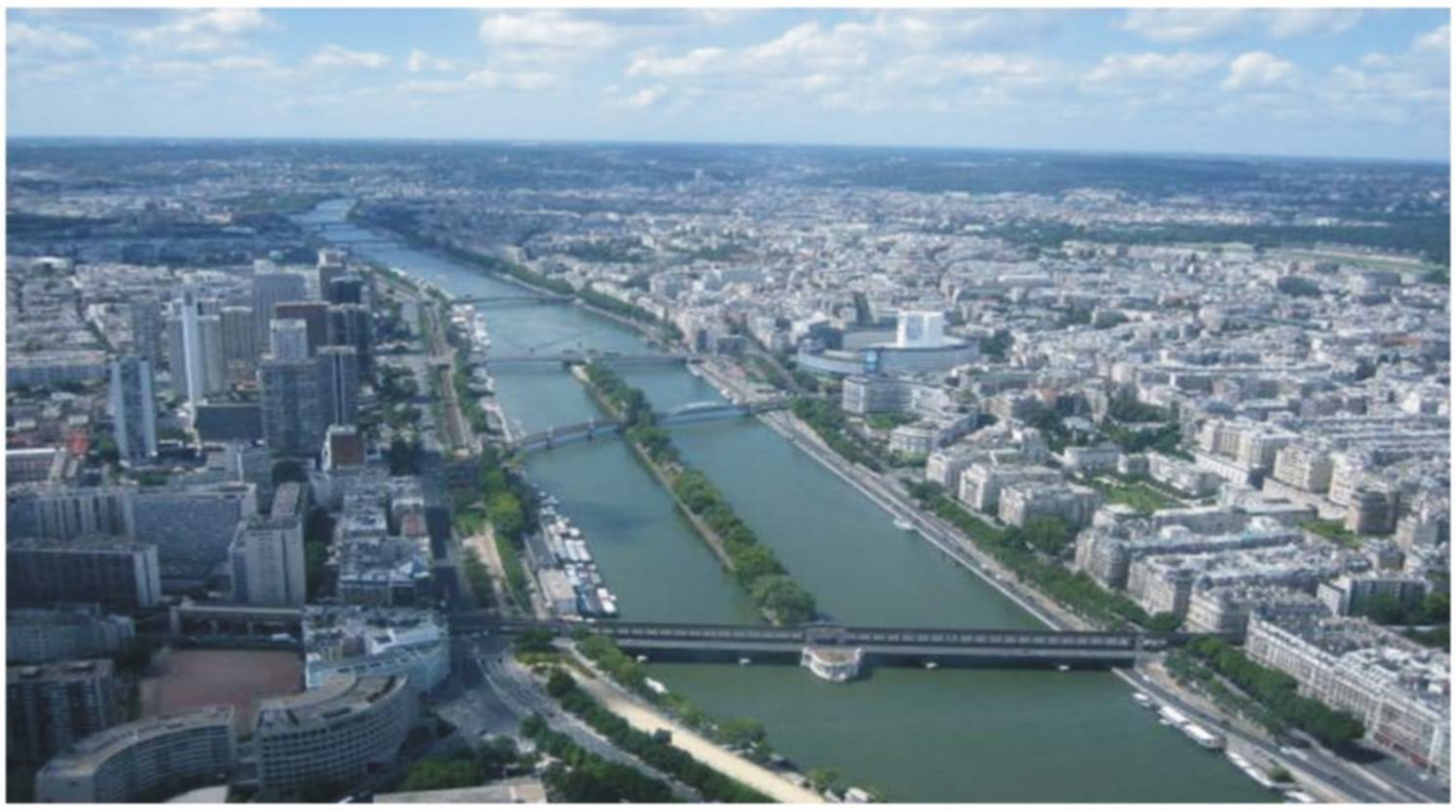
- **Thermal efficiency and urban design** - denser urban areas emit less radiant heat energy per parcel than do more expansive developed areas (*low density v. high density development)*
- **Linking urban form and air quality** – channeling and concentrating population in zones result in compact cities with high air quality than dispersed cities
- **Environmental performance of land cover types**- linkages exist between land use, land cover and energy demand, water use and traffic generation.

Proposed Land use Zoning for Awka



State Secretariat, Jos

Aerial view of Paris



Bank of River Niger, Onitsha

Climate Change: The Rich V. Poor Countries

- Rich countries contribute highest Co2 emissions and also have technology to reduce the emissions.
- Poor countries contribute the lowest and lack technology to respond.
- Impact of global climate change likely to be more on poor developing countries than rich ones

Effects of Climate change in US by Regions

PACIFIC NW -WETTER & WARMER WEATHER - INCREASE IN ANNUAL AVERAGE TEMPERATURE -INCREASE IN ANNUAL PRECIPITATION - TREND TO CONTINUE INTO FUTURE	**NORTHEAST** -HAS LOWEST ESTIMATES FOR FUTURE WARMING -INCREAS EIN WEATHER EXTREMES SUCH AS RAIN -INCREASED STRESS ON ESTUARIES, BAYS, MARSH AND WETLANDS
WEST - PROBLEM WITH AIR QUALITY, WILDLIFE, WATER ISSUES -TEMPERATURE INCREASED FROM 2-5oF -NEED TO REVERSE TREND	**SOUTHEAST** - TEMP. INCREASE -MORE EVAPORATION AND LOWER MOISTURE CONTENT -FLOODING IN LOW LEVEL PORTIONS

Climate change & urban planning in Lagos

- Lagos a city of strategic importance yet facing threats of being drowned due global climate change, because of its costal location
- Lagos - one of fastest rapidly urbanizing and sprawling cities in Nigeria.
- Important centre for commerce, industry, ICT, education, air, land and sea travel
- Lagos' population growth rates rose from 3.3% in 1940s rising to 14% during the 1960s and declining to 4.5% during 1990-95.
- Present population estimated between12-15million
- Has spiral and sprawling spatial growth, outstripping any planning endeavour, currently being tamed.

An overview of urban planning in Lagos

- **Ad hoc approach to urban planning from colonial period till 1980**
- **In 1980 prepared and adopted First Regional Plan (1980-2000) based on traditional comprehensive land use master principle and designated several development areas with emphasis on conservation of the natural landscape along Creeks and Atlantic Ocean.**
- **2005 Review of the implementation of Regional Plan BY Experts showed serious deviations.**
- **The Revised Regional Plan is yet to be produced**
- **2007, Present Government adopted a decentralized approach to planning the various sub-units of the Megacity.**
- **2007 Government and Fed Govt took up challenge to develop Lagos as a Megacity, with several innovations.**

An overview of urban planning in Lagos

- New plans still adopted traditional approach to planning of sub-units Lekki, Lagos Island, Ikorodu etc
- References to climate change issue in these plans is non-existent.
- Somehow Lagos succeeded hitting progress towards addressing through adopted State Government defined Misison Statement & 10-point agenda

Current development efforts and climate change in Lagos

Mission Statement and 10 point Agenda:

- **General improvement in environment quality, i.e sanitation, drainage, landscape, traffic management, reduction of pollution and security.**
- **Four out of 10-point Agenda focus on environmental protection, including environment and physical planning, roads and infrastructure, transportation and shelter**
- **Above are critical development issues that can impact positively on climate change.**

Success factors pf current effort in urban planning in Lagos

- **Adoption of environmental improvement focused vision**
- **Strong political commitment at highest level**
- **Substantial improvement in solid waste management**
- **Vigorous pursuit of landscape improvement and city beautification.**
- **Implementation BRT, which has made journey to work faster, with more patronage of car user and impacting on Co2 emission reduction.**
- **According recognition to all stakeholders in development**

Climate change and urban development challenges in Lagos

- **Managing the present sprawl to achieve a compact city.**
- **Building on the present drive for landscape improvement and city beautification.**
- **Curbing endless sand filling & reclamation of the mangrove swamps**
- **Reducing the effect of heat islands by encouraging more of soft landscaping in city centre.**
- **Managing the volume of traffic and reduction of Co2 emissions.**
- **Development along coasts, lagoons and creeks prone to flooding in and drowning in case of global melting of icecaps – predicted to affect Victoria Island & Lekki**
- **Finding alternative sources of energy to reduce the reliance on generators for electricity supply**

The Grande, Paris – Example of Hard landscape

VGC Park

Consideration for climate change & urban planning in Nigeria

- **Total Population 140 million, rapid urbanization of 2.5% annual growth, 70% or 50 million lives in slums.**
- **12-16 million housing deficit.**
- **54% poor**
- **Over 843 urban centres without physical plans.**
- **Lack of policy focus on climate change as evidenced from 2006 Urban development policy**
- **Inadequate legal provisions as evident in he 1992 Urban and regional Planning law**
- **Lack of national programme for climate change**

Consideration for climate change & urban planning in Nigeria

- **Non-implementation of Agenda 21**
- **Poor environmental governance**
- **Adopted land use planning concept, standards and management are at variance with norms of preventing the effects of climate change as can be ascertained from urban sprawl, lack of solid waste management, absence of tree-lined streets and developed parks etc**
- **Ignorance of concept of climate change among urban practitioners and city managers.**

The Role of UN-HABITAT in Urban Management

- **Habitat Country Programme for Nigeria (2008-2009) identified 3 areas of interventions - Urban mgt & Aid Coordination; Housing Delivery & Basic Services, Urban Security**
- **UN-HABITAT is working with UNEP to promote sustainable cities programme as an entry point for promoting environmental sustainability.**

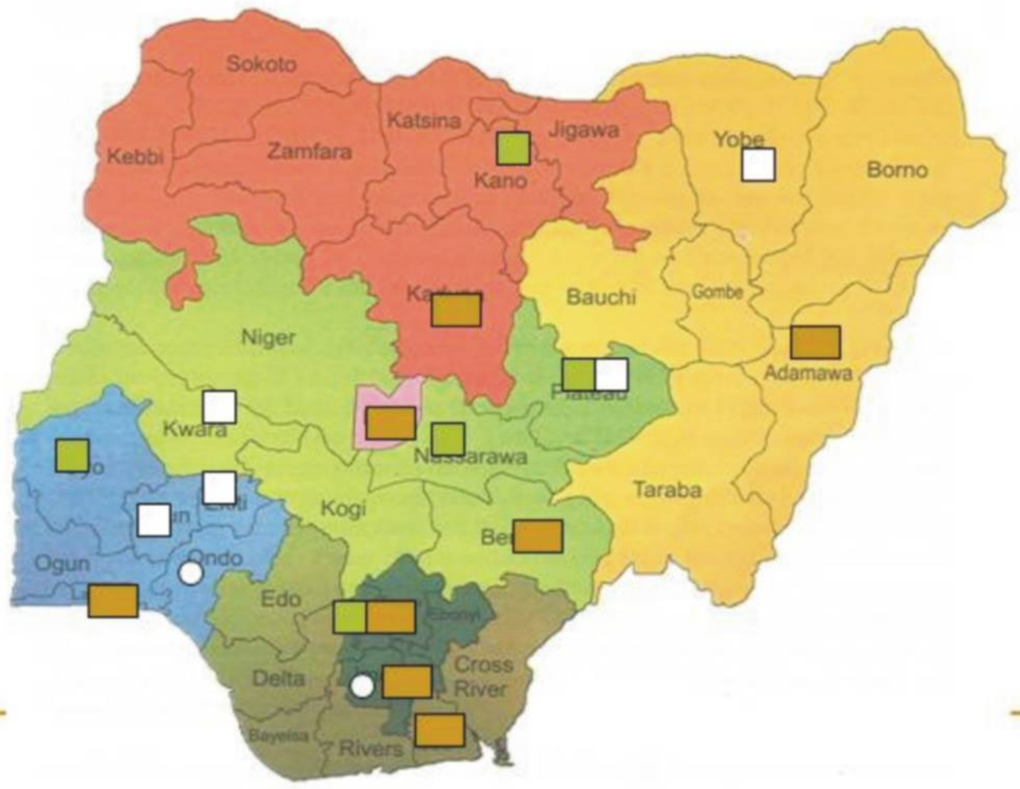
UN-HABITAT Programmes for Nigeria

- **UN-HABITAT Programme Support Office promoting strategic urban planning for cities that is MDG and Habitat agenda focused.**
- **State Urban Structure Plan Project including Anambra, Nasarawa, Osun, Lagos, Kaduna, Adamawa, Benue, Imo, Akwa-Ibom and FCT.**

UN-HABITAT Programmes for Nigeria

- **Assessment of GUG in Nigeria in collaboration with UNDP.**
- **Project on Crime prevention in Cities being negotiated with UNODC.**
- **GUO/LUO for Nigeria with Mission undertaken in 2008**
- **Housing Demand survey for Nigeria with CA**
- **Youth Programme for Nigeria.**

UN-HABITAT



Recommendations

- **Adopt a culture of strategic urban planning, landscape design and management.**
- **Promote clean and beautiful city through greening and solid waste management**
- **Enforce pollution control for industries and motor vehicles and aircrafts.**
- **Promote compact cities and discourage urban sprawl.**
- **Establish centre for monitoring Co2 emission in large cities.**

Recommendations

- **Alternative sources of energy and discourage the use of private generators.**
- **Establish research programme to measure and monitor carbon emissions in cities to design control programmes**
- **Implement sensitization programme for political leaders, city administrators.**
- **Promote green building to reduce the effect of energy consumption and emission rates in buildings**
- **Providing mass transit system**

Recommendations

- **Every city should strive to achieve MDG 7: Ensure environmental sustainability**

1. Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.
2. Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.
3. Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million-slum dwellers.

- **Habitat Agenda by promoting sustainable urbanization.**

Recommendations

- UN-HABITAT is willing to build partnership with States and LGs for strategic urban planning to achieve environmental sustainability.

End

- Thanks for Listening
- Merci

PLENARY SESSION 9

Climate Change and Adaptation: integrating adaptation to climate change into national development planning

Presented at the Lagos Summit on Climate Change , March 24-26 at Eko Hotel and Suites, Lagos

by

Ademola Salau

1

Unique nature of the problem

There are unique features of climate change issues as relates to LDC, particularly Africa, that must be kept in mind in the efforts to find solution and some of these are:

1. The people most at risk from the impacts of climate change live in developing countries that have contributed the least to the accumulated GHG in the atmosphere.

2

2. Those most affected are also the least able to cope, making it an issue of inequality, security and above all, one of justice.
3. Climate change poses a difficult challenge because of its intrinsic links to economic growth and sustainable development.
4. Impacts of climate change could negate decades of slow progress and undermine efforts to reach the Millennium Development Goals.
5. The costs of solving the problem may be very prohibitive and thus a way must be found to do this without harming economic growth . This is of particular importance to Africa

3

What is Adaptation to Climate Change and why does it matter?

4

Adaptation to climate change is a complex topic that presents a number of challenges. According to the IPCC adaptation involves an adjustment in natural or human systems to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

5

Adaptation measures are taken mainly to lessen damage from climate change and to increase social and ecosystems' resilience.

However, the big problem is how to define it in more practical and operational terms.

6

THE SIGNIFICANCE OF CLIMATE CHANGE VS CLIMATE VARIABILITY.

•Climatic fluctuations are not unusual – this is what we expect with climate variability. However, due to climate change, what is an extremely hot year today may become the norm by 2030 – and what is an extremely hot year in 2030 is likely to be outside the range of what is experienced today. A hot year in 2080 will be more extreme still.

•As these climatic extremes become the norm, we move outside our coping ranges and become vulnerable. As a result, we have to adapt. Climate change will bring more frequent breaches of our coping range – and may even create a permanent shift outside the coping range.

7

Fig. i : ADAPTATION AND COPING RANGE

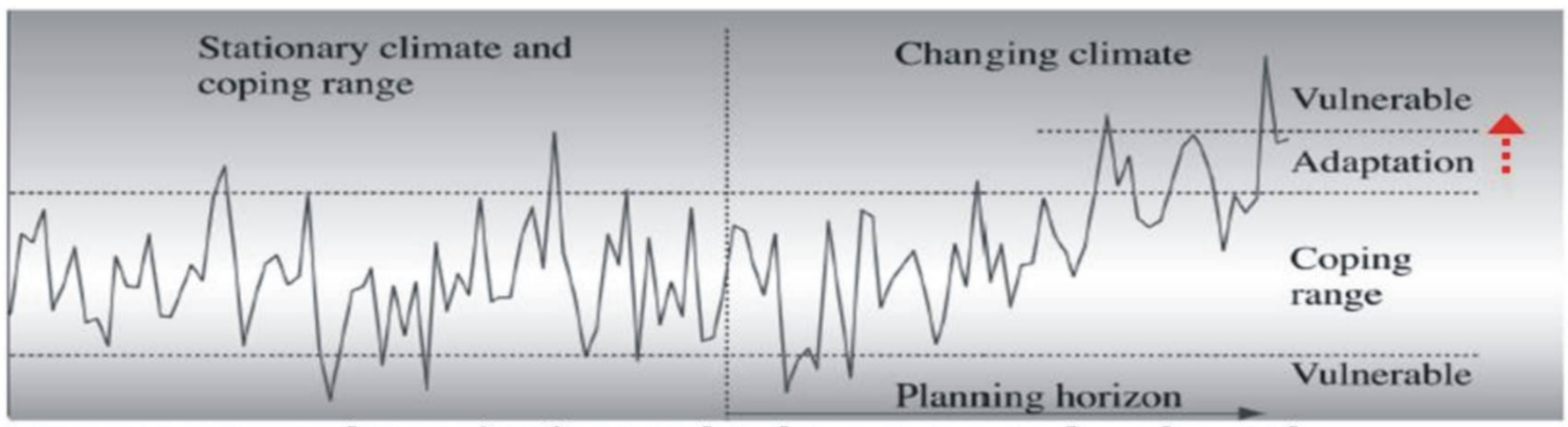
Historically:

- Societies & systems cope with a range of climatic variations
- Coping ranges are exceeded occasionally under "normal" conditions

Climate change:

- More frequent breaches of the coping range
- Permanent shift outside coping range

Adaptation aims to expand coping range



Source: From Jones and Mearns (2005) – APF Technical Paper 7: Assessing future climate risks

8 8

Coping just with short-term variability is not sufficient – and in some cases may even result in maladaptive planning. It is also necessary to manage long-term climate risks.

For example, a rice-growing country could build dams to offset increasing variability in rainfall and also introduce drought-resistant strains of the crop. However, if the long-term projections for rainfall indicate that water will become even more scarce, then it would be recommendable for government policies to focus upon new agricultural crops and the introduction of alternative livelihoods to farming.

9

Why does adaptation matter?

- According to a new study led by United States NOAA(National Oceanic and Atmospheric Administration, climate change is "largely irreversible" for the next one thousand years, even if carbon dioxide emissions could be abruptly halted. Thus the need to take urgent action cannot be overemphasized. However, for some regions like Africa, the need to adapt to the current and future negative impacts is more than necessary. As the Working Group II of the IPCC 4th Assessment puts it adaptation to climate change for many people in Africa is "not an option but a necessary compulsion".

10

- **Climate change threatens poverty reduction and thus sustainable poverty reduction should be seen as a key to increase adaptive capacity.**

- **There is a synergy between actions taken to cope with climate change and efforts or policies to promote quicker development process.**

- **Adaptation must be viewed as a long-term issue that must be mainstreamed into the sectoral and other policies and programmes at different level of decision-making.**

11

Adaptation and development:

Adaptation is closely linked with development and this linkage is critical to reducing vulnerability to climate change. Economic growth is essential for developing countries to improve the health, economic livelihood and quality of life of their citizens. It is also essential to increase the capacity of developing countries to adapt to the negative impacts of climate change. However, development in line with 'business-as-usual' is often not sufficient to adapt to climate change. Indeed, some dimensions of development can impede the adaptation

The relationship between adaptation and development is vividly shown in the figure ii below where it shown how climate change poses a serious risk in many developing countries to attaining the Millennium Development Goals (MDGs) . Fig..iii shows that the climate change also poses risk to the Official Development Assistance(ODA).

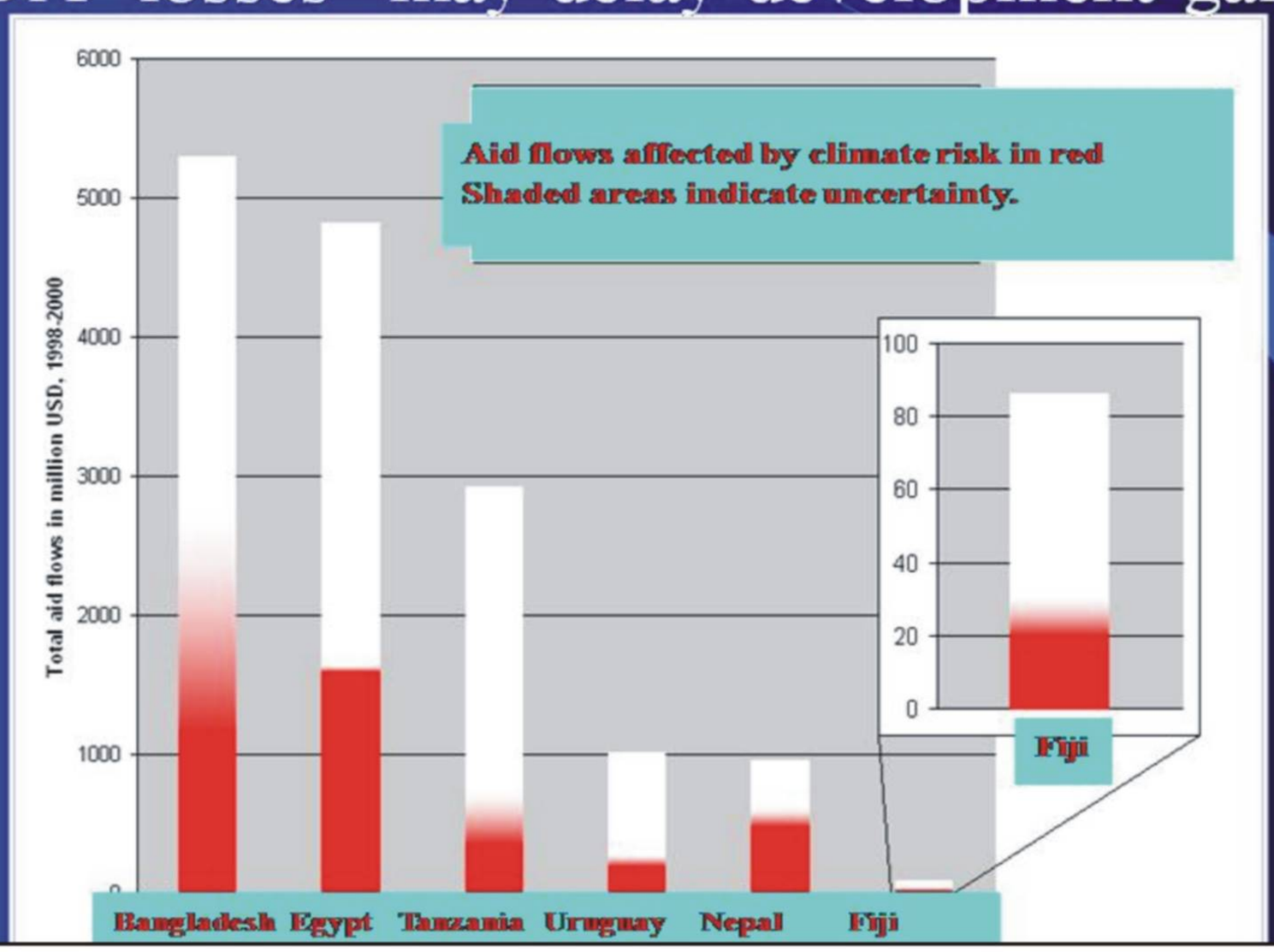
12

Fig ii : Climate change poses risks to all MDGs

Millennium Development Goals	CLIMATE CHANGE RISKS
MDG 1 Eradicate extreme poverty and hunger	**Depleted livelihood assets**, reduced economic growth, and **undermined food security**.
Achieve universal primary education	**Reduced ability of children to participate in full-time education by loss of infrastructure, livelihoods (forcing children to work), and displaced families.**
Promote gender equality and empower women	**Additional burdens on women's health and time to participate in decision-making and income-generating activities.**
Reduce child mortality; Improve maternal health; Combat HIV/AIDS, malaria and other diseases	**Greater prevalence of vector- and water-borne diseases, heat-related mortality. Declining food security, maternal health and availability of potable water.**
Ensure environmental sustainability	**Negatively impacted natural resources** and productive ecosystems.

Fig.iii : Climate change also poses risks to development assistance

ODA "losses" may delay development gains



Adaptation is not cost-neutral

Adaptation choices fall upon cost continuum

'No regrets' activities:

- Increase resilience to current climate variability
- Develop climate risk information
- Inform public

$$

additional cost: flexible, soft options, e.g. disaster risk management, climate risks management planning

$$$

significant additional cost: hard measures, e.g. protection against sea-level rise

Must integrate climate risks in decision process

15

15

- Funding needs in Billions

- The adaptation financing gap

How can the financing gap be met?

•$15-150 B/yr	•Stern, 2006
•$10-100 B/yr	•World Bank
•$50-170 B/yr	•UNFCCC, 2007

- Funds available in Millions

•$235 M	•Multilateral,
•$95 M	•Bilateral*, 2000-5
•$150 M	•Bilateral, 2007
•**$480**	•Total Cum.

*(Jennifer Frankel-Reed, 2006)

16

Who pays for adaptation?

- The private sector – farmers, households, industry etc- will bear a large part of the costs of adaptation;
- Government policy will be central to influencing how private sector resources are allocated in a climate-sensitive way.
- Public sector expenditures for adaptation are also likely to be large.

17

According to the UNFCCC signed in Rio de Janeiro in 1992, the governments of developed countries agreed to help "the developing countries that are particularly vulnerable to the adverse effect of climate change in meeting the costs of adaptation to those adverse effects".

However, today that pledge is yet to be translated into a vigorous and meaningful action. Actions so far has been more ad hoc , fragmented, and 'characterized by chronic underfunding'

18

SOURCES	CURRENT LEVEL OF FUNDING
GEF Trust Fund Strategic Priority for Adaptation (SPA)	**$50 million (GEF 4,2007-2010)**
Special Climate Change Fund(SCCF)	**$74 million (until March 2008)**
Least Developed Countries Fund(LDCF)	**$173 million pleadged until March 2008**

Integrating Adaptation into National Development planning.

20

Adaptation – the imperative of right policies

- Vulnerability to climate change as much to do with policy failures and challenges than with the weather (agriculture, water, health);
- Government policy is critical to ensure the right level of adaptation takes place. A large proportion of adaptation will be paid for by the private sector;
- Public sector adaptation funding gap: For most countries the necessity for new source of finance to deal with the climate change issues cannot be overemphasized nor the fact that the money should be new and additional.

21

Key challenges to early policy action

Developing countries face three key challenges to put in place supportive public policies:

1. **Political traction**: Given costs and uncertainties of climate change, difficult to get political traction to implement proactive adaptation responses
2. **Policy mix:** UNDP survey indicates governments find it hard to determine appropriate policy mix
3. **Finance:** Difficult to find finance to develop capacities and policies

22

3 categories of governance measures

To promote early action, developing countries need to consider

Provision of public goods

- Reliable information on climate change;
- Protecting, building defensive investments (water supply, costal protection)

Regulatory role

- Adjust fiscal policy to create private sector incentives for adaptation
- Set performance standards and establish codes that encourage both private and public investments in building long-lived capital and infrastructure that take climate change into account

Strengthening adaptive capacity

- Building in climate risk management into on-going and planned development investments

23

Conclusion:

The need for identifying adaptation options, setting priorities, and engage in adaptation planning cannot be overemphasized. However, adaptation must be introduced as part of the national policy framework and planning.

One of the most important lessons from the activities so far in this area is that appropriate institutional arrangements must be fashioned to plan and implement adaptation with different stakeholders playing relevant and effective roles.

The need for private –public collaboration and participation as well as international assistance is essential for catalyzing the huge resources required to implement adaptation in developing nations.

24

Thank You

25

INTEGRATING ADAPTATION TO CLIMATE CHANGE IN NATIONAL DEVELOPMENT

Emma Nzegbule (NEST)

LAGOS STATE MAIDEN SUMMIT ON CLIMATE CHANGE 24-26TH MARCH, 2009

FEATURES OF LAGOS STATE

- Coastal stretch
- Industrial Hub
- Agriculture and fishing
- Heavily populated
- Strong rural-urban and urban-urban interaction
- Poorly developed and inadequate infrastructure
- Mostly poor

Climate Change Challenges

- Sea level rise and Salt water intrusion affecting fresh water availability
- Severe flooding and storms
- Blocked drainages
- Displacement and unemployment
- Conflict
- More disease incidence
- Poor agricultural yield

APPROACH TO ADAPTATION

- Mapping area and context
  - Vulnerability and impact analysis
- Social change research
  - Needs assessment
  - indigenous knowledge
  - Adaptation options
- State Adaptation Plan Action
  - prioritize actions & sectors
- Enlarged awareness campaign

Adaptation Options

- Sector-specific adaptation measures
- Livelihood based with co-benefits
- Investment in community-based pilot projects
- Integrated flexible options
- Sustainable and target the poor
- Development +
- Migration
- New technology

KEY CONCERNS

- Avoid maladaptation
- Show flexibility
- Gender concerns
- People oriented (mobilization)
- Finance

  -private sector involvement

PARTNERING WITH BNRCC

- RESEARCH
- COMMUNITY BASED PILOT ACTIVITIES
- OUTREACH PROGRAMME
- INTEGRATING INTO POLICY
- www.nigeriaclimatechange.org

END

- THANK YOU

PLENARY SESSION 10

Global climate change and its regional agricultural and hydrological impacts for West Africa: Challenges and opportunities for a German-Nigerian collaboration

Dr. Patrick Laux

Institute for Meteorology and Climate Research (IMK-IFU)
Garmisch-Partenkirchen, Germany

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Motivation

- Rainfall distribution in time and space has significant im… **availability** and socio-economy in West Africa
  - ➢ Severe droughts in 1970s and 1980s (i.e…
- **Rainfed agriculture** highly expos… …riability
  - ➢ 70% of population depe… …griculture
  - ➢ Food Security: *se… …ere*
- Crucial pro… …agriculture: Decision about the **sowing date**
  - ➢ S… …as possible to avoid wasting of valuable growth time
  - … early may lead to crop failure and high economic losses
  - … **Prediction of Onset of the Rainy Season (ORS)**

Global climate change is expected to aggravate rainfall variability and water scarcity in 21. Century (IPCC, 2007)

Outline

Case study 1: Volta Basin (Ghana & Burkina Faso)

- Observed signals of climate change
- Regional climate modeling: expected future climate
  - ➢ Impact climate change on regional water availability
  - ➢ Impact climate change on agricultural sector

Case study 2: Cameroon

- Impact climate change on food production

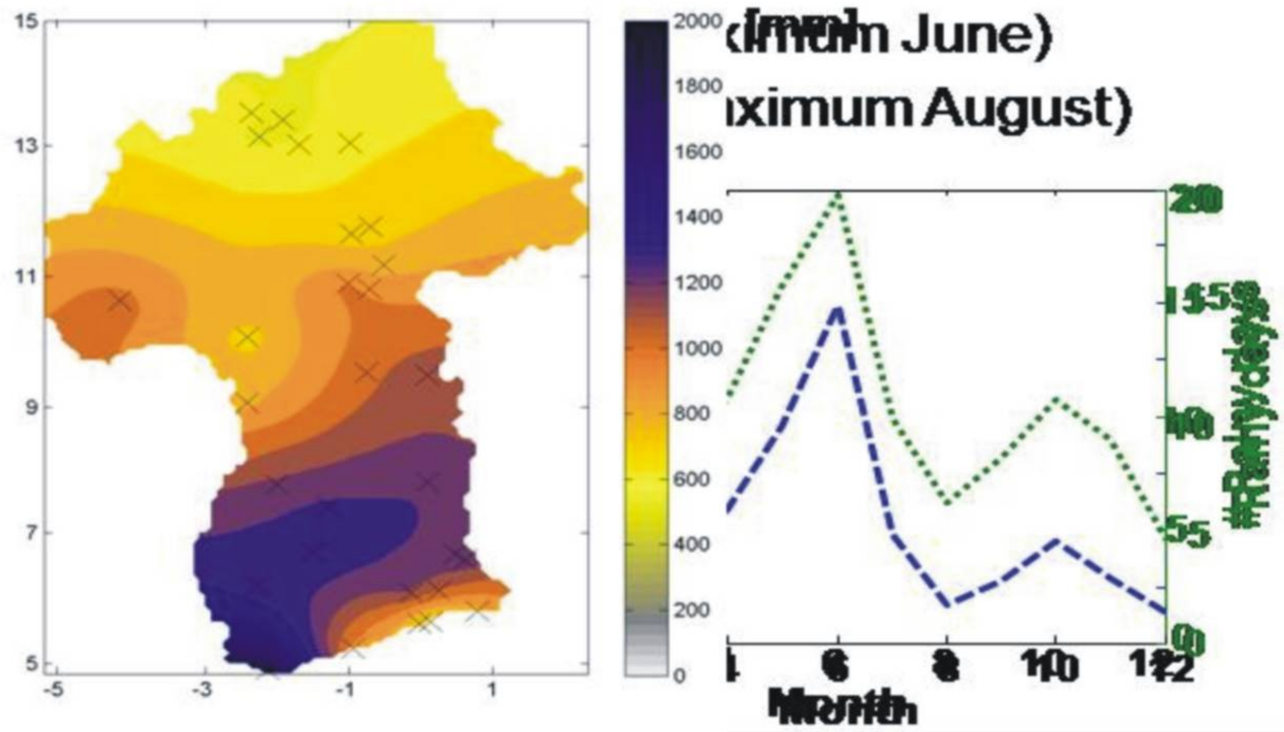
Conclusions

Research foci

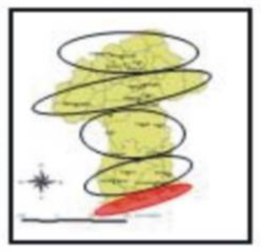
- Volta Basin (Ghana & Burkina Faso), Cameroon
- Similar climate: High spatial and temporal rainfall variability
  - ➢ Climate: sub-humid to arid
  - ➢ Rainy Season (*Intertropical Convergence Zone* ITCZ)

(from June)

(maximum August)



Volta Basin



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Case study 2: Cameroon

- Impact climate change on food production

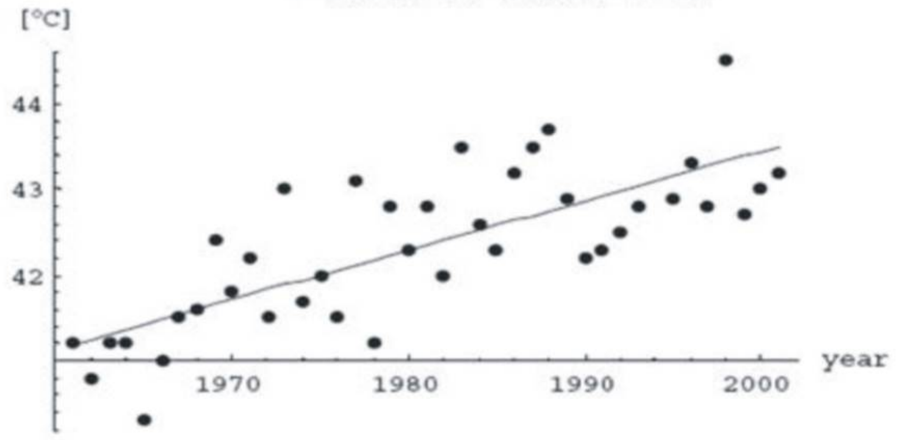
Conclusions

Observed Climate Change (1961-2000)

KIT Karlsruhe Institute of Technology

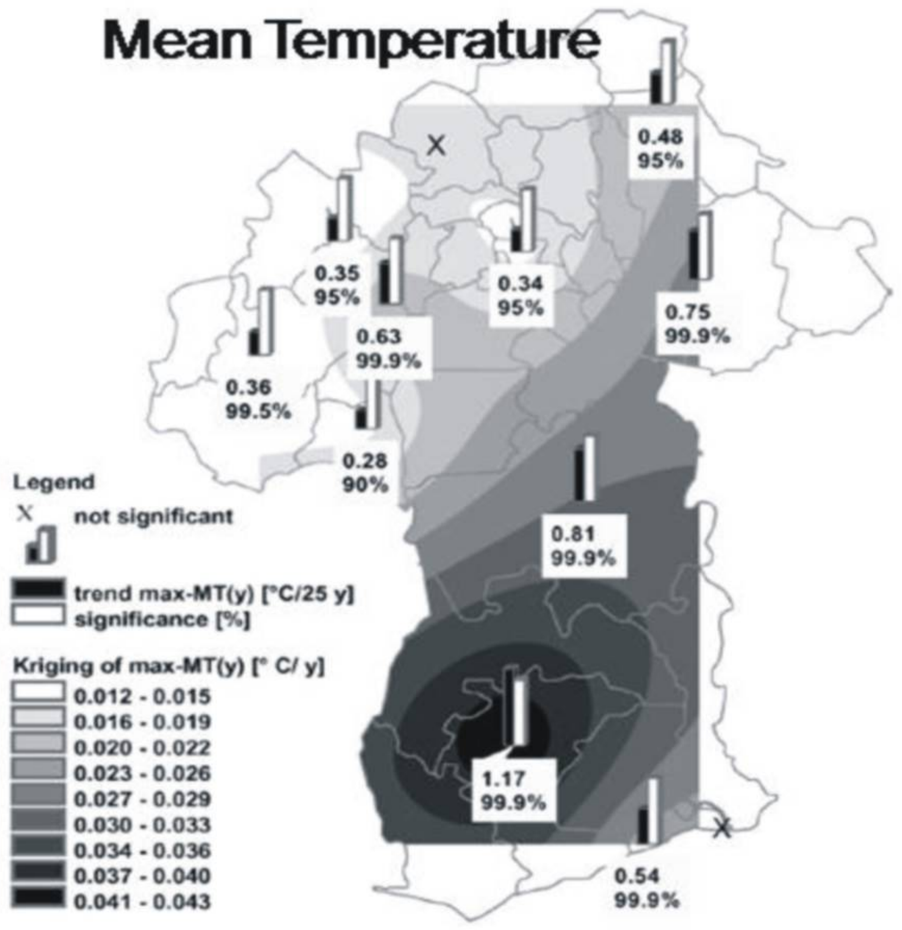
Trends in Temperature

Maximum Temperature Fada N'Gourma



[Neumann et al., 2007]

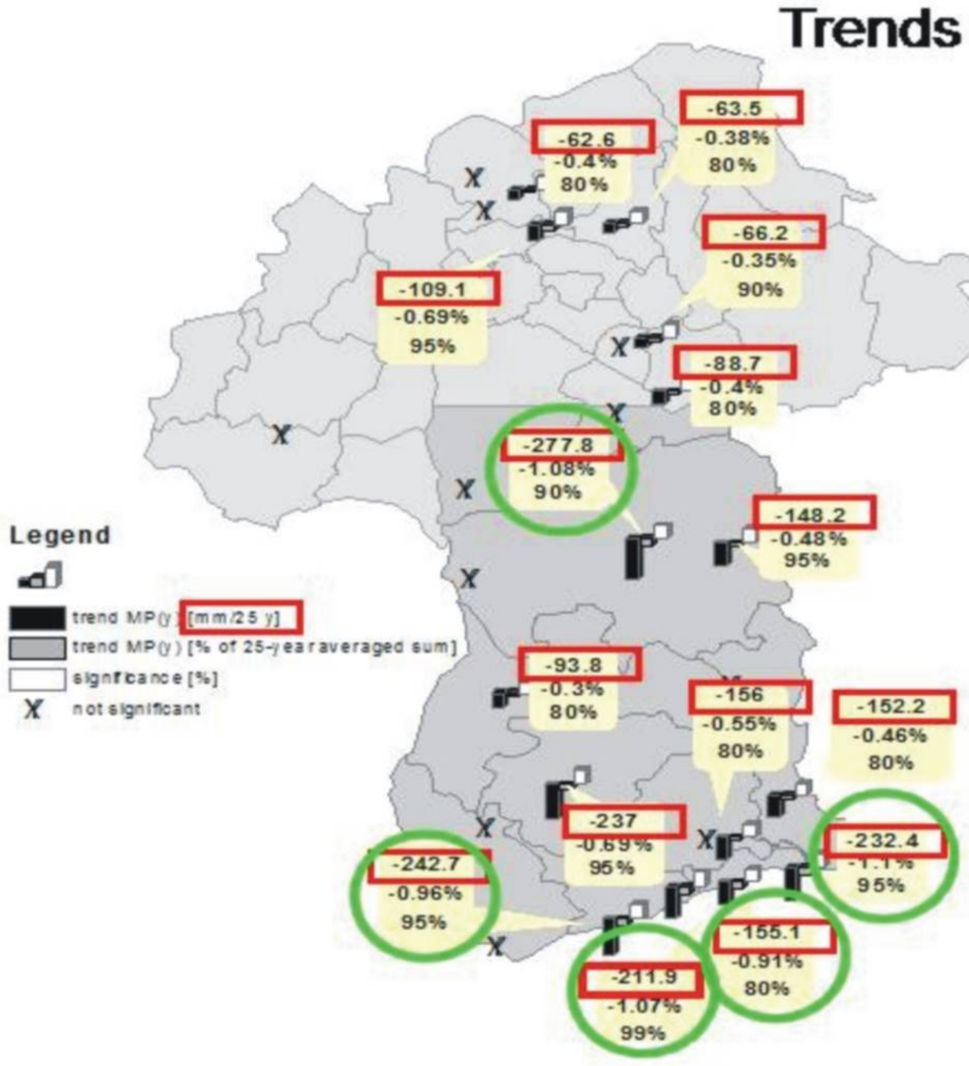
Mean Temperature



Observed Climate Change (1961-2000)

KIT Karlsruhe Institute of Technology

Trends annual rainfall amounts



Significant decrease of annual rainfall amount

≈ 25% decrease annual rainfall amount within 25 years

Outline

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- Impact climate change on food production

Conclusions

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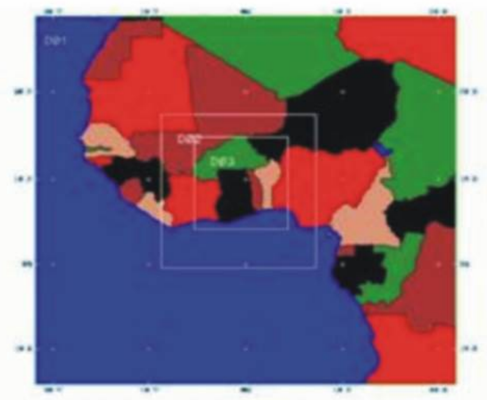
Regional Climate Modeling (Dynamical Downscaling)

- Temperature
- Precipitation
- Wind
- Relative Humidity
- Radiation

ECHAM4 & MM5
Scenario IS92a



2.8° → 9 km resolution

WaSiM

- Orography
- Land use
- Soil properties
- Aquifer properties
- Flownet structure

1 km resolution

Evapotranspiration
Infiltration
Surface runoff
Groundwater flow

10 | P. Laux | Institute for Meteorology and Climate Research (IMK-IFU) | 26.03.09
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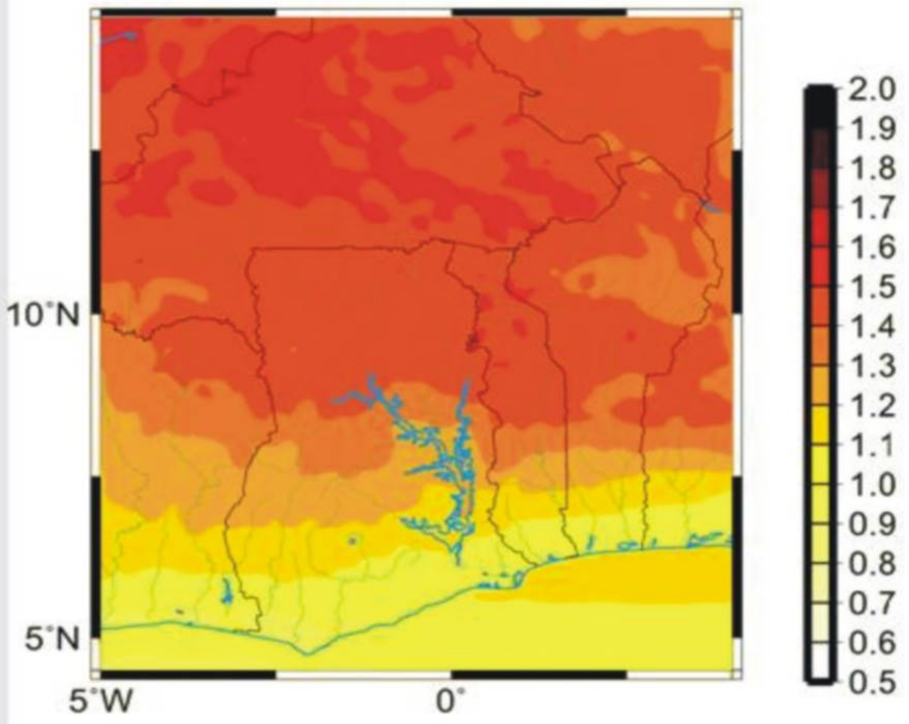
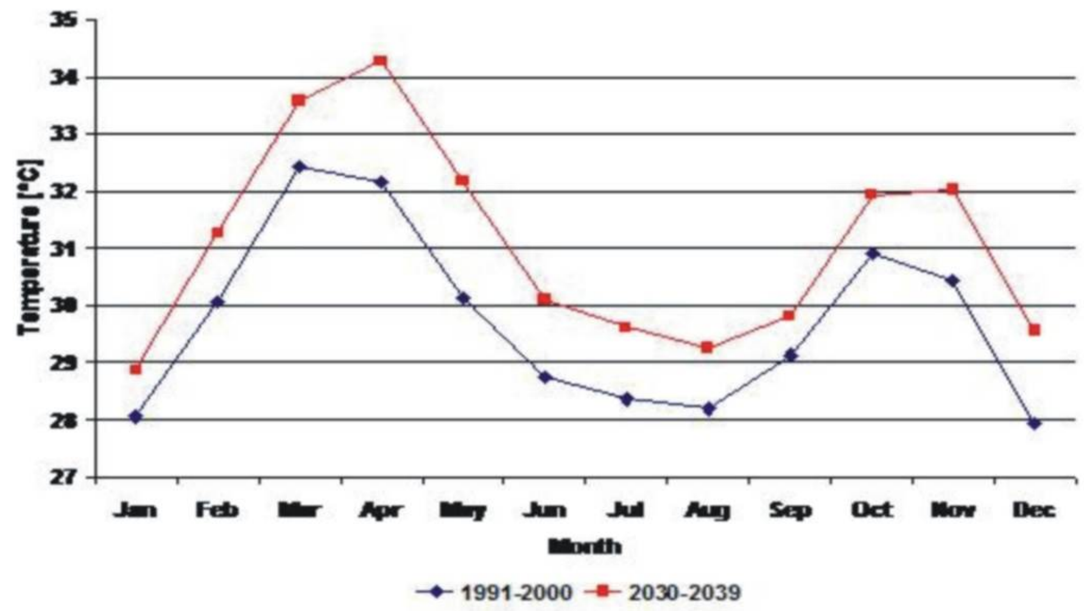
Regional Climate Modeling

Temperature Change till 2039





Mean annual temperature change [%]

Mean monthly temperature [°C] (2030-2039 vs. 1991-2000)

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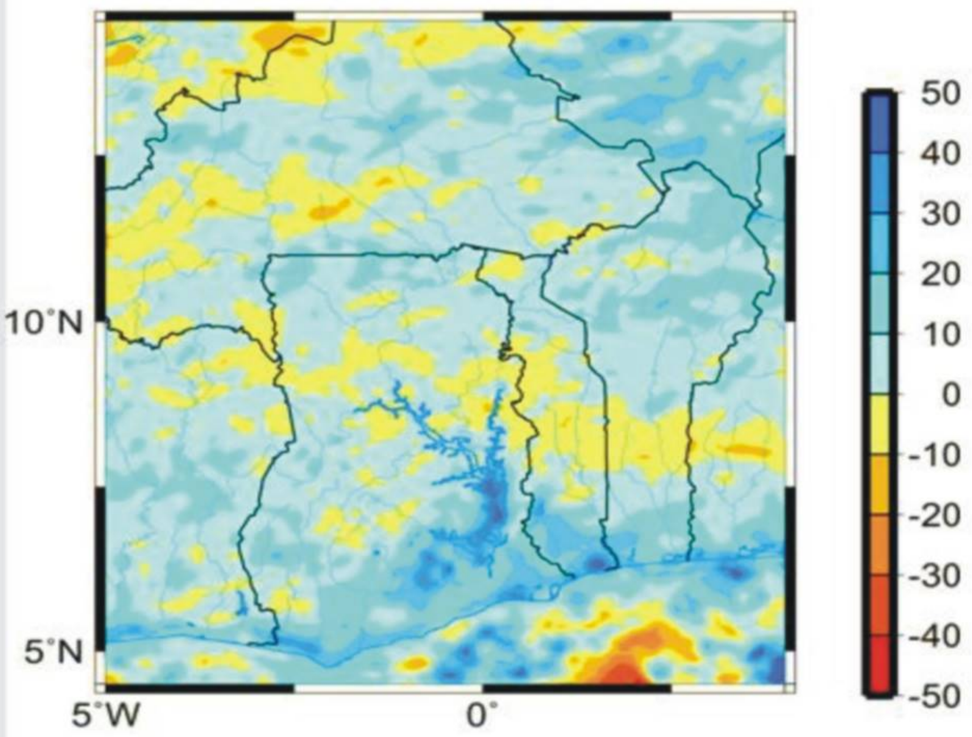
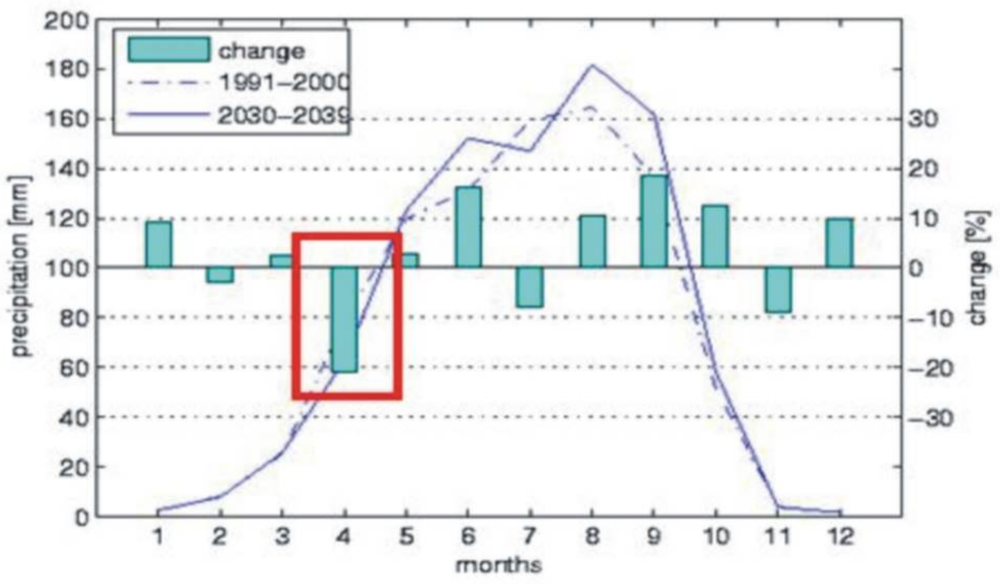
Regional Climate Modeling

Precipitation Change till 2039



Significant decreases in April



Mean annual precipitation change [%]

Monthly mean precipitation [mm] and change [%] (2030-2039 vs. 1991-2000)

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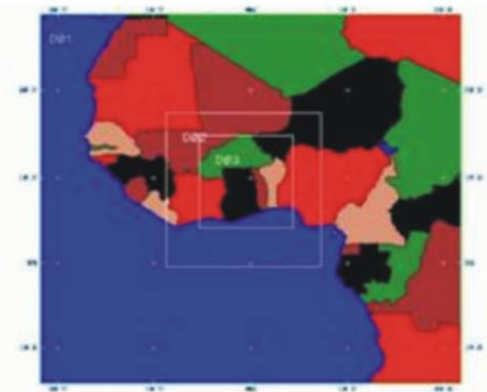
Regional Hydrological Modeling

Joint Regional Climate-Hydrology Simulations

- Temperature
- Precipitation
- Wind
- Relative Humidity
- Radiation

ECHAM4 & MM5



2.8° → 9 km resolution

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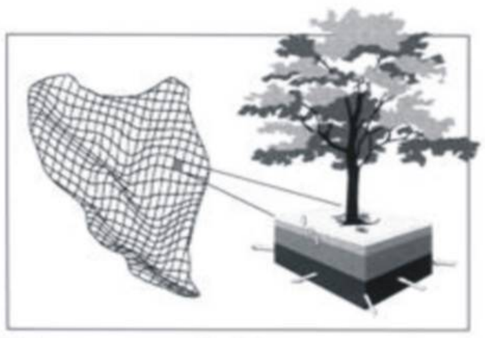

1 km resolution

Evapotranspiration

Infiltration

Surface runoff

Groundwater flow

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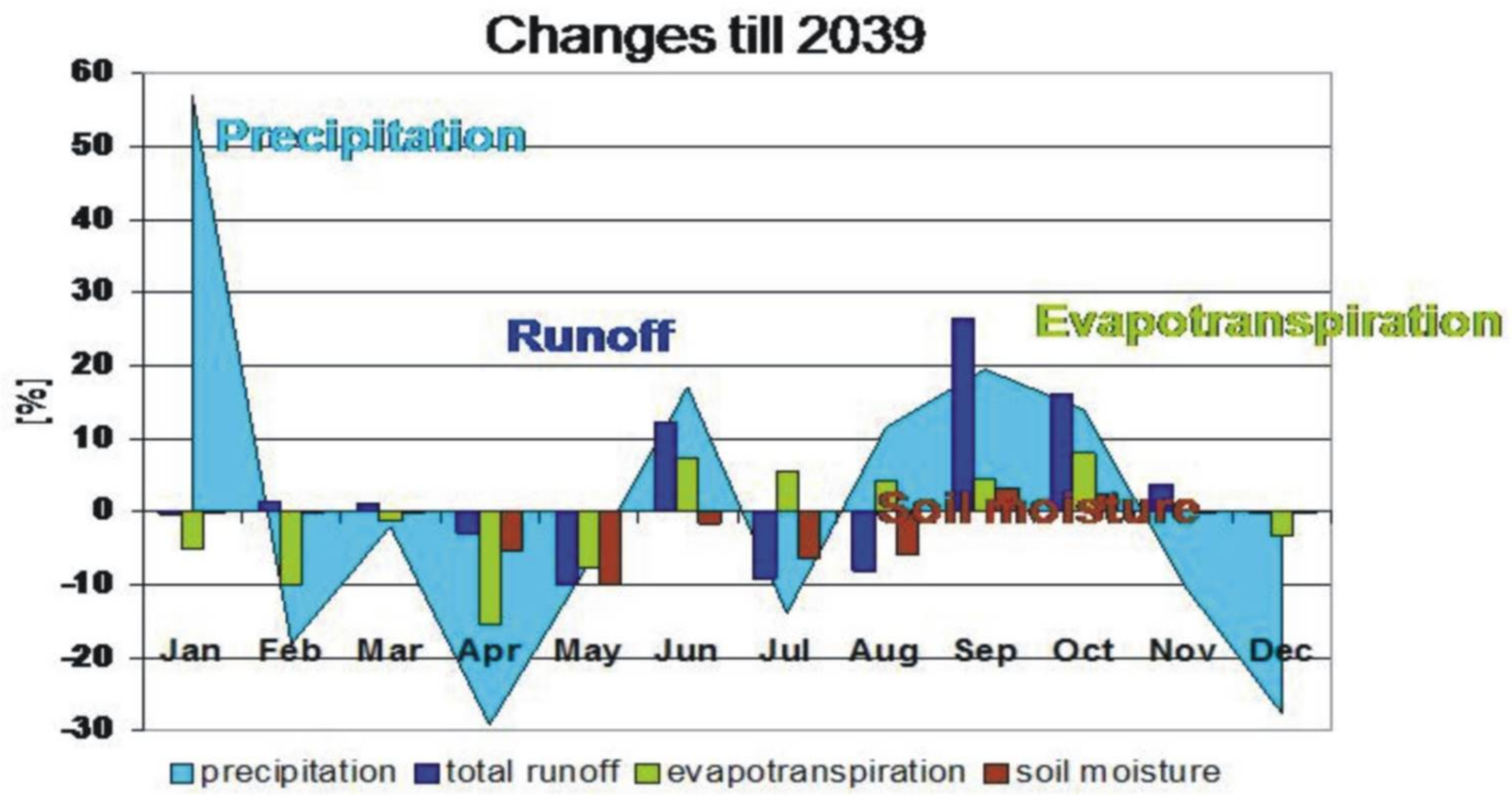
Regional Hydrological Modeling

Impact Climate Change on Water Balance



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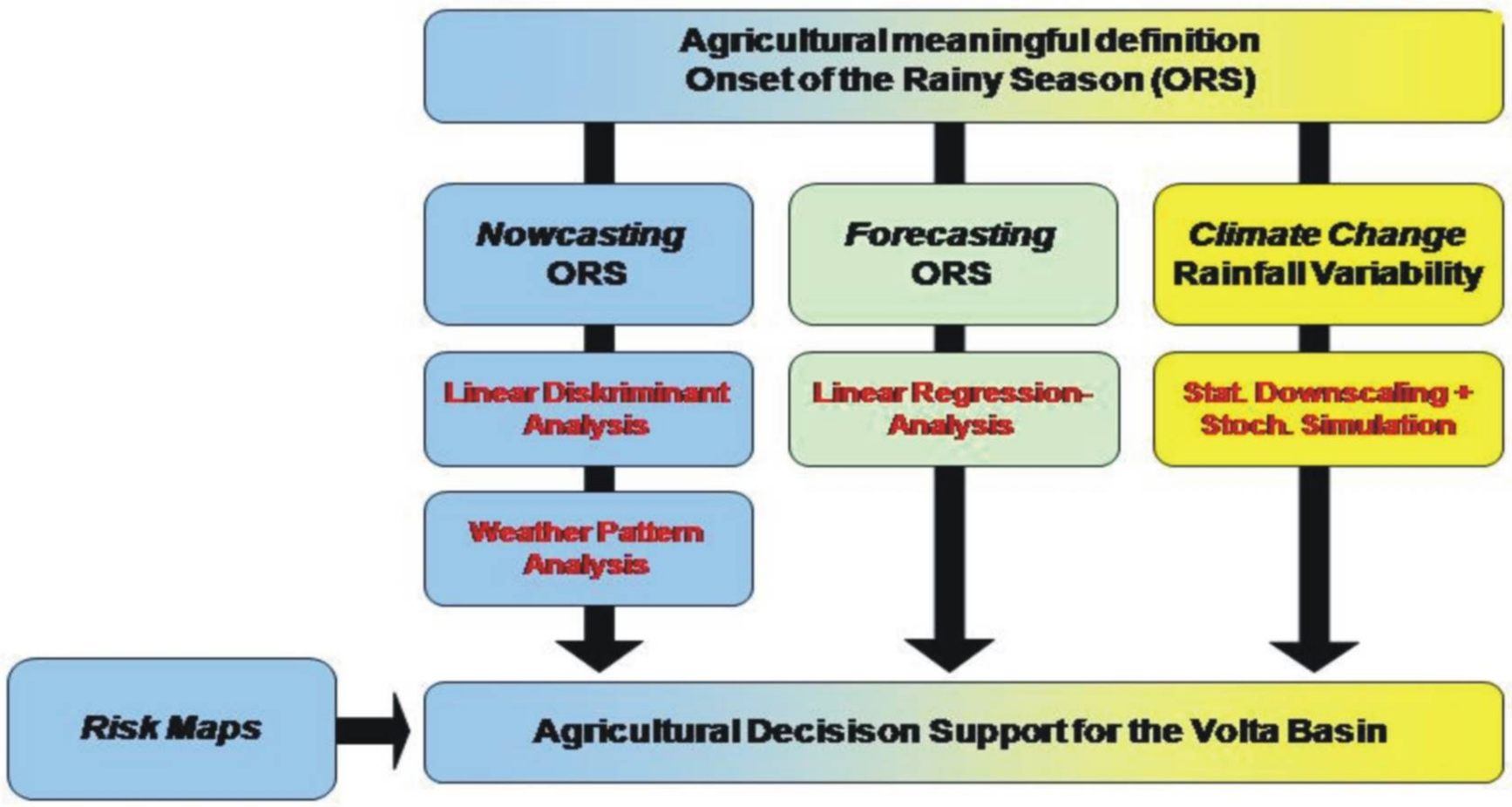
Agricultural *Decision Support System DSS*



[Laux et al., 2007, 2008 & 2009]

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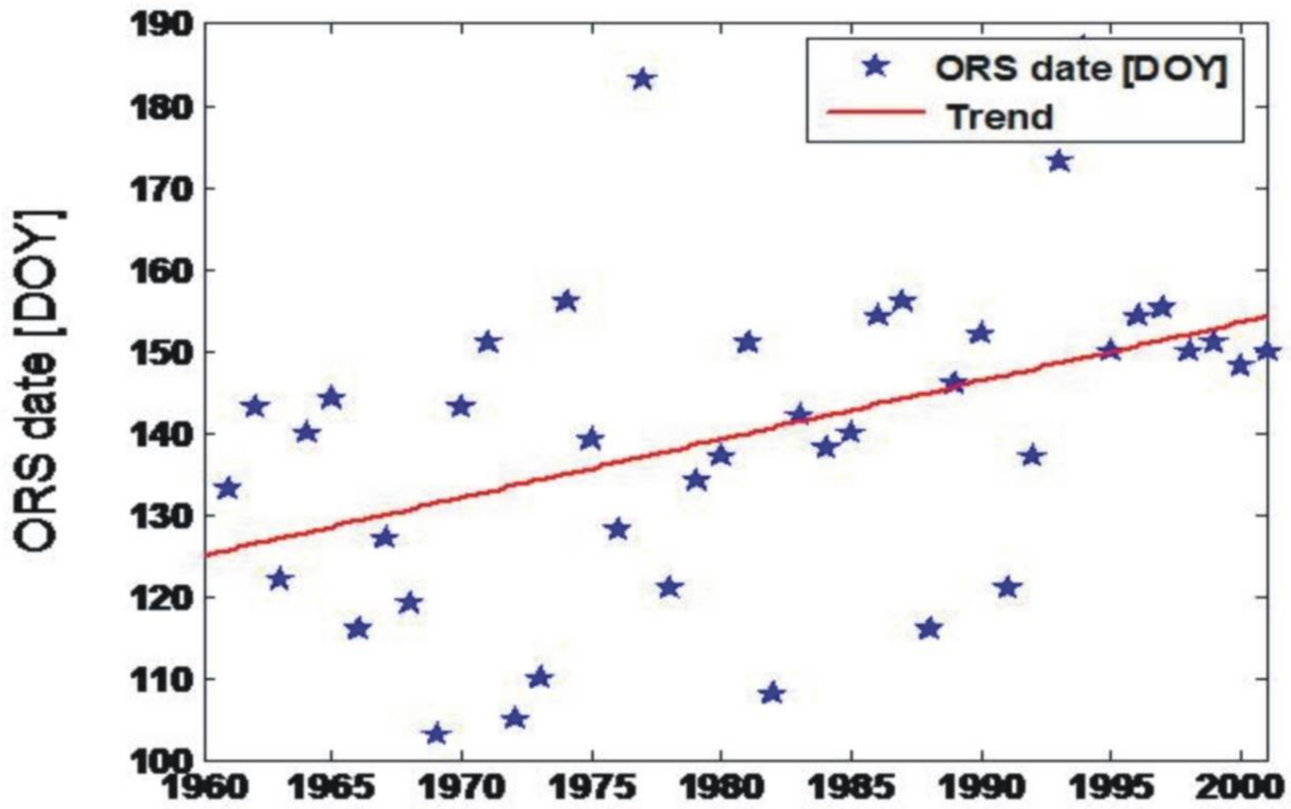
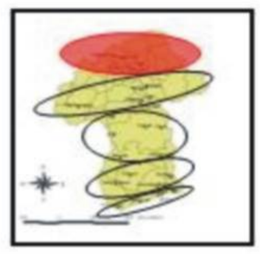
Climate Change and Onset of the Rainy Season





→ Significant delay of the ORS up to 30 days for 1961-2001

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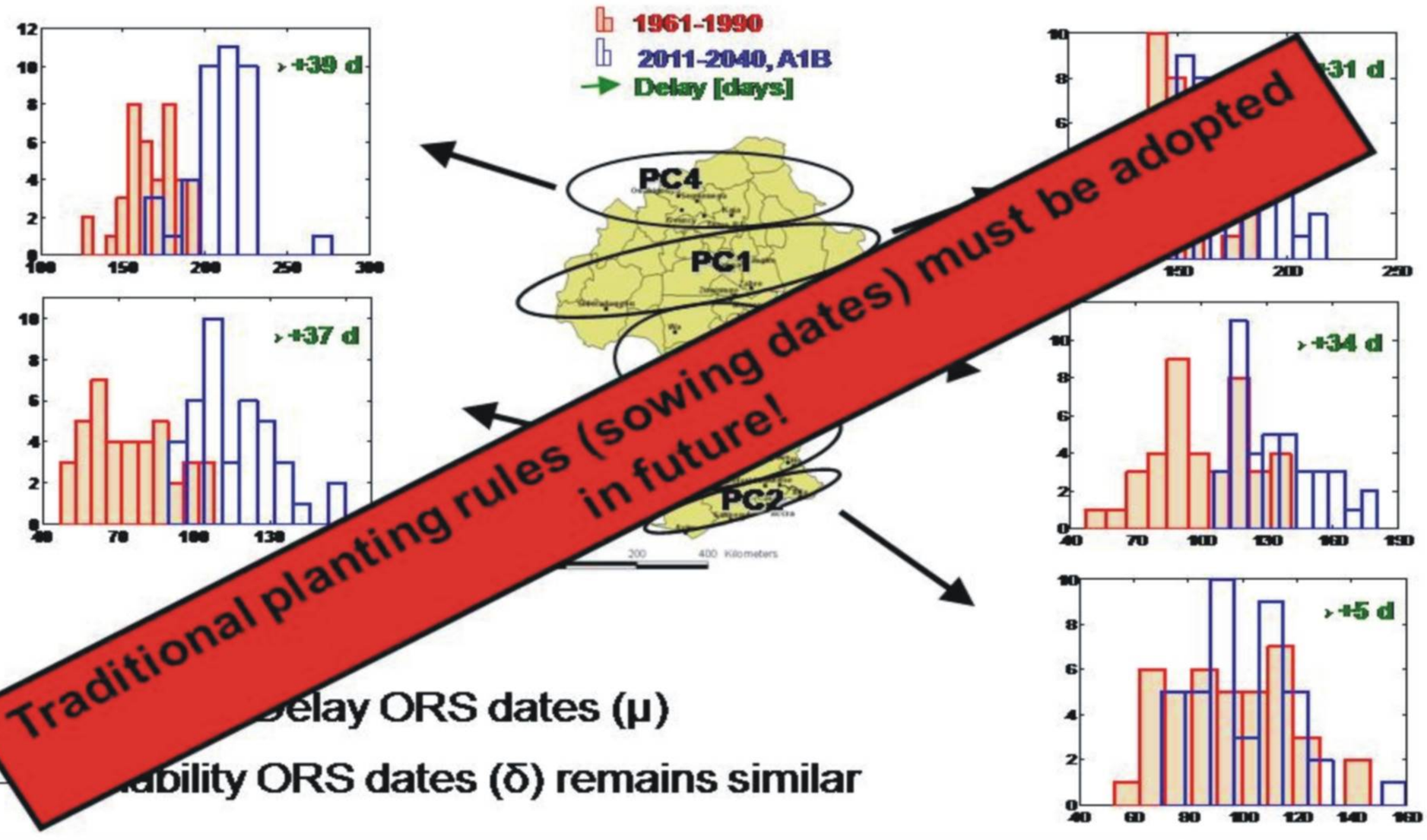
Onset of the Rainy Season in future?



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PLANT A TREE TODAY

Case study 1: Volta Basin (Ghana & Burkina Faso)

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Conclusions

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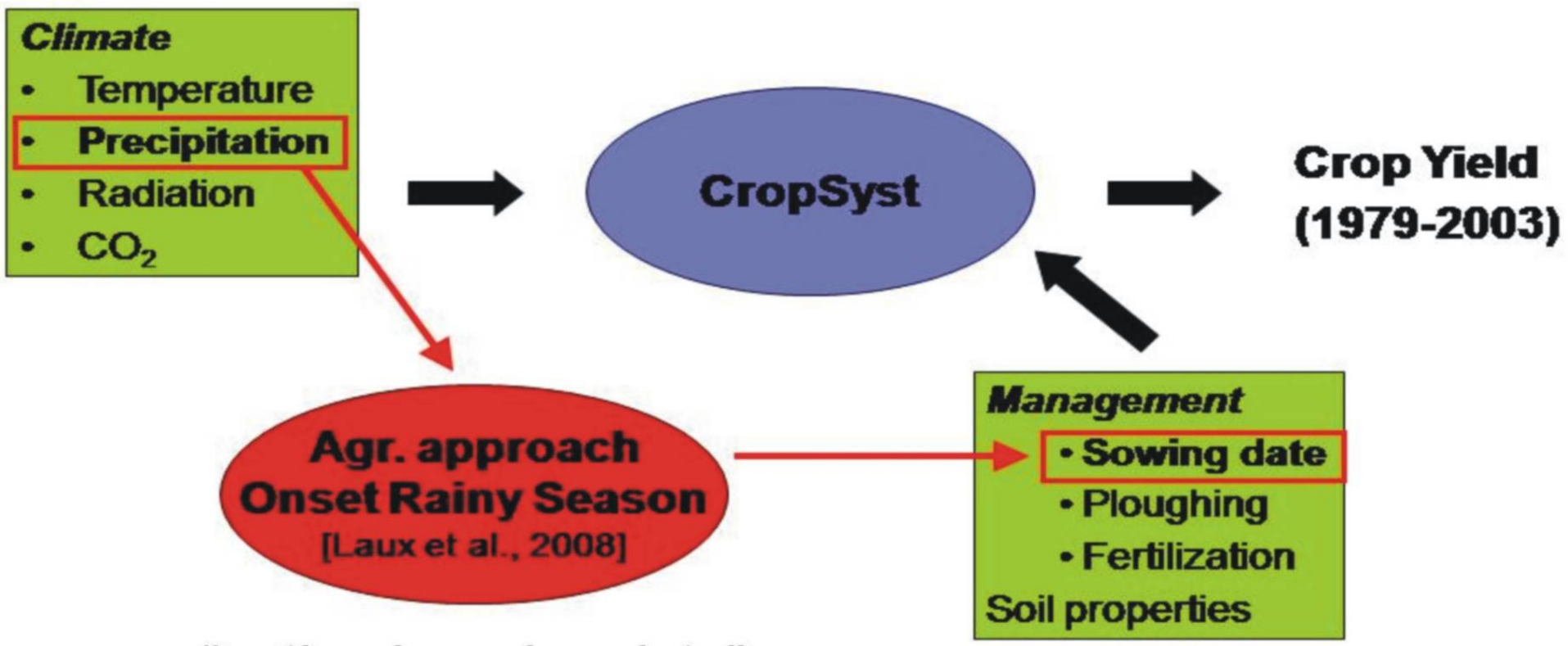
Impact Sowing Date on Crop Yield

Joint Climate Crop Modelling (only useful for rainfed agriculture)



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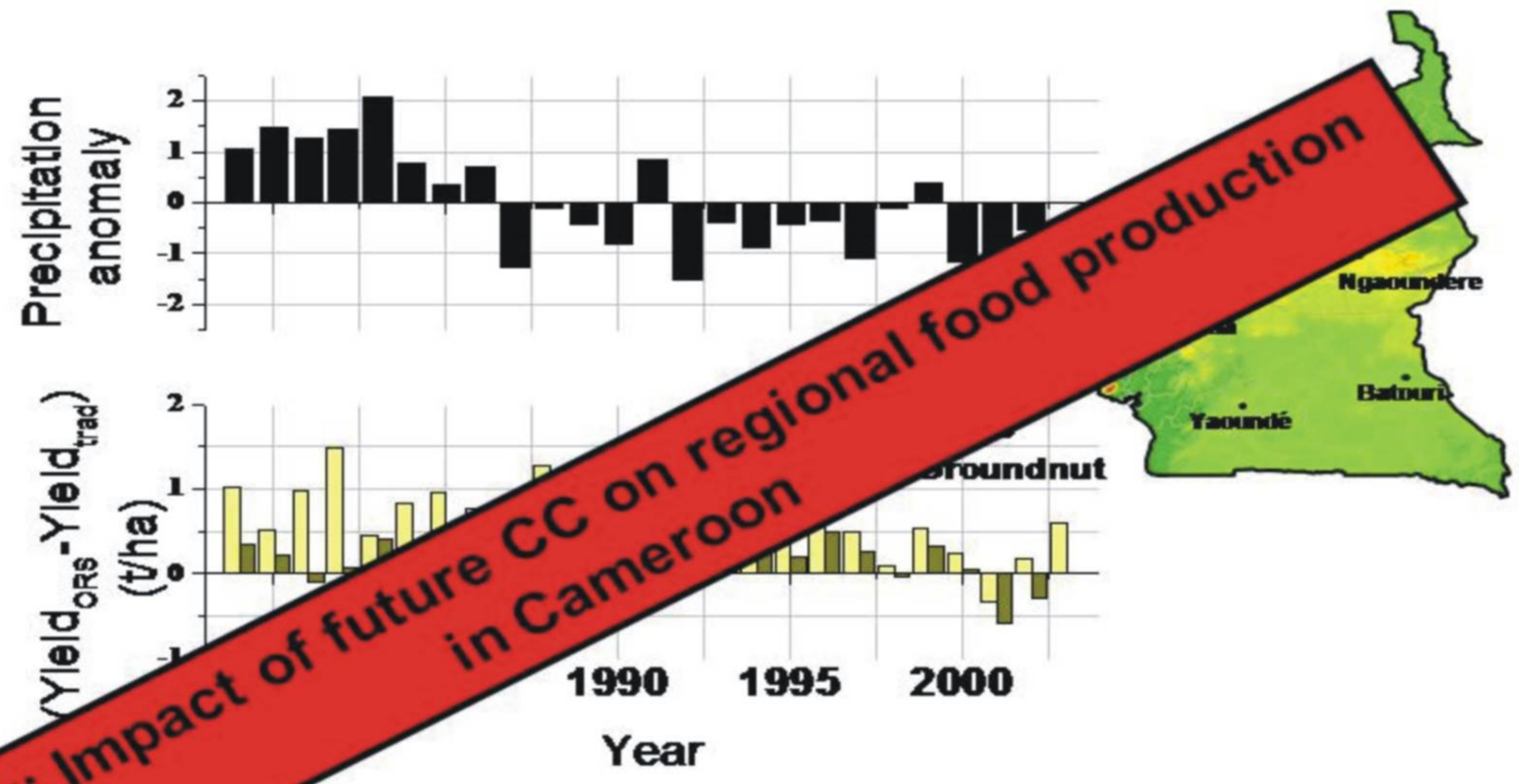
Approach ORS vs. Traditional Sowing Rules



Outlook: Impact of future CC on regional food production in Cameroon

...979-2003) increased up to 20% using ORS approach

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Some conclusions

- Spatially distributed **change of precipitation** (between -20 and +50%) in the Volta Basin
  - ➢ Increase in the rainy season
  - ➢ Decrease at the onset of the rainy season
  - ➢ Significant delay of ORS expected in future
- **Agricultural DSS** could significantly increase crop yield (food security) in a cost-effective way
- Spatially distributed climate information **useful for different sectors** e.g. health sector

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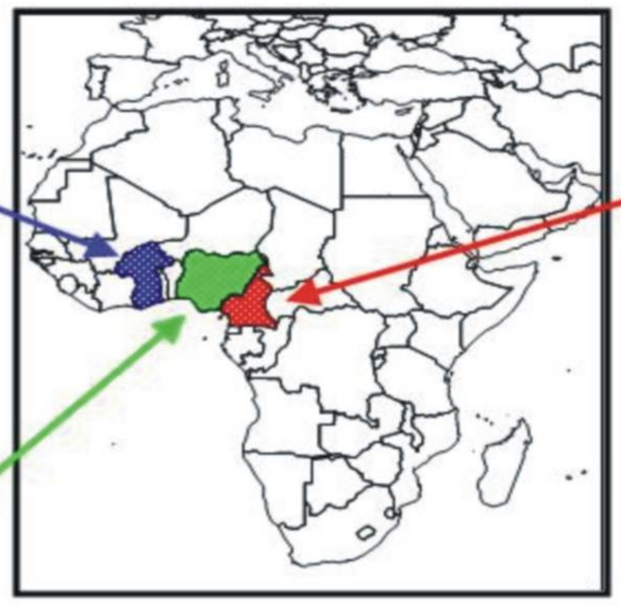
Challenges and opportunities for a German-Nigerian collaboration

Development Agro-Hydro-Meteorological Decision Support System for Ghana & Burkina Faso

Status: finalized



Evaluation of methods for Cameroon

Status: ongoing

Application for Nigeria: German-Nigerian cooperation

Status: wanted?

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Further Information

Grote, R., Lehmann, E., Brümmer, C., Brüggemann, N., Szarzynski, J., Kunstmann, H. (2008) Modeling and observation of biosphere-atmosphere interactions in natural savannah and agriculture in Burkina Faso - West Africa, *Physics and Chemistry of the Earth*, accepted for publication

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Thank you for your attention!

24 | P. Laux | Institute for Meteorology and Climate Research (IMK-IFU) | 26.03.09

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What can be done to help farmers?

- **Evaluation & Improvement of existing tools (further projects)**
- **Capacity building at a very early stage of collaboration**
- **Reading the rains: intra-annual time scale**
- **Spreading the risk (alternatives)**
  - ➢ Irrigation strategies
  - ➢ Drought resistant species
  - ➢ DSS for rainfed agriculture …

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26 | P. Laux | Institute for Meteorology and Climate Research (IMK-IFU) | 26.03.09
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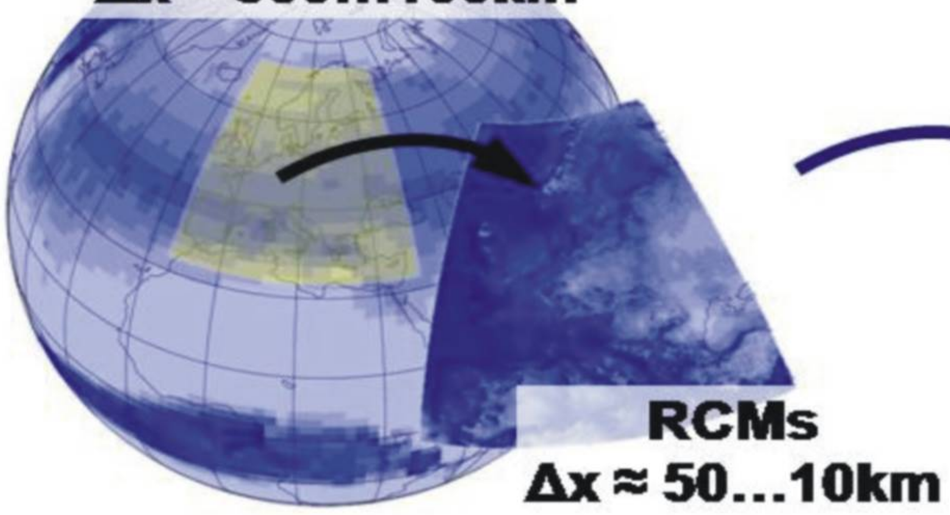
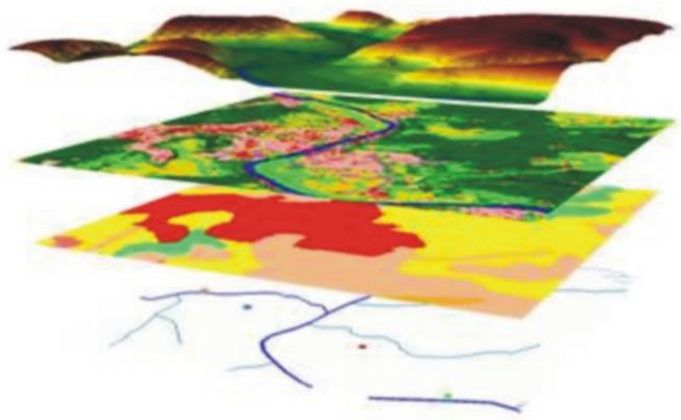
Regional Climate Modelling: Downscaling

GCMs
Atmosphere & Ocean
Δx ≈ 300…100km

Hydrology

Catchment Hydrology:
Δx ≈ 1km…100m





Dynamic downscaling by RCMs

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Regional Climate Modeling

Momentum conservation

$$\frac{\partial \vec{v}}{\partial t} + (\vec{v}\cdot\nabla)\vec{v} = -f\vec{k}\times\vec{v} - \nabla\Phi - \frac{1}{\rho_a}\nabla p_a + \frac{\eta_a}{\rho_a}\nabla^2\vec{v} + \frac{1}{\rho_a}(\nabla\cdot\rho_a\mathbf{K_m}\nabla)\vec{v}$$

Energy conservation

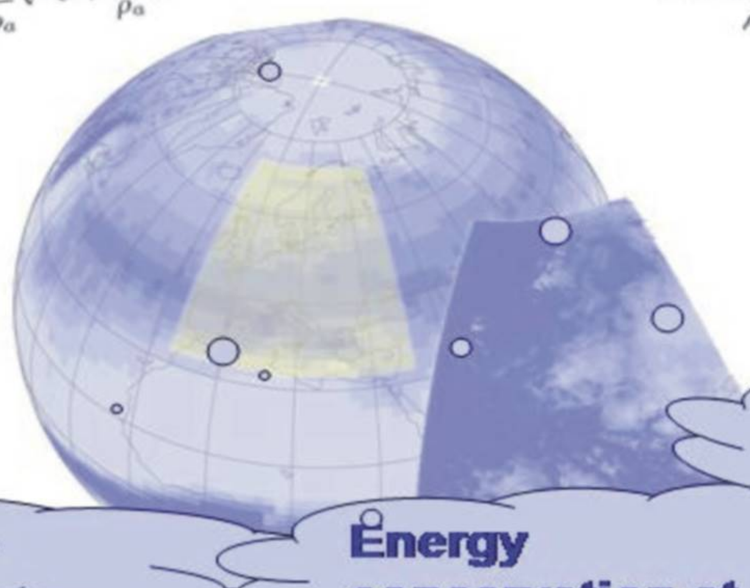
$$\frac{\partial\theta_v}{\partial t} + (\vec{v}\cdot\nabla)\theta_v = \frac{1}{\rho_a}(\nabla\cdot\rho_a\mathbf{K_h}\nabla)\theta_v + \frac{\theta_v}{c_{p,d}T_v}\sum_{n=1}^{N}\frac{dQ_n}{dt}$$

Gas law

$$p = \frac{nR^*T}{V}$$

Air mass conservation

$$\frac{\partial\rho_a}{\partial t} + \nabla\cdot(\vec{v}\rho_a) = 0$$



Soil temperature diffusion

Conservation water mass

$$\frac{\partial q_v}{\partial t} + (\vec{v}\cdot\nabla)q_v = \frac{1}{\rho_a}(\nabla\rho_a\mathbf{K_h}\nabla)q_v + R_{evap} - R_{cond} - R_{iini} - R_{idep/sub}$$

$$\frac{\partial q_c}{\partial t} + (\vec{v}\cdot\nabla)q_c = \frac{1}{\rho_a}(\nabla\rho_a\mathbf{K_h}\nabla)q_c + R_{cond} + R_{iini} + R_{idep/sub} - R_{aconv} - R_{accr}$$

$$\frac{\partial q_r}{\partial t} + (\vec{v}\cdot\nabla)q_r = \frac{1}{\rho_a}(\nabla\rho_a\mathbf{K_h}\nabla)q_r - R_{evap} + R_{aconv} + R_{accr} - \frac{\partial V_f\rho_a g q_r}{}$$

Energy conservation at land surface

$$= SW_{net} + LW_{net}$$

$$= (1-\alpha)SW\downarrow + LW\downarrow - \epsilon\,\sigma_B\,T^4_{surf}$$

$$C(\Theta)\frac{\partial T_s}{\partial t} = \frac{\partial}{\partial z}\left[K_t(\Theta)\frac{\partial T_s}{\partial z}\right]$$

Soil water infiltration

$$\frac{\partial\Theta}{\partial t} = \frac{\partial}{\partial z}\left[D(\Theta)\frac{\partial\Theta}{\partial z}\right] + \frac{\partial k(\Theta)}{\partial z}$$

Precipitation

$$R_{evap\ (rain)} = \frac{2\pi N_{0r}(S_w - 1)}{A_r + B_r}\left[\frac{0.78}{\Lambda_r^2} + 0.32\left(\frac{a_r\rho}{\eta_a}\right)^{1/2} S_c^{1/3}\frac{\Gamma(5/2 + b_r/2)}{\Lambda_r^{5/2+b_r/2}}\right]$$

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Lagos Summit on Climate Change - Reclaiming the Environment:
Challenges and consequences of Climate Change
24th – 26th March 2009

Karl-Heinz Koehler
Former UNESCO ASPnet National Coordinator Germany

Climate Change Awareness and Capacity Building for Sustainable Development

The German case study

Climate Change Awareness in Germany

- Results of a recent survey

  80 % think human beings cause climate change
  64 % believe climate change threatens mankind

- A new insurance against catastrophes caused by climate change

- Jokes

Climate Change Awareness and Capacity Building for Sustainable Development

I. What does Capacity Building for Sustainable Development mean?

II. Examples:
Capacity Building for Sustainable Development involving Climate Change Awareness and international Cooperation

I. What does Capacity Building for Sustainable Development mean?

Sustainable development (SD) means

- to ensure/improve everyone's **quality of life**
- including that of **future** generations
- by reconciling **economic** growth, **social** development and **environmental** protection

In 1987, the World Commission on Environment and Development, presided by Brundtland, used the expression in its report for the first time.

The main points of the concept: defined in the „Agenda 21" adopted at the Rio Earth Summit in 1992.

What is capacity building for sustainable development?

The main part of capacity building for sustainable development is **education for sustainable development (ESD)** which will contribute to enabling

- **citizens** to face the challenges of the present and future and
- **leaders** to make relevant decisions for a viable world.

Aim: using education to make people capable of acting to create a fairer worldwide distribution of opportunities in life, while respecting environmental considerations.

Education for sustainable development is promoted through the **UN Decade** Education for sustainable development (2005 – 2014).

Aspects of Education for Sustainable Development (de Haan 2007)

- Learning about creative solutions that could make economic prosperity and the conservation of nature a simultaneous possibility
- Providing the knowledge needed to develop innovative, resource-saving techniques
- Knowledge of new forms of political action in which the engagement of civil society is more highly valued
- Reflecting on new lifestyles which combine wellbeing, contentment and respect for nature and other people
- Taking up the viewpoint of people from other countries
- Fair trade initiatives
- New forms of worldwide cooperation

The Core Competence in the Concept of ESD

Gestaltungs Competence (de Haan 2007) = Ability

- to use analysis of the present and studies of the future to draw consequences about environmental, economic and social developments in their mutual interdependence
- to take logical decisions on this basis
- to understand their consequences
- to act on them individually, cooperatively and politically so as to make sustainable development processes a reality

Why the topic climate change for capacity building for sustainable development ?

Climate change is one of the most important issues in our time.

Using this topic the three dimensions of education for sustainable development can be covered in a clear and convincing way:

- ecological dimension, e.g. more dangerous storms
- economic dimension, e.g. new industry for renewable energies
- social dimension, e.g. poverty reduction through renewable energies

The topic Climate change combines the local and the global level.

II. Examples:

Capacity Building for Sustainable Development Involving Climate Change Awareness and International Cooperation

Organisation of the UN Decade ESD in Germany

Official German Projects of the UN Decade ESD

There are about 100 projects concerning climate.
You will find some of them on the website

http://www.bne-portal.de/

Click on "English" -> "Official German Projects"
-> "List of Official German Decade Projects"

Nachhaltigkeit lernen
Weltdekade der Vereinten Nationen 2005–2014
Bildung für nachhaltige Entwicklung
UNESCO

e.g. Allianz Zukunft "Blauer Planet"
Ch@t der Welten
www.verbraucherbildung.de

Interested in cooperation? Please contact the projects

Annual Themes

- 2009: Energy

  This multifaceted theme encompasses a wide spectrum of sustainable development areas, such as renewable energies, climate change or renewable raw materials.

- More information:

  http://www.bne-portal.de/

  Click on “English“ -> “Annual themes“ -> “2009: Energy“

- Interested in cooperation? Please contact the German Commission for UNESCO/Secretariat UN Decade ESD: http://www.bne-portal.de/

UNESCO Associated Schools
The International Climate Change and Global Warming Project of the BBS Osterholz-Scharmbeck

- Aim: to make students aware of the impact of humans‘ actions on the environment

SUSEMAS
SUSTAINABILITY THROUGH ECO MANAGEMENT & AUDIT SCHEME

- Stage 1/ Nov. 2008: Students from Romania, Turkey and Germany researched and prepared a brief presentation on the climate change impact in their own country (including a survey)

- Stage 2/ Dec. 2008: Meeting of the students in Germany: presentation of the results of their work to the students from the other schools and joint project work (preparing a theater play on the global warming topic)
- Stage 3/ Dec. 2008: Performance of the theater play to the school community and guests
- More information on the website of the project:

http://www.sus-emas.ro/activities/show_activity/id/44

- Methodology of the Climate Change Project
- Questionnaire and results of the survey
- Videofilm about the project

Workshops for Teachers and Students from Arab Countries and Europe

- Organised by the German Commission for UNESCO
- Aim: Promoting Education for sustain-able development
- Contents: main issues of sustainability including energy and climate change
- Example: Workshop in Barka, Oman Nov. 2008

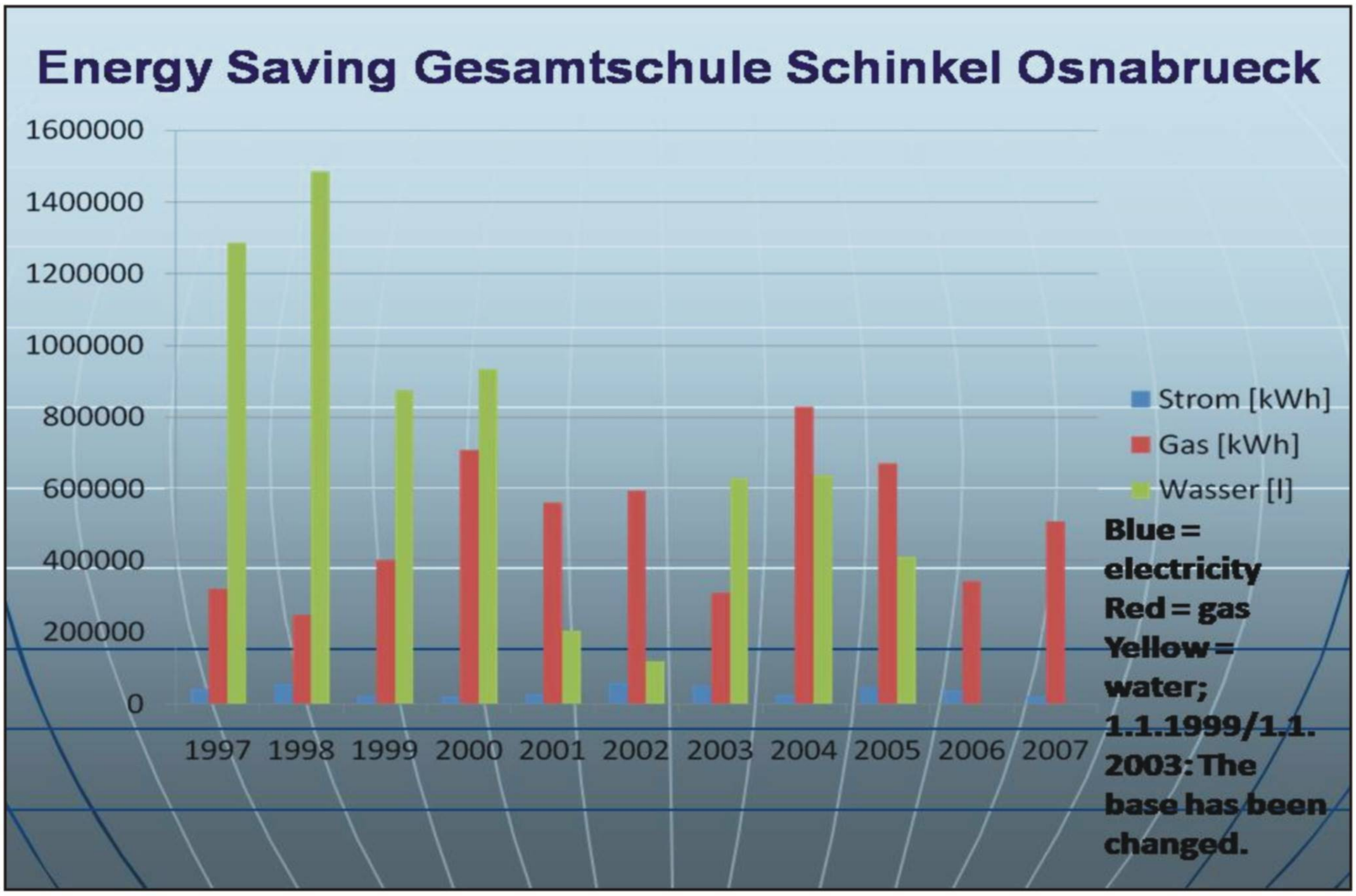
Energy Saving by the German UNESCO ASPnet School Gesamtschule Schinkel Osnabrueck – Presented during the Workshop in Oman

Overall result in 2007

Energy saving: 31.415,35 €

Distribution of the savings

- 40% freely usable for the school = 12.566,14 €
- 35% for energy saving projects of the school = 10.995,37 €
- 25 % for energy cost reduction for the town = 7.853,84 €



UNESCO ASPnet School G.-Hauptmann-Schule Rossleben, Germany: Renewable energies projects and international School Partnership

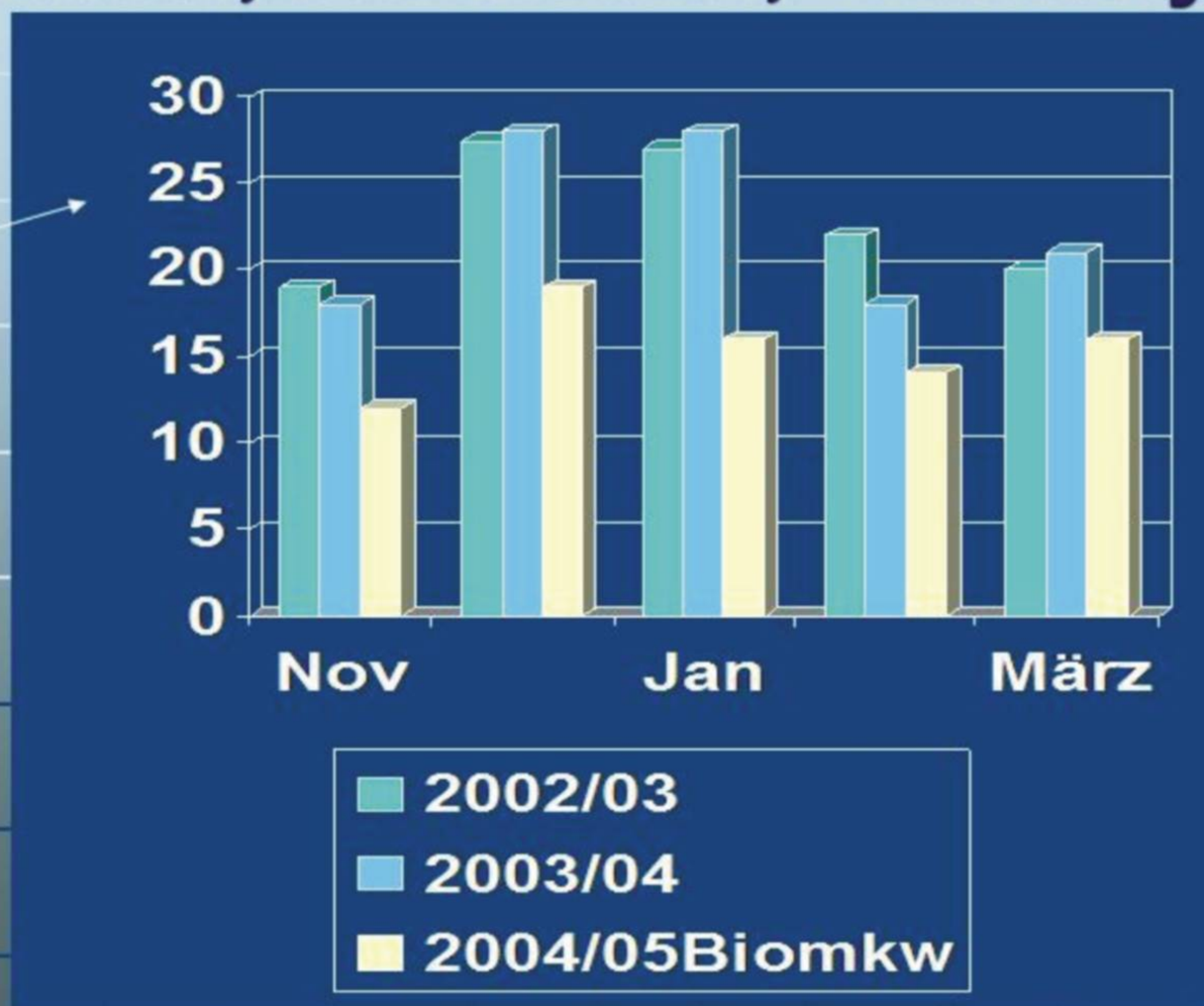
- Thematic focus: climate, renewable energies
- Projects: photovoltaic conversion, solar hot-water supply, weather station, biomass power station etc.
- Students' company; thematic focus also integrated in daily lessons (the school influenced the State curriculum)

UNESCO ASPnet School G.-Hauptmann-Schule Rossleben, Germany: Renewable energies projects and international School Partnership (II)

- International cooperation: school partnership with a school in Kriwoi Rog, Ukraine – joint projects in the area climate/ESD
- Great interest in a partnership with a school in Lagos State

First Profitability Analysis of the Biomass Power Station in the UNESCO ASPnet School G.-Hauptmann, Rossleben, Germany

- Produced and needed MWh/Month
- Comparison Months Nov. - March (2004/ 2005: first year of biomass power station)
- Results: 25% energy saving; 75% less CO2 emission



Phenological Studies in UNESCO ASPnet Schools in 7 Countries around the Baltic Sea

Example: First observation of the brimstone (a butterfly) in the year (average per country)

Year	Latvia	Germany
1996	-----	04/14
1997	04/27	03/03
1998	04/11	04/07
1999	04/09	03/20
2000	04/01	03/21
2001	04/03	05/06
2002	04/06	04/20
2003	03/13	02/24
2004	-----	04/09
2005	03/25	03/23

8th International Project Day of the German UNESCO ASPnet

- Theme: "Our Action – Our Future"
- Climate change and energy will be important topics of the projects carried out
- Project work 2009 - presentation 26th April 2010
- All Schools from around the world are invited to participate in the project work and project day
- Please contact the German UNESCO ASPnet National Coordinator Mr. Hoerold: hoerold@asp.unesco.de

Information:

www.ups-schulen.de

Why students' projects on climate change?

- The topic climate change is about worldwide interdependences, the local and global dimension and therefore especially suitable for joint projects of schools in the South and North.
- On the basis of the topic climate change capacity building for sustainable development can effectively be promoted.
- That means to use action oriented learning methods and to enhance the school quality.
- Students are the future decision-makers; therefore they schould face the most important global challenges already in school.

- Students present their results to the public and contribute in this way to increasing awareness about climate change.
- Parents learn from their children with regard to environmental issues.
- Climate change and sustainable development can effectively only be tackeled through international cooperation. Students projects are good examples and training ground for international cooperation.

Conclusion

International projects on climate change, especially projects of students

- are important contributions to promoting climate change awareness in the public which will lead to changes of lifestyle, politics etc.,
- exemplify how sustainable development issues have to be tackled and
- are models for capacity building for SD.
- The best way to tackle issues of sustainable development is to involve young people, because it is about their future.

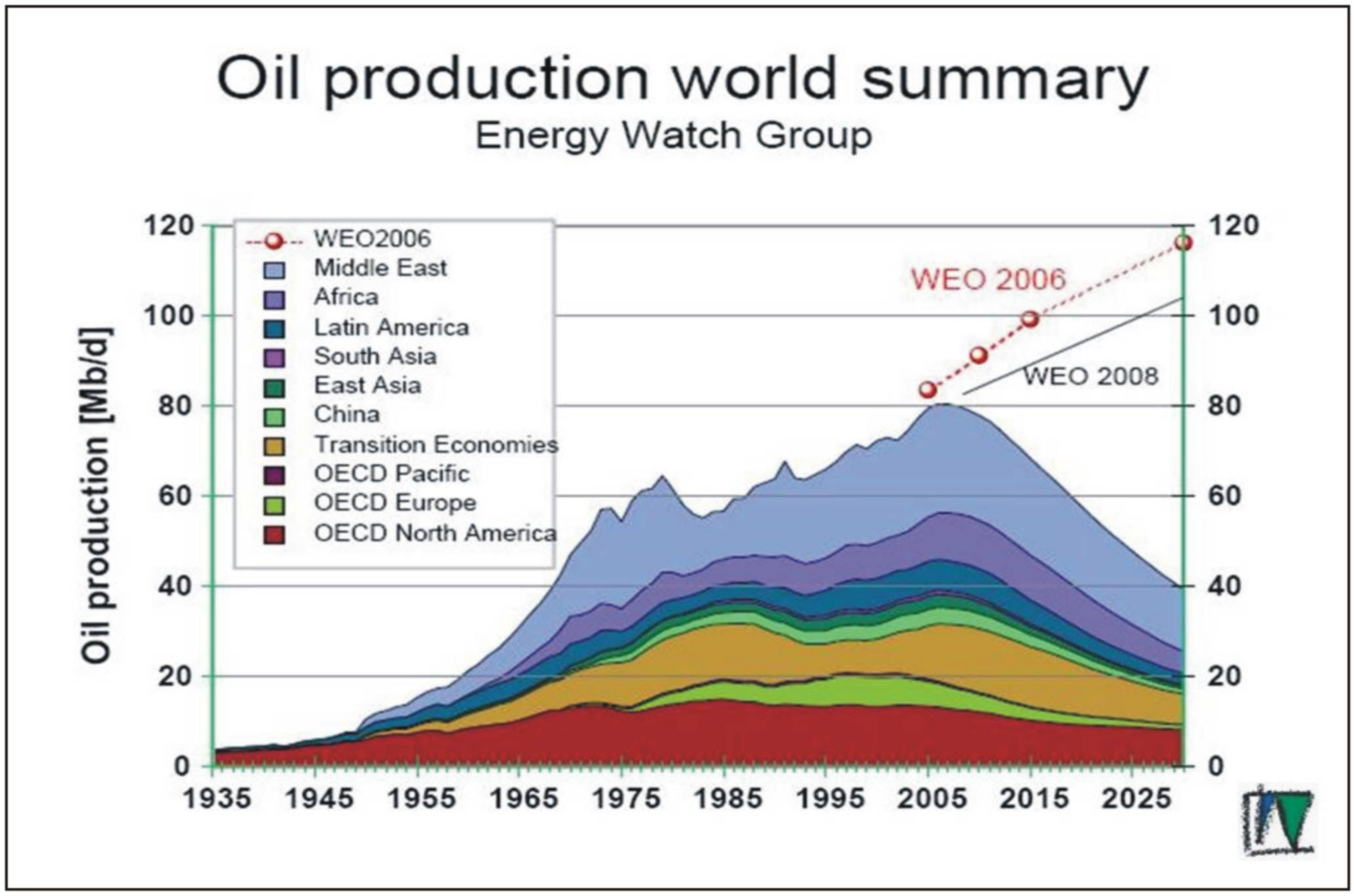
Thank you

Dr. Karl-Heinz Koehler
Munich
khkoehler@googlemail.com

Decentralized Renewable Energies in Germany
- prospect for collaboration with the Lagos State -

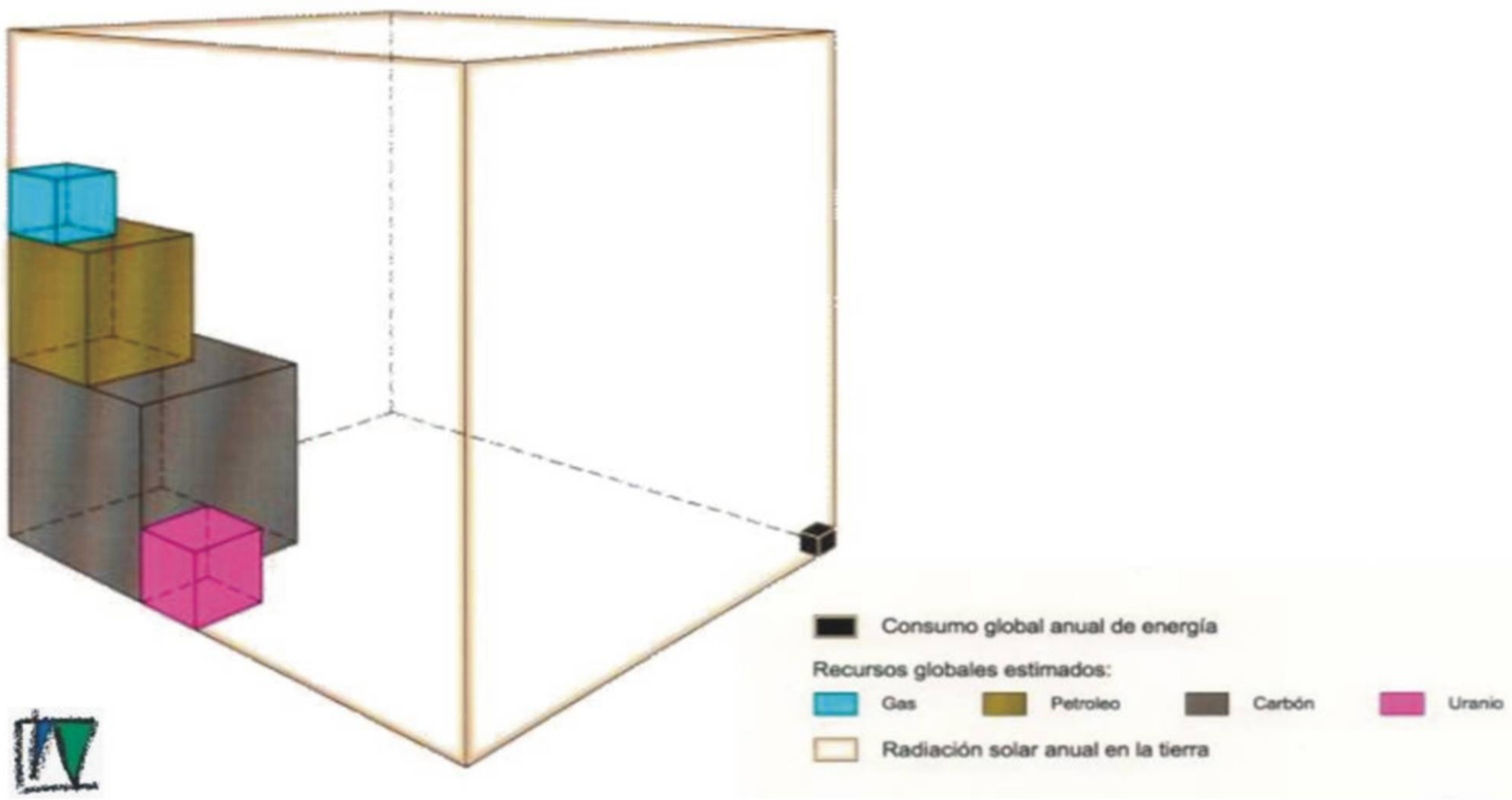
Contribution to „The Lagos Summit on Climate Change" in Lagos, Nigeria
26th March 2009

Prof. Dr. Ernst Schrimpff
Fachhochschule Weihenstephan
University of Applied Sciences
Bavarian Solar Energy Association

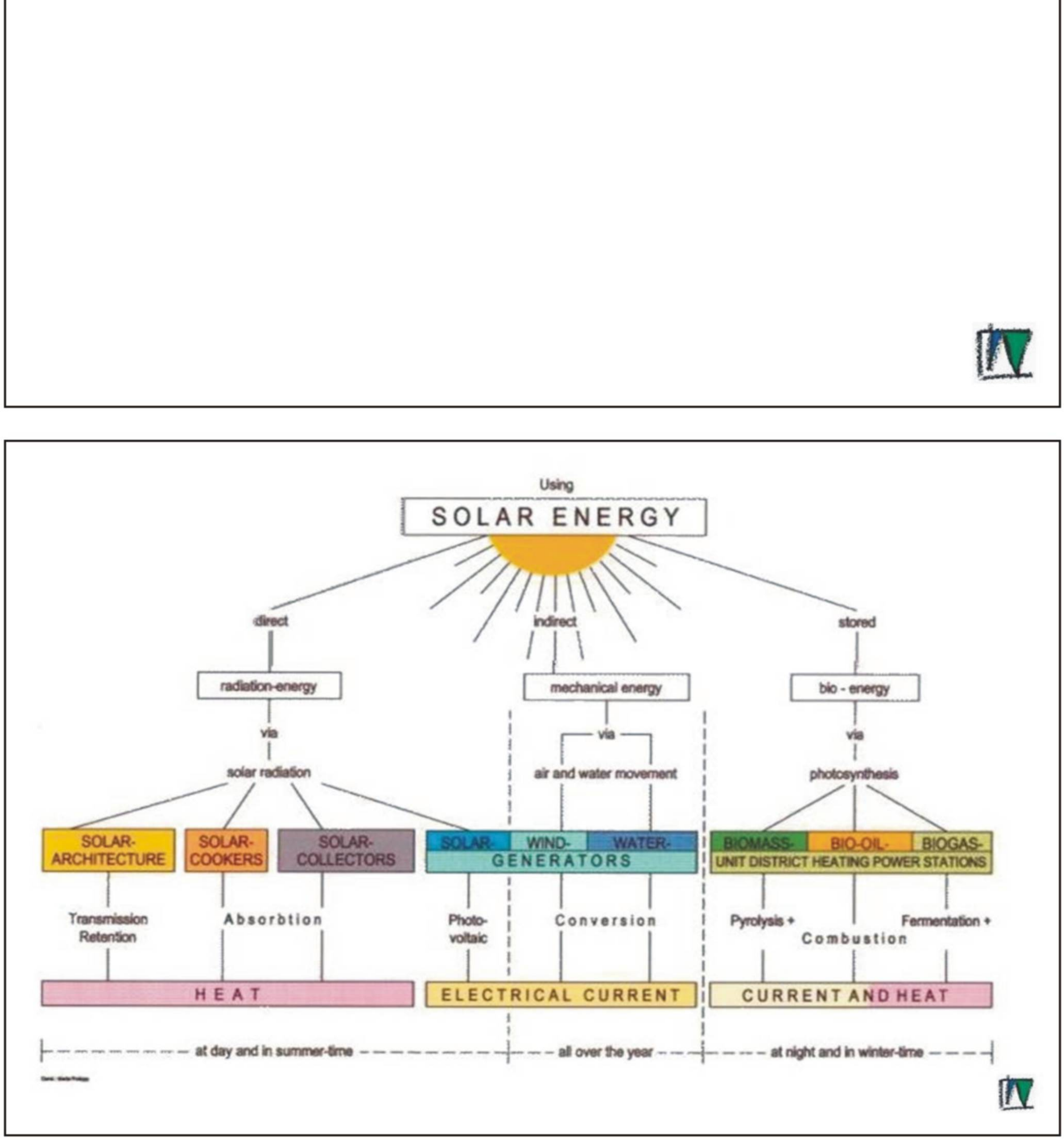


Renewables Potential

Global Energy Consumption and total Energy Reserves

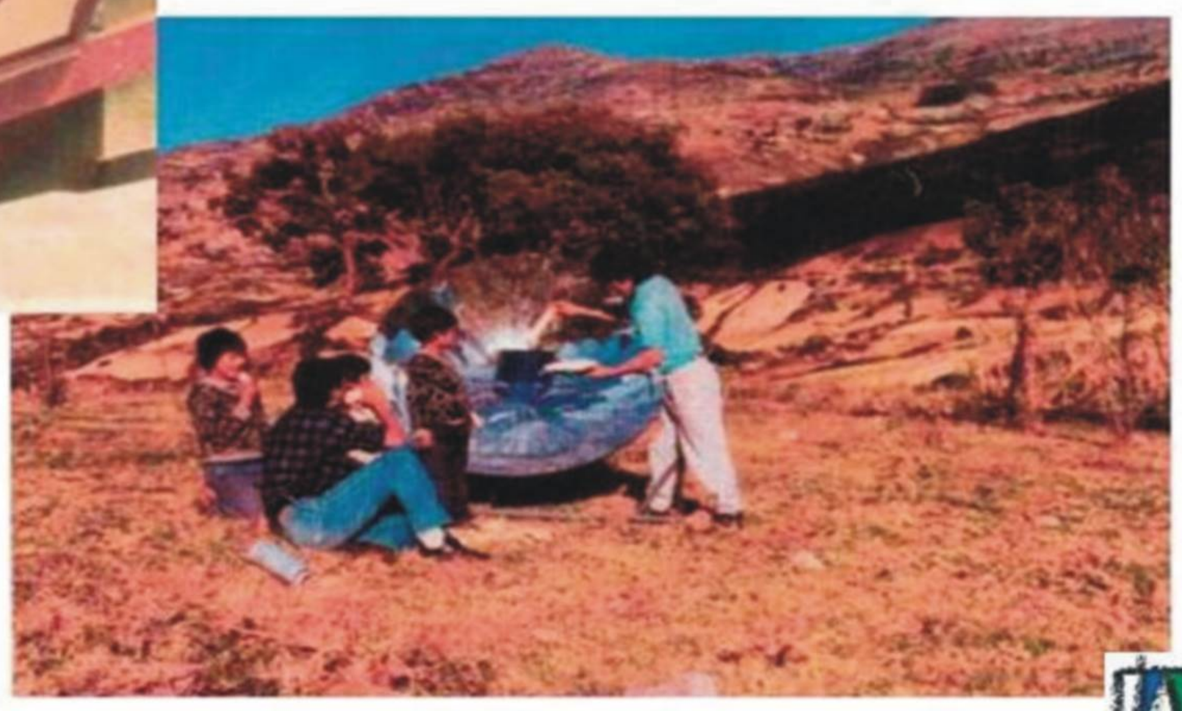


Using Solar Energy - the 3 Paths

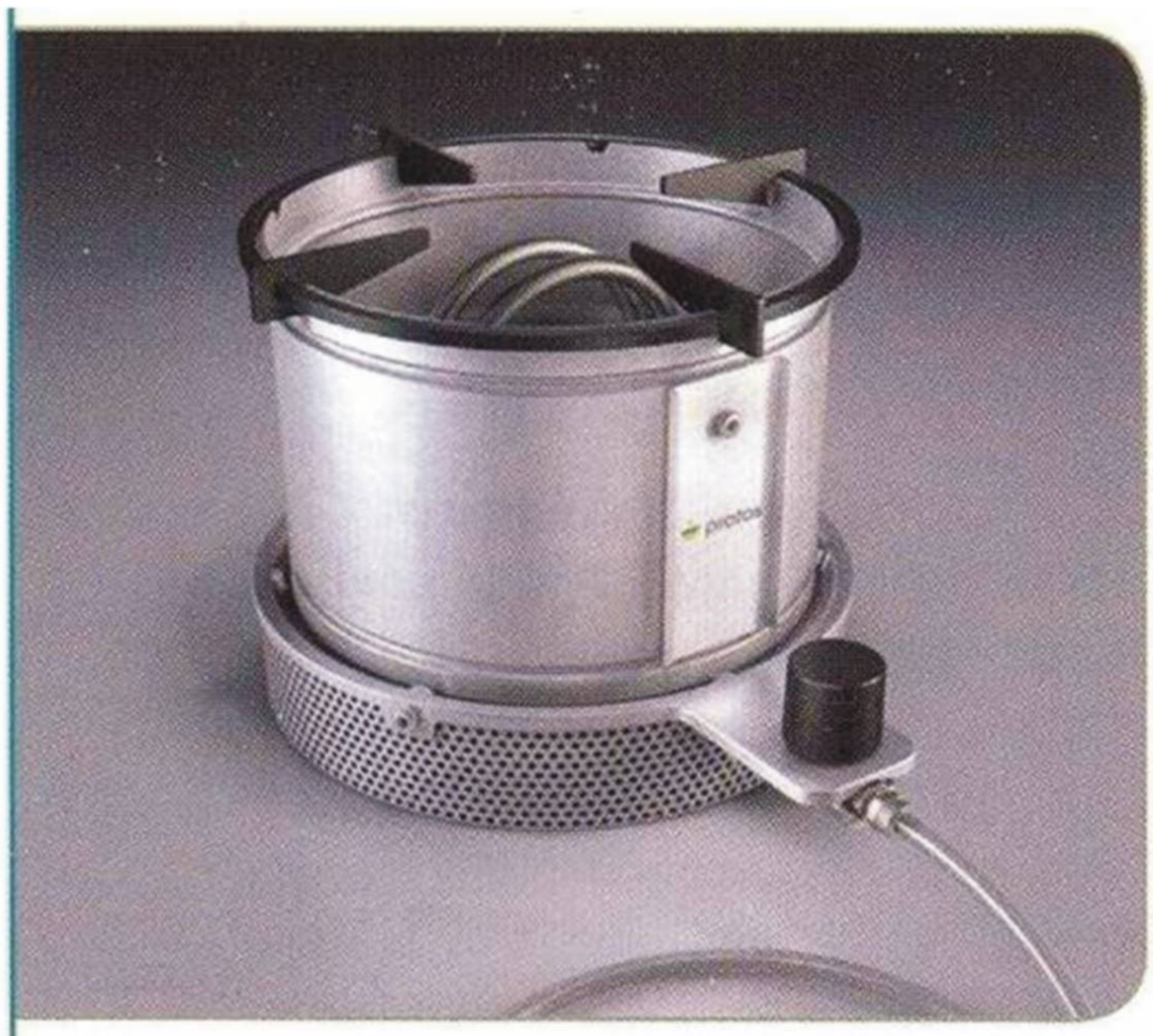


Solar heated zero-emission House in Bavaria

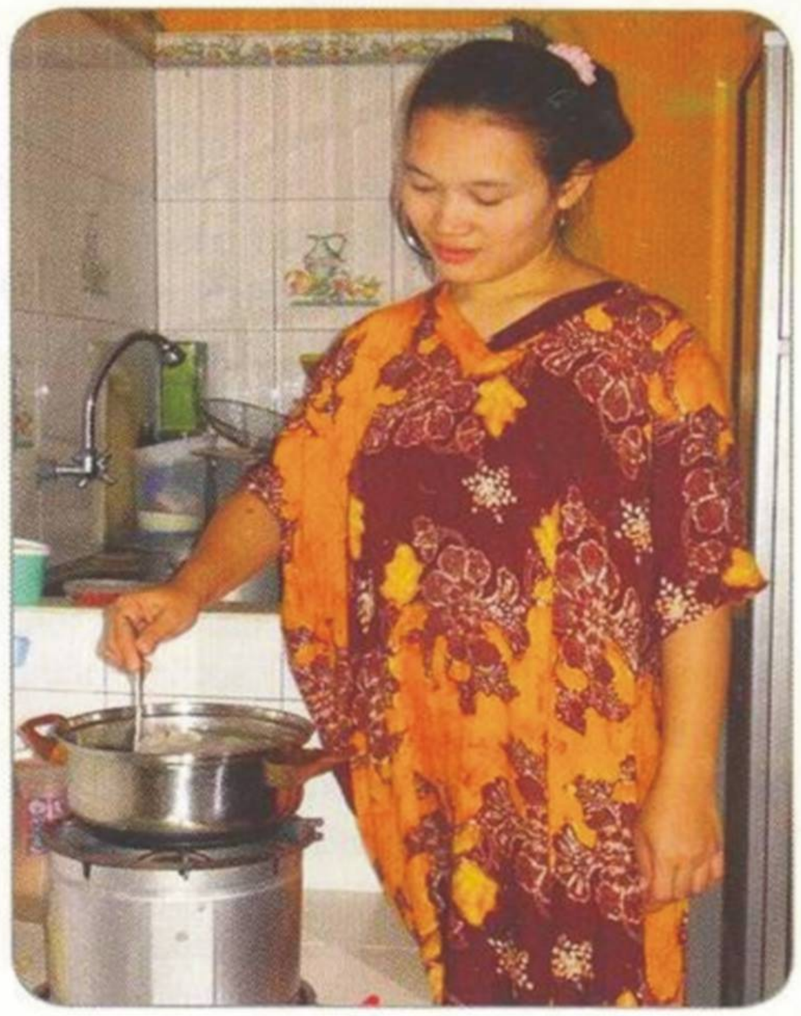
Solar Cookers



Plantoil Cooker



Pflanzenölkocher von Protos

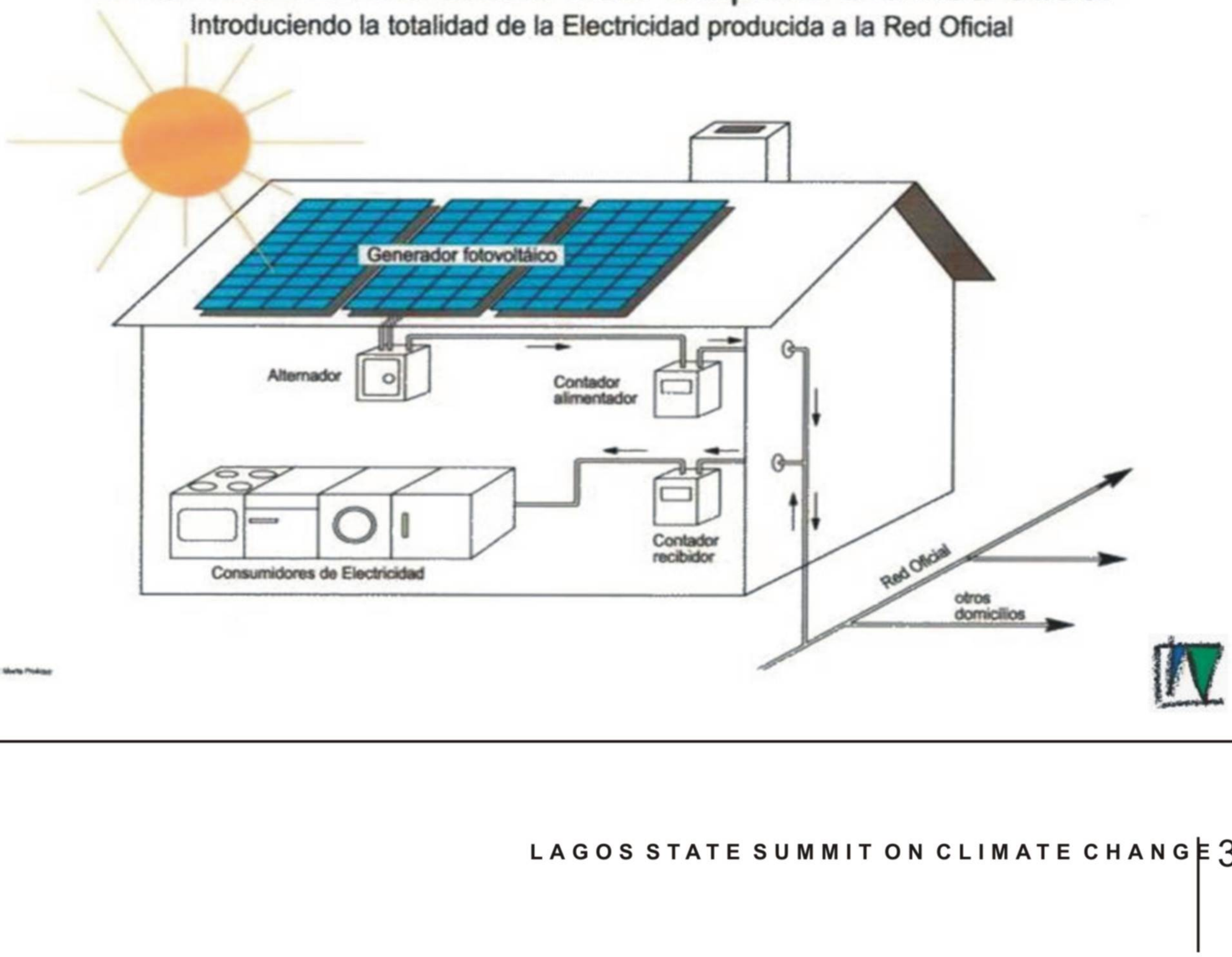


Indonesierin beim Kochen

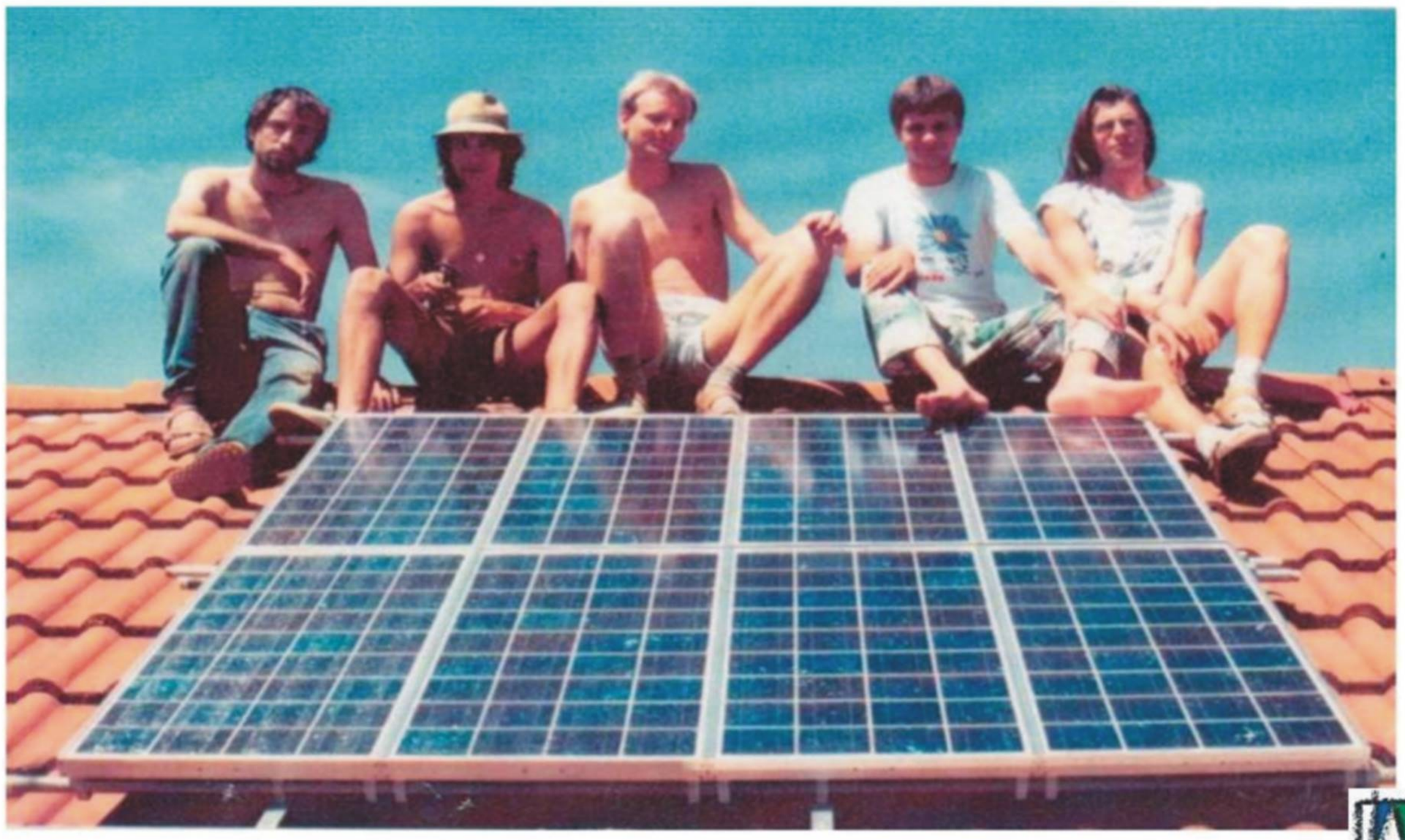
Solarcollectors on the Roof

Electricity

Grid connected PV-system



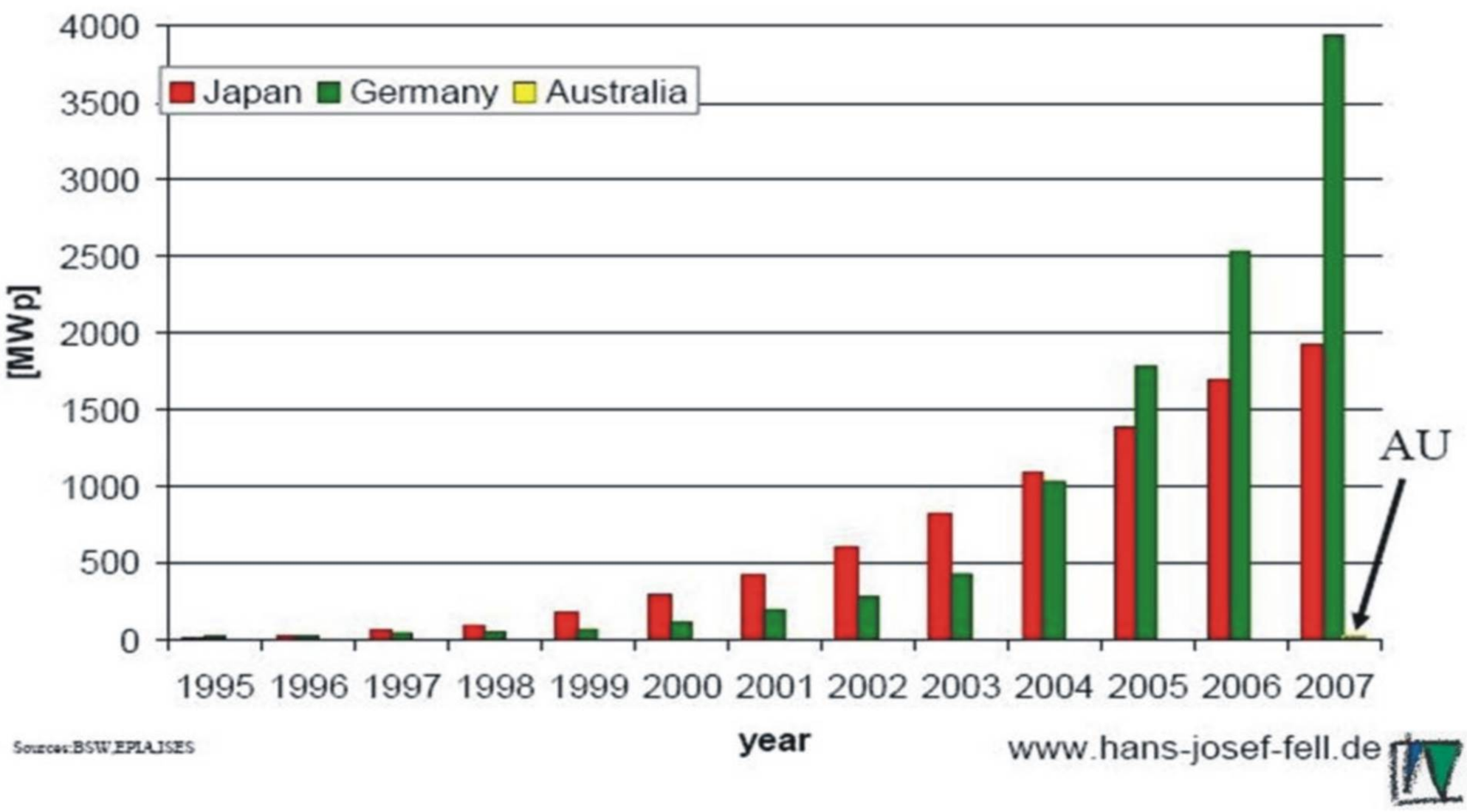
First PV-Plant on the roofs of Freising, Bavaria (1990)



Photovoltaics on Stadium Roof

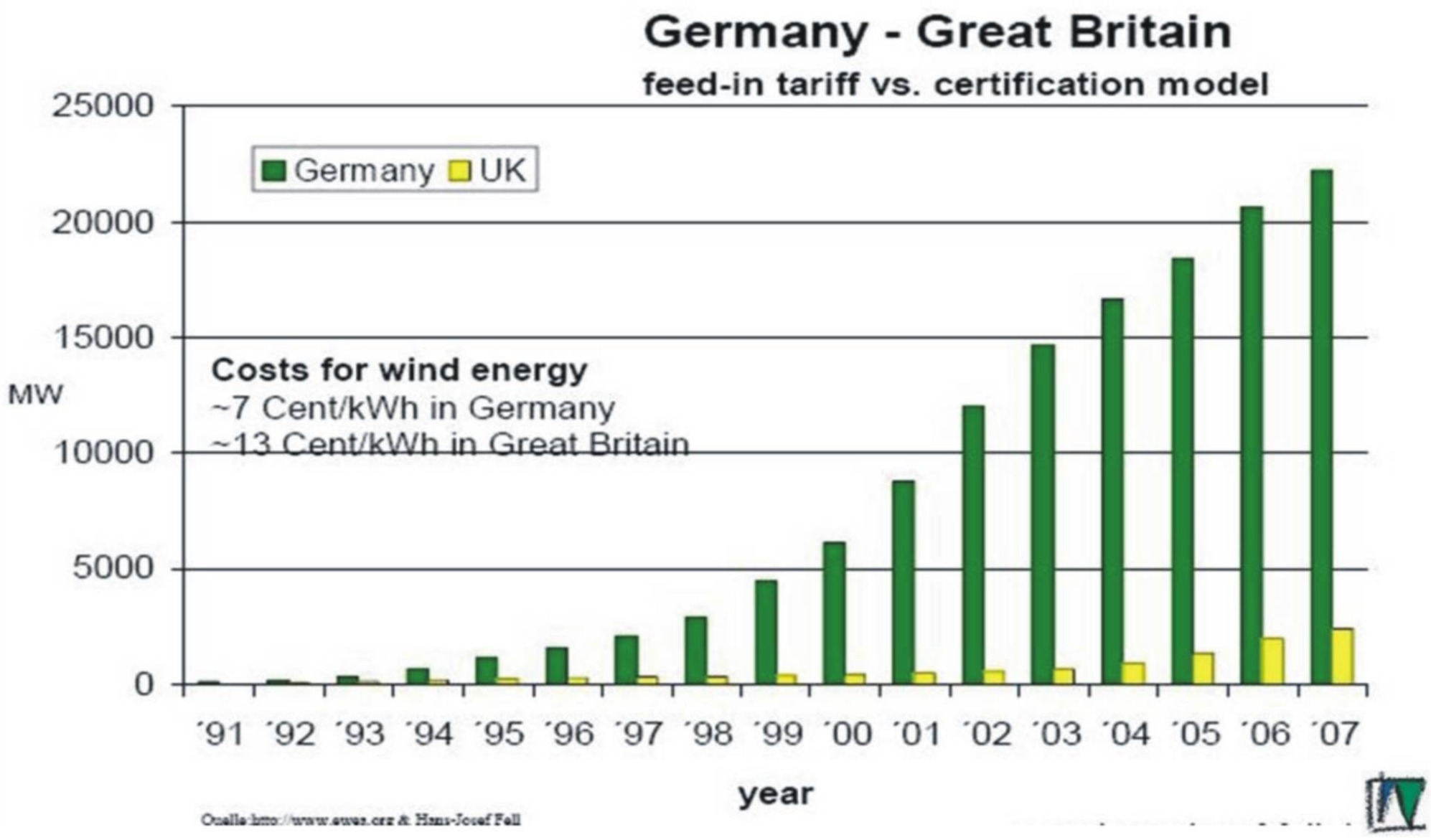
Photovoltaics on a Factory Roof

Photovoltaics – Germany, Japan and Australia



Wind Power Overview

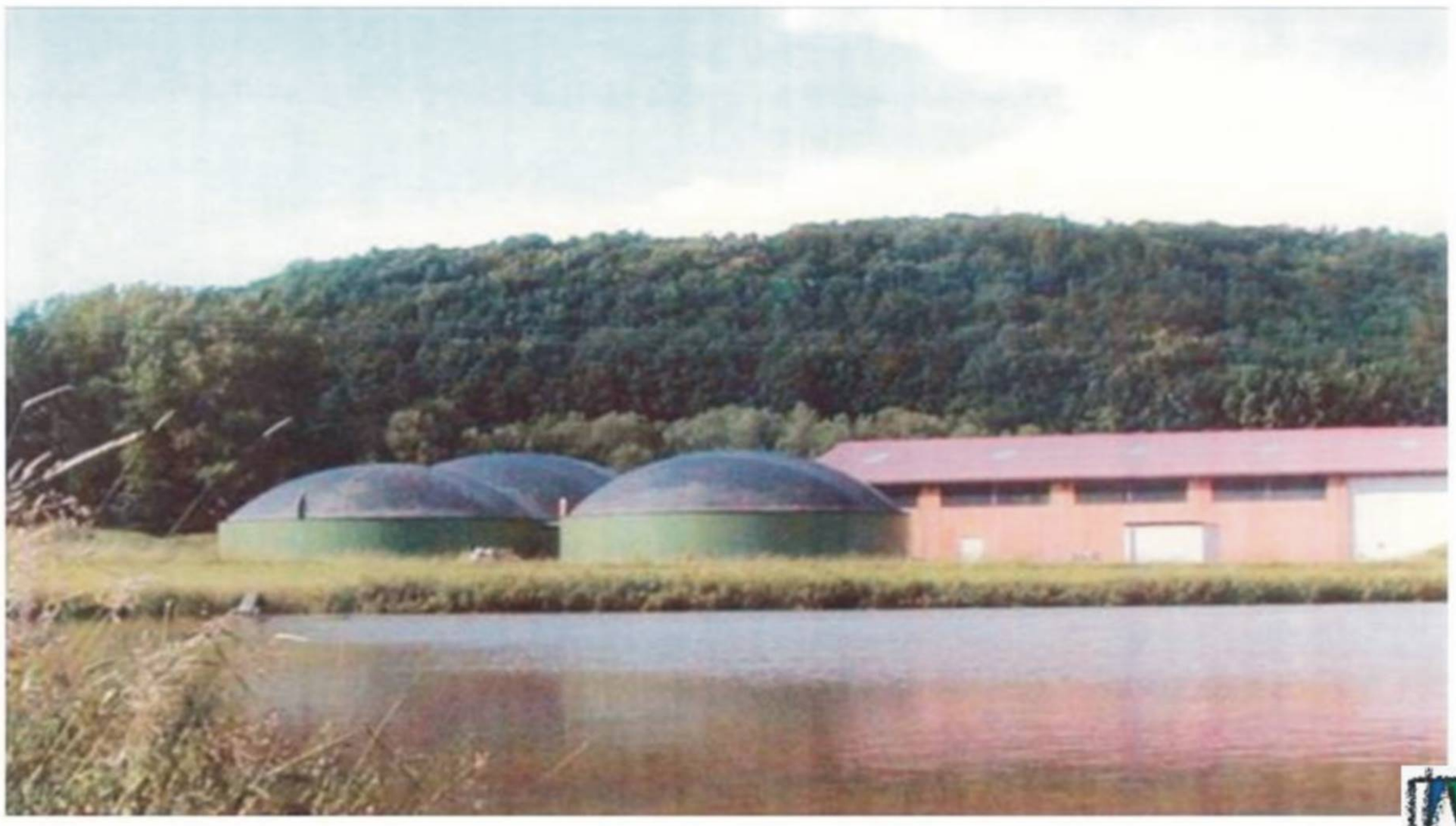
Wind power – Increase & Costs



Small Hydropower

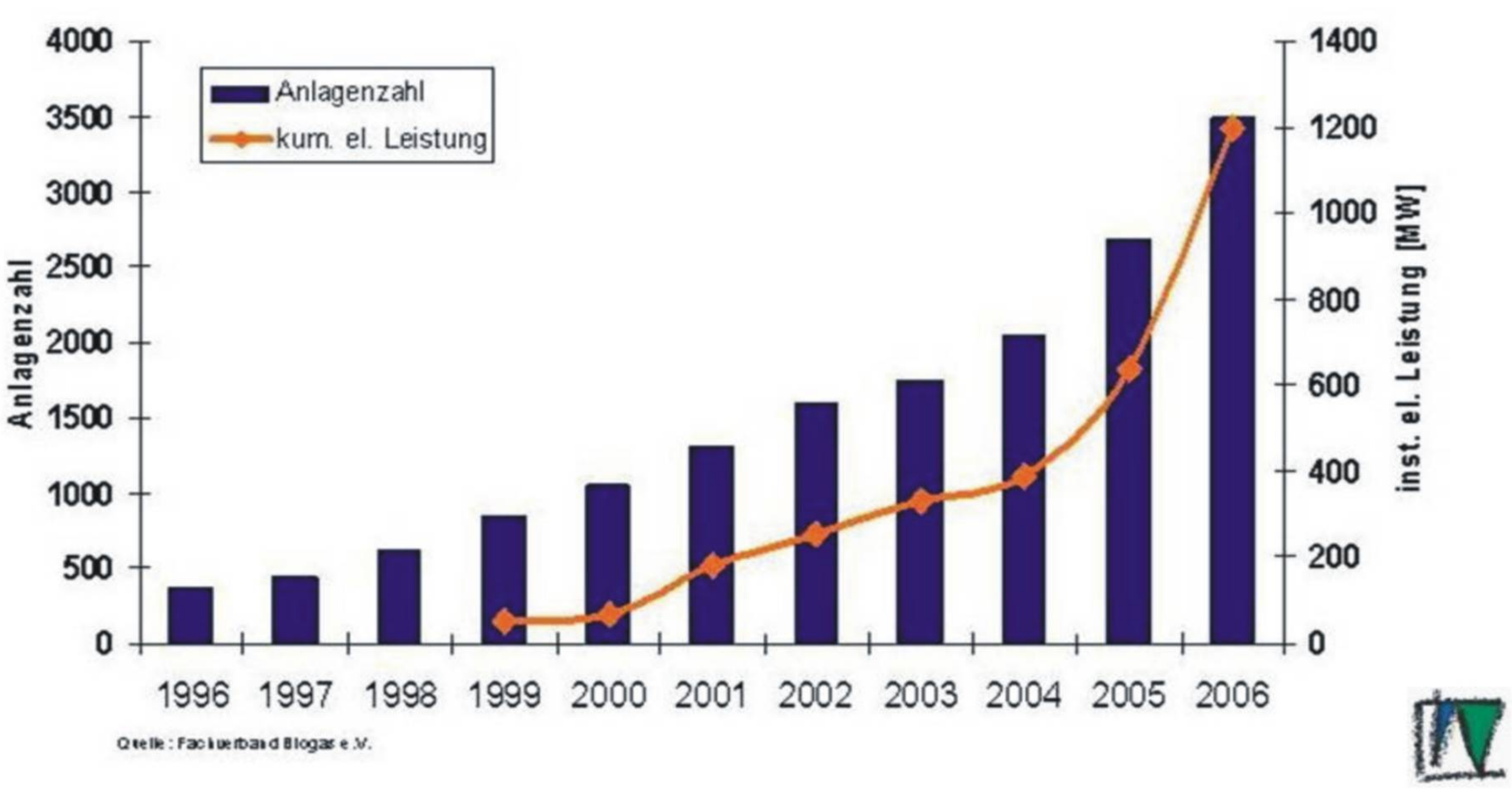
Sources: Badenova

Biogas Overview



Increase of Biogas Plants in Germany

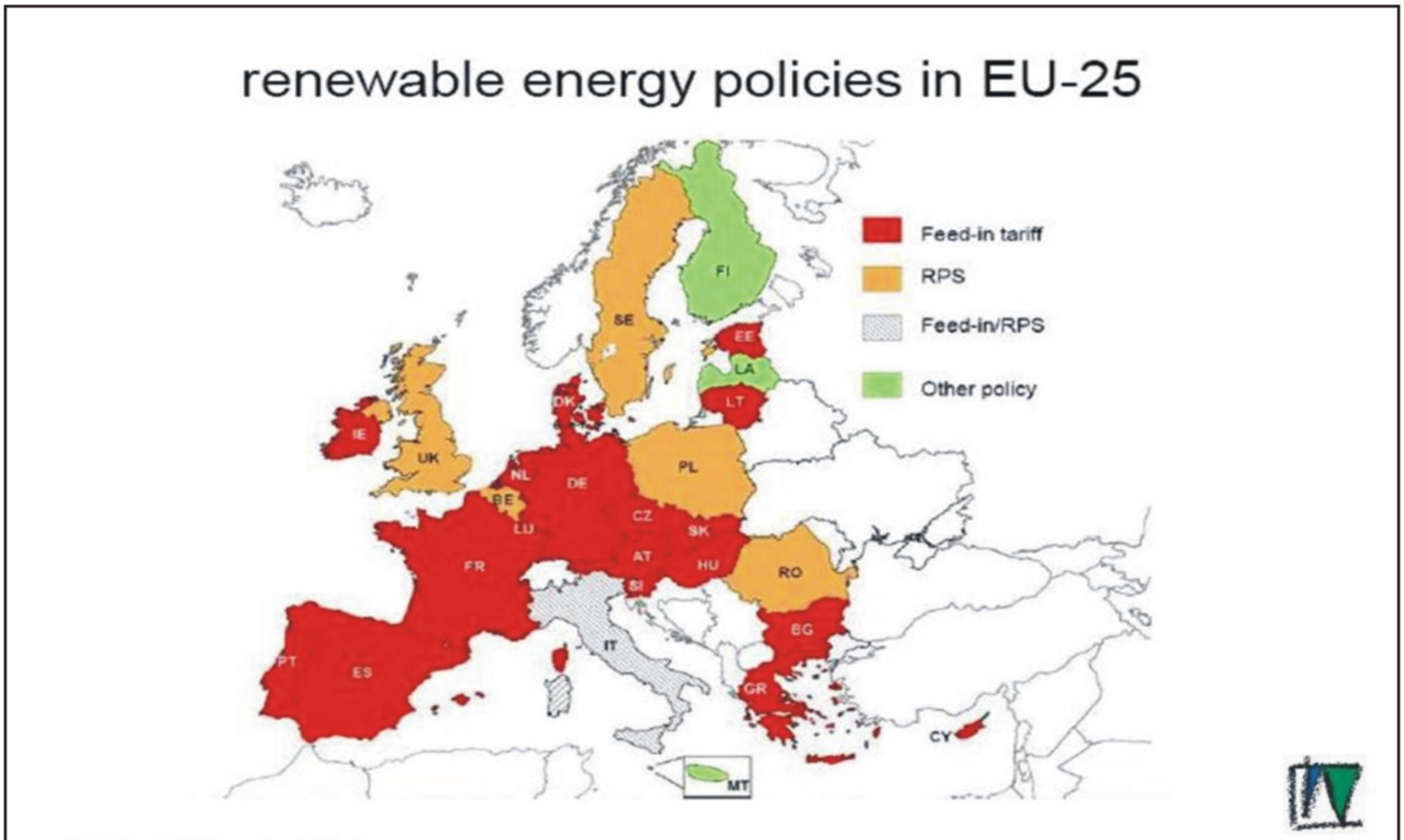
Marktentwicklung Biogas



Reasons for the rasant Development of Renewable Electricity in Germany

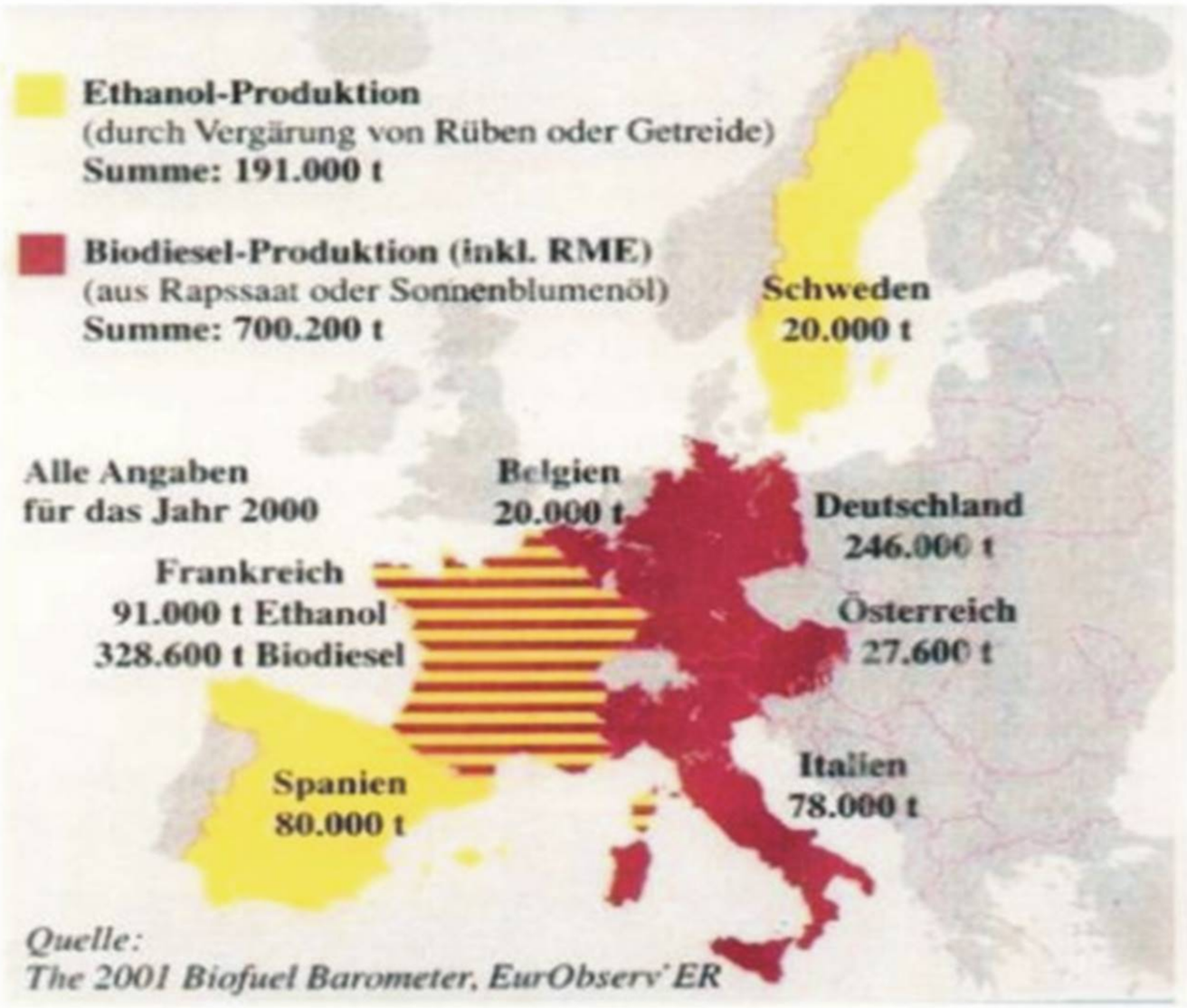
- Tschernobyl Desaster 1986
- > 200 People's NGOs for Solar Energy since 1990
- Cost covering Feed-in Tariffs for all Renewables
- City council resolutions in Freising & other 50 cities
- German Renewable Energy Law in 2000

- ***Now Model of Feed-in Tariffs exist in 23 countries !***


renewable energy policies in EU-25
Feed-in tariff
RPS
Feed-in/RPS
Other policy
FI
SE
EE
LA
LT
DK
IE
UK
NL
DE
PL
BE
LU
CZ
SK
AT
HU
FR
SI
RO
BG
IT
PT
ES
GR
CY
MT
Quelle: Heinrich Böll Foundation, A White Paper
www.hans-josef-fell.de

Biofuels

Fuel usage by type in Europe

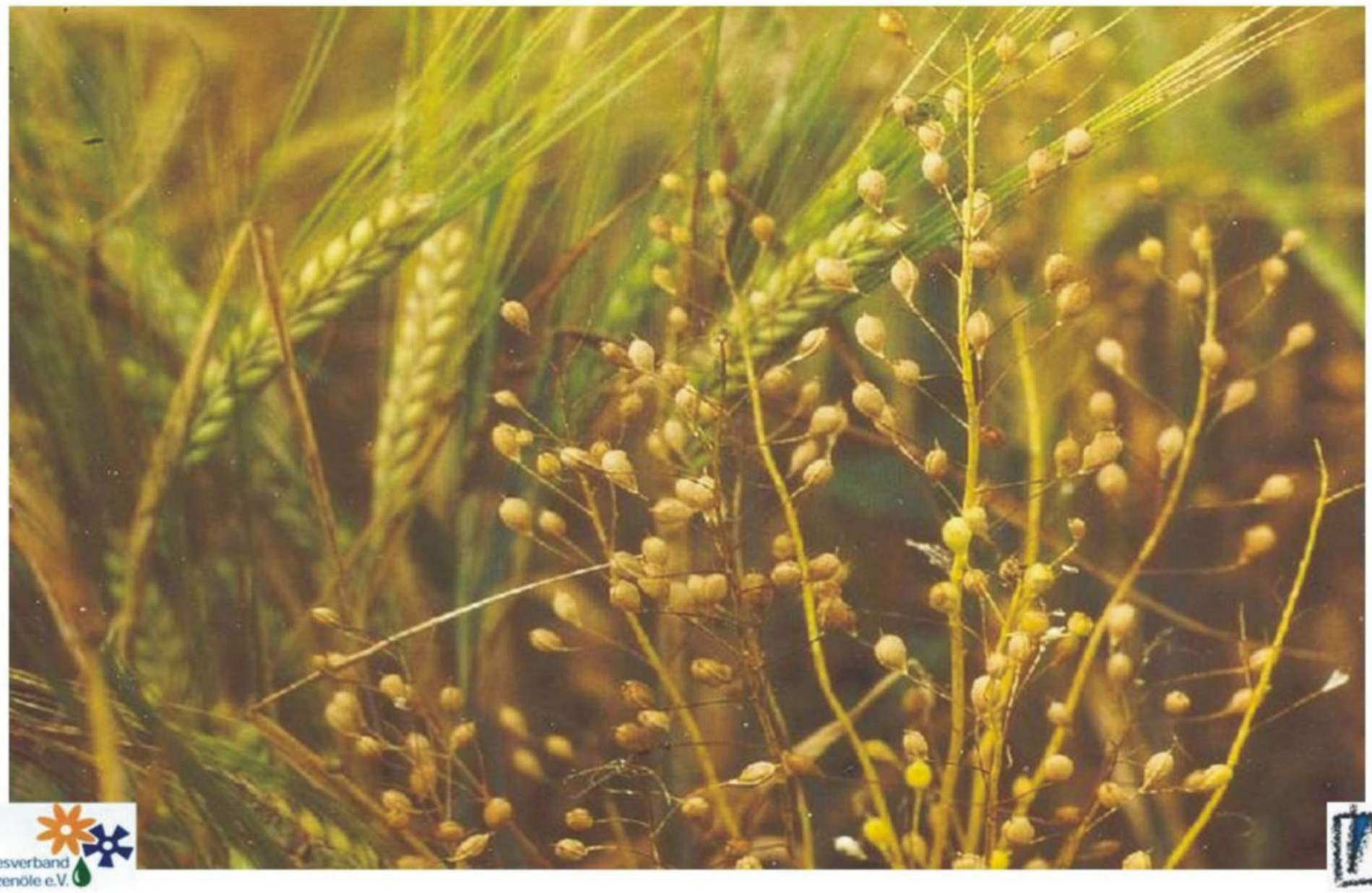


Bundesverband Pflanzenöle e.V.

Rape seed crops in Germany (May aspect)

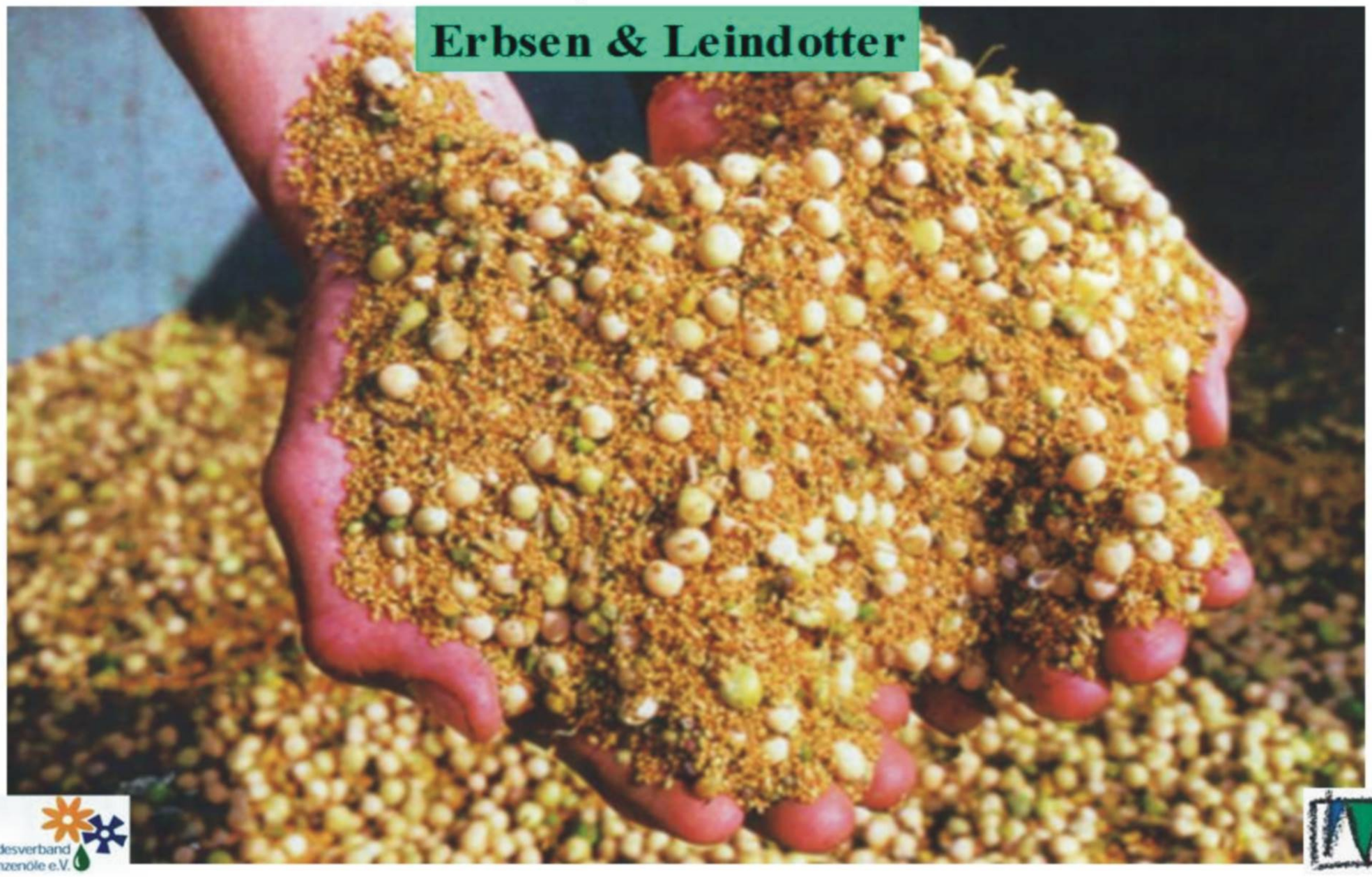
Bundesverband Pflanzenöle e.V.

Mixed Crop: Barley & Camelina



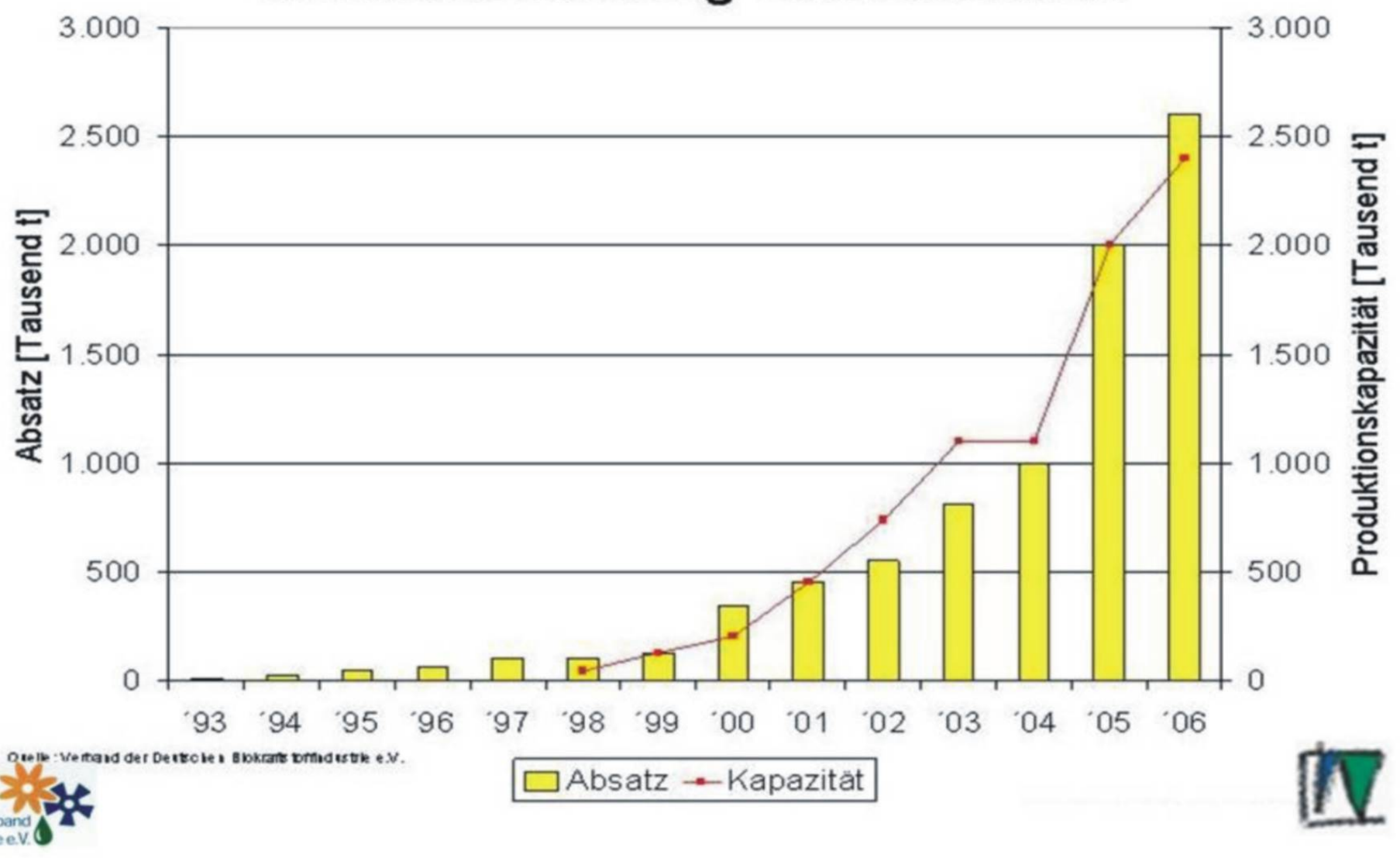
Bundesverband Pflanzenöle e.V.

Mixed Crop: Peas & Camelina



Bundesverband Pflanzenöle e.V.

Biofuels Production in Germany



Pure Plant Oil

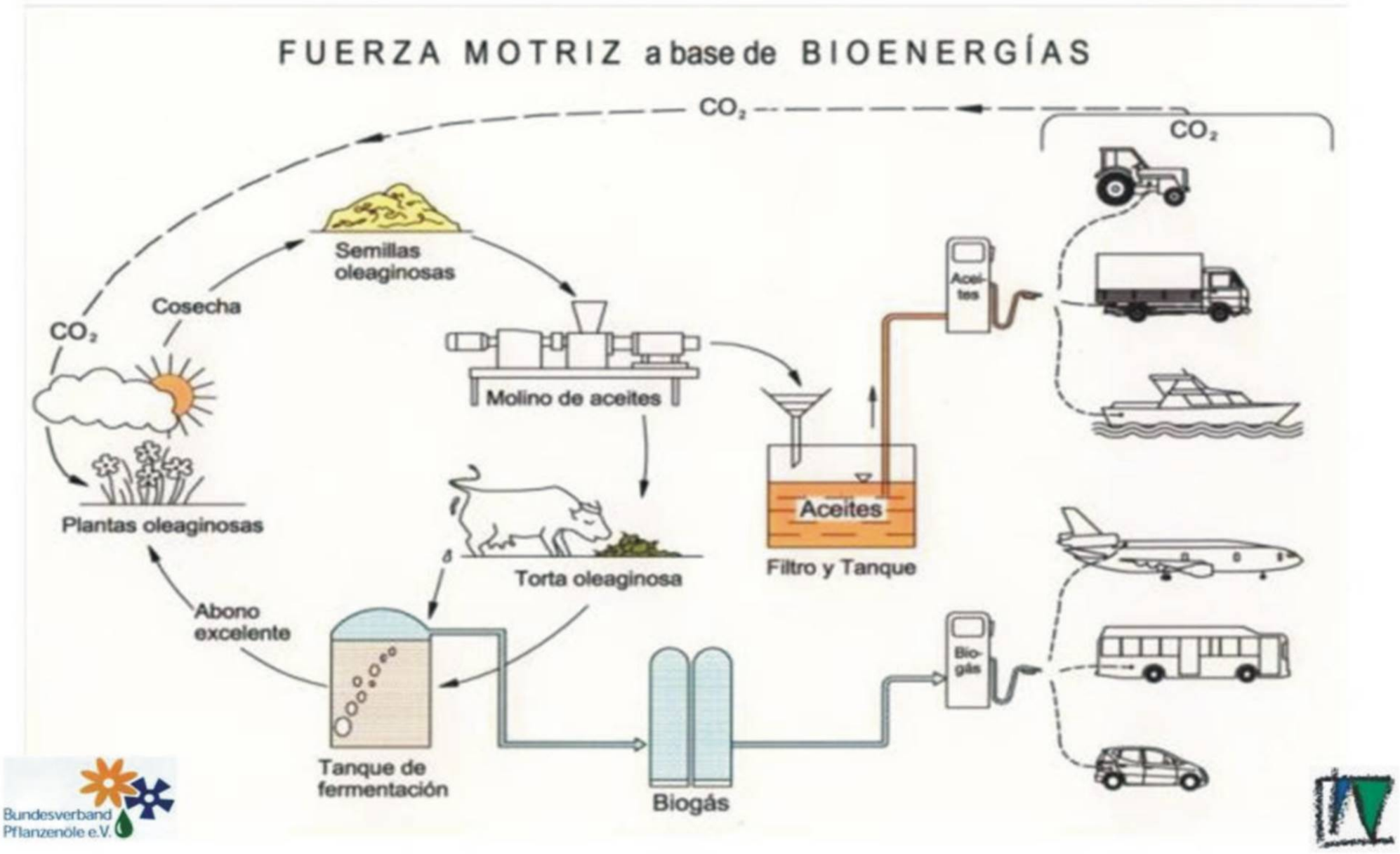
- It smells nice, tasts good and ...
- **you can drive with it !**

- ***The ready Fuel in each grain of seed***

- ***= pure stored Solar Energy !***

Bundesverband Pflanzenöle e.V.

Pure Plant Oil and Biogas as Biofuels



Pure Plant Oil Technology - Fendt & John Deere

Pure Plant Oil Technology - Trucks

Bundesverband Pflanzenöle e.V.

Pure Plant Oil Technology - Racing Car

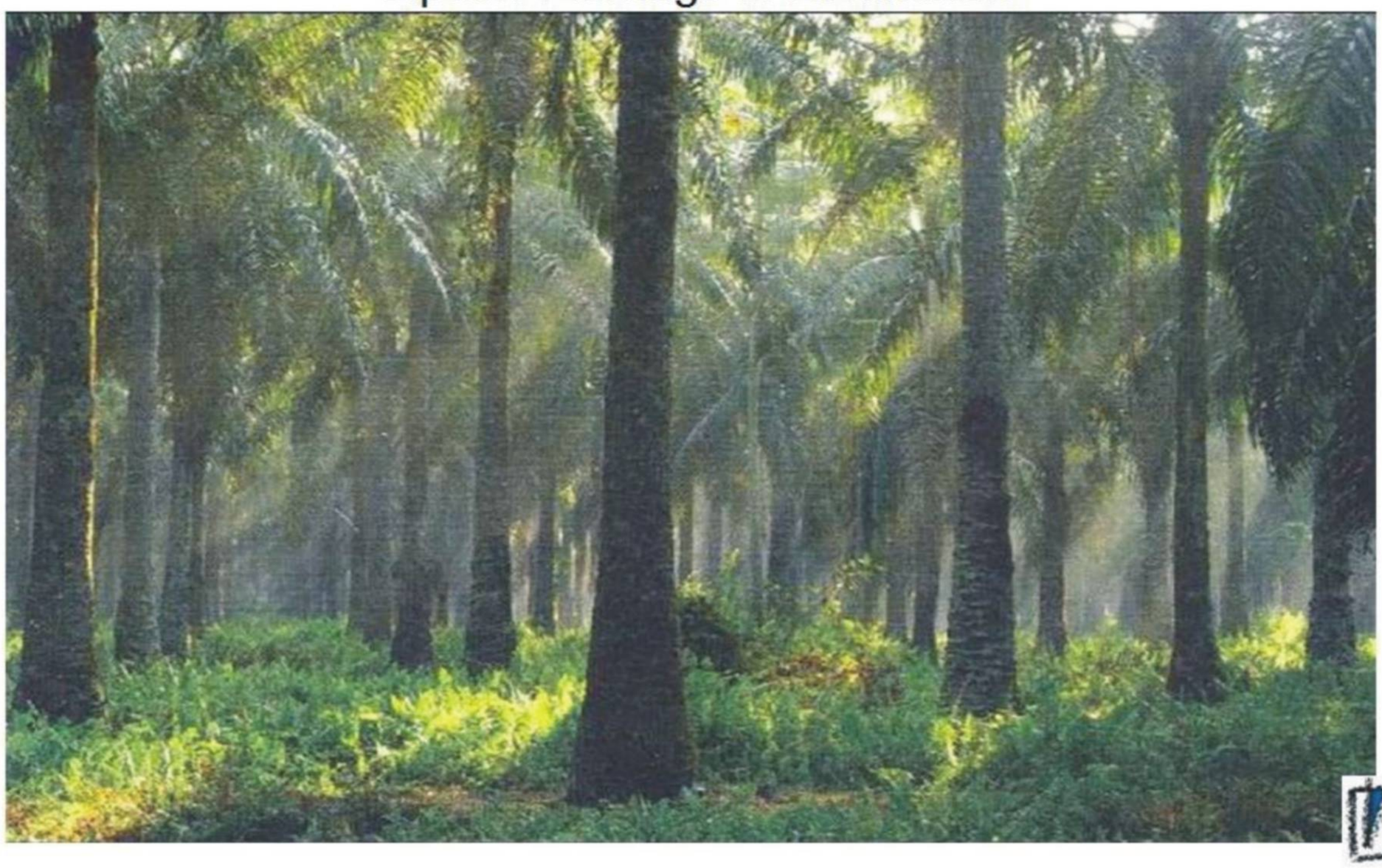
Bundesverband Pflanzenöle e.V.

Possibilities in Nigeria

Bundesverband Pflanzenöle e.V.

Oil Palm Plantation in Colombia

Ölpalm-Plantage in Kolumbien



Physic Nut Crops in India

Ein Bauer aus dem Dorf Chorvadla im indischen Bundesstaat Gujarat zeigt die Pflanzen einer Jatropha-Plantage. Rund um sein Dorf gibt es 500 Hektar Ödland, auf dem die Sträucher gedeihen können.

Bundesverband Pflanzenöle e.V.

Physic Nuts (*Jatropha curcas*)

Die Jatropha-Früchte (links) enthalten je drei ölhaltige Samen (rechts).

Biomasse - massenhaft verfügbar?

Bundesverband Pflanzenöle e.V.

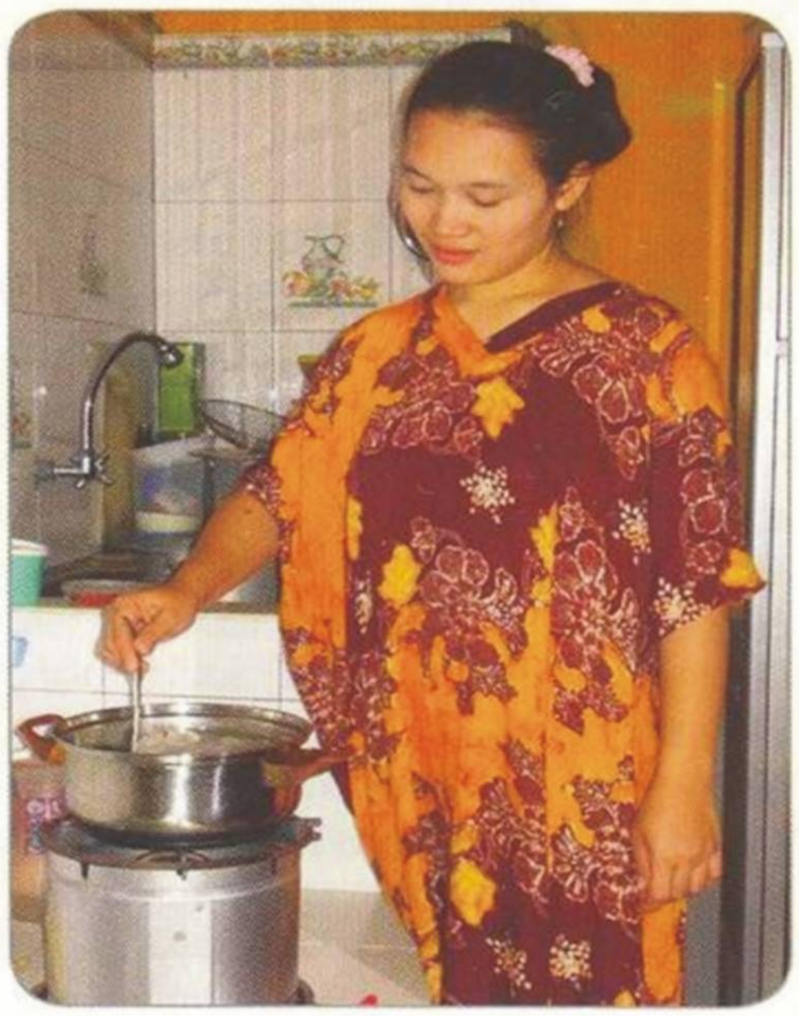
Castor Oil Plant in Ecuador

Rizinus-Fruchtstand mit Samenkapseln

Bundesverband Pflanzenöle e.V.

Plantoil Cooker

Pflanzenölkocher von Protos



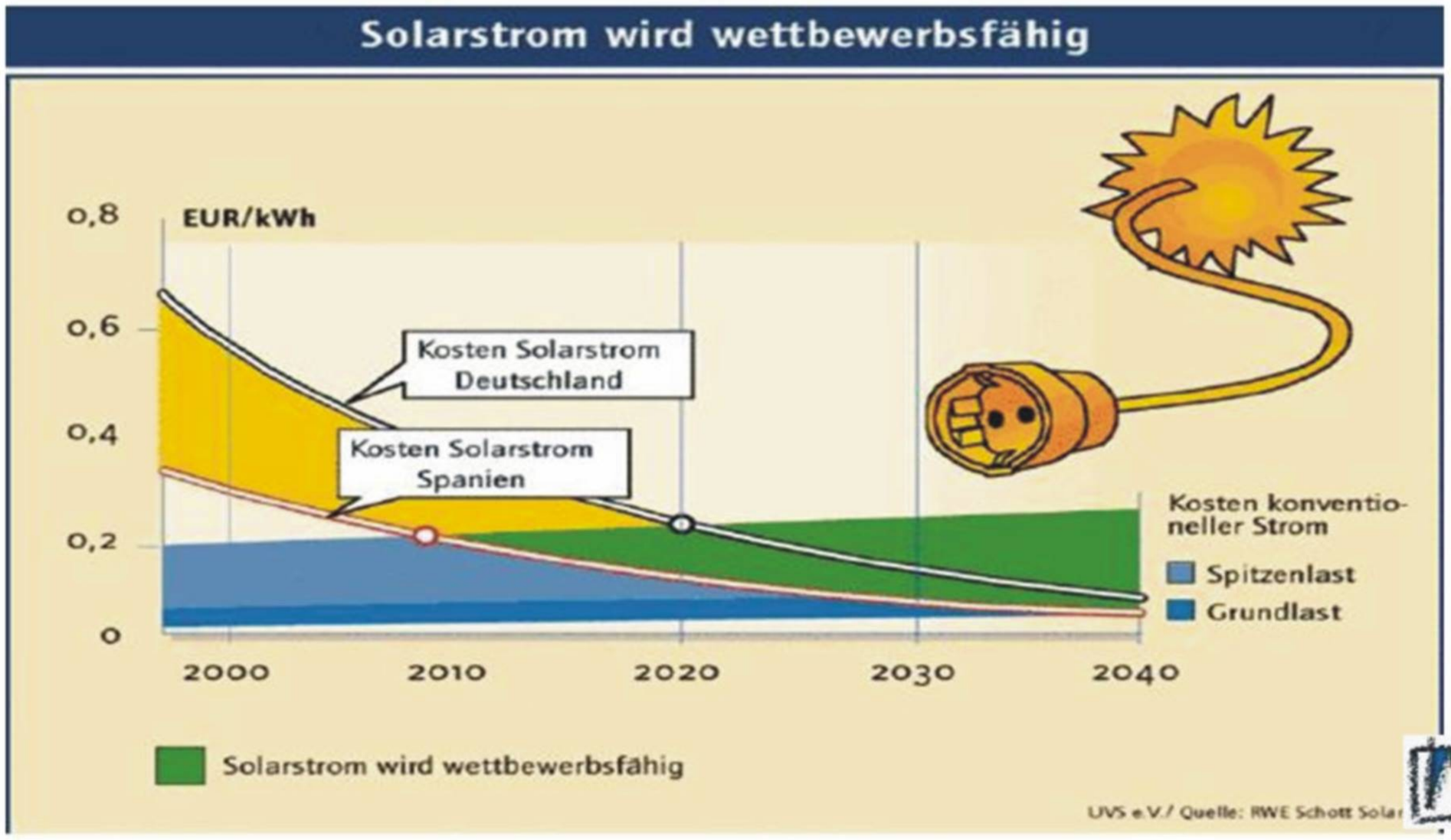
Indonesierin beim Kochen

Bundesverband Pflanzenöle e.V.

Sustainable Biomass

Good practice: Agroforestry in Southern Ruanda – food, fibre and fuel from integrated systems

Photovoltaic electricity will soon become competitive : In Spain allready in 2008 with peak power.



Electric Cycles in Shanghai

Conclusions

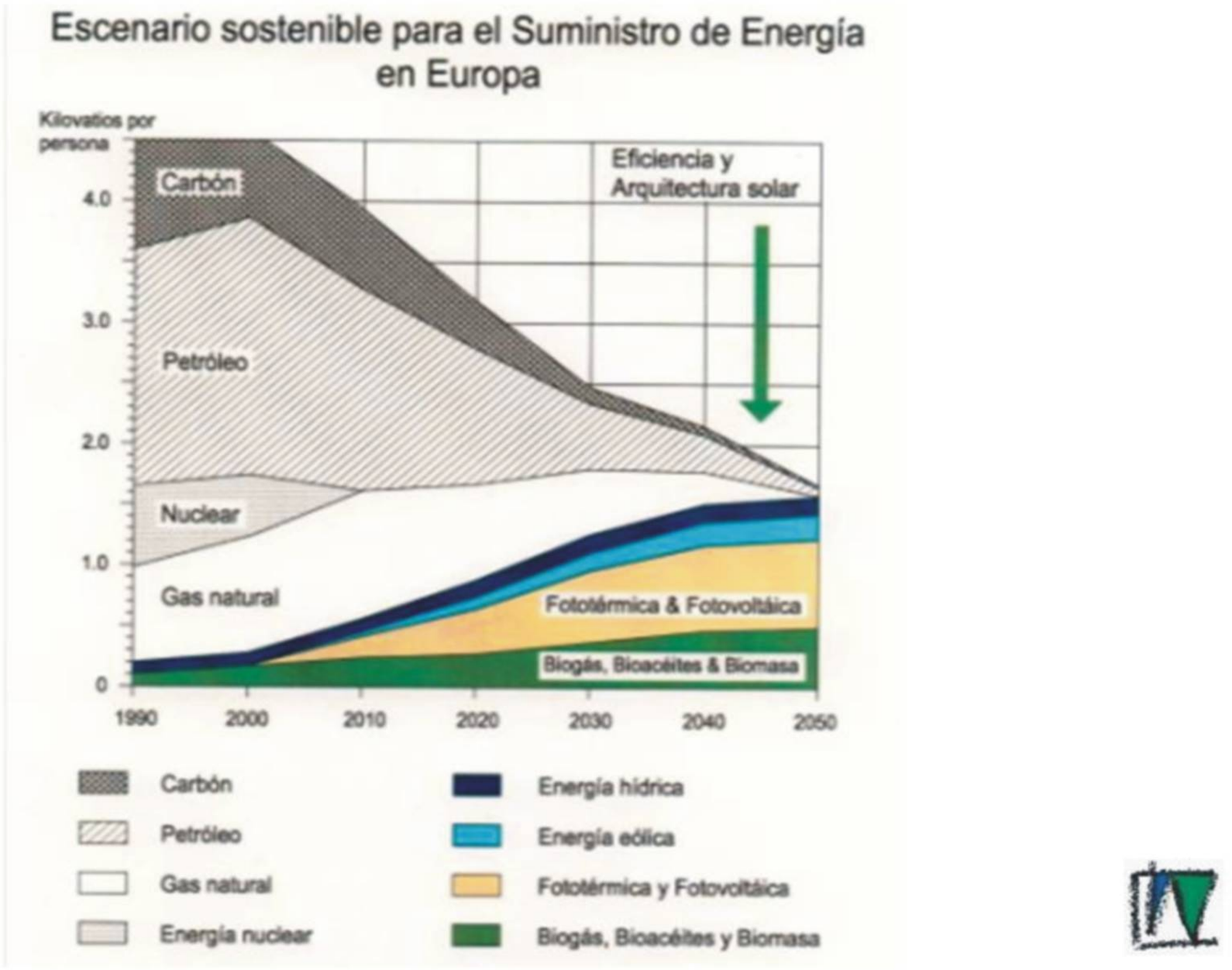
Oil, Gas & Coal are the main causes of damage to the Climate

- **Burning of coal, oil and gas emits worldwide ~80 % of all greenhouse gases.**
- **Real Climate protection is only possible by ending the use of coal, oil and gas.**
- **This means, using only Renewable Energies and renewable Chemestry.**
- **Energy saving is very helpful; but saving alone will not solve the Climate problems.**

Renewables (REN) have a lot of benefits, nearly no burden!

- REN bring new Jobs,
- REN decrease the energy costs,
- REN bring independence from rising oil, gas, coal and uranium prices,
- REN bring energy security; mostly by domestic energies,
- REN solve the pollution problems of air, water, and soils; they do not pollute in any way.
- REN solve the problem of oil wars!

Towards a Solar (zero-emission) Age in Europe



Climate problems can be solved by only two strategies:

1. Total Stop of greenhouse gas emissions
(not only reducing them)

- **Promoting zero emission technologies**
- **Cancelling the use of fossil & nuclear energies**

Climate problems can be solved by only two strategies:

2. Taking out Carbon from the atmosphere

.

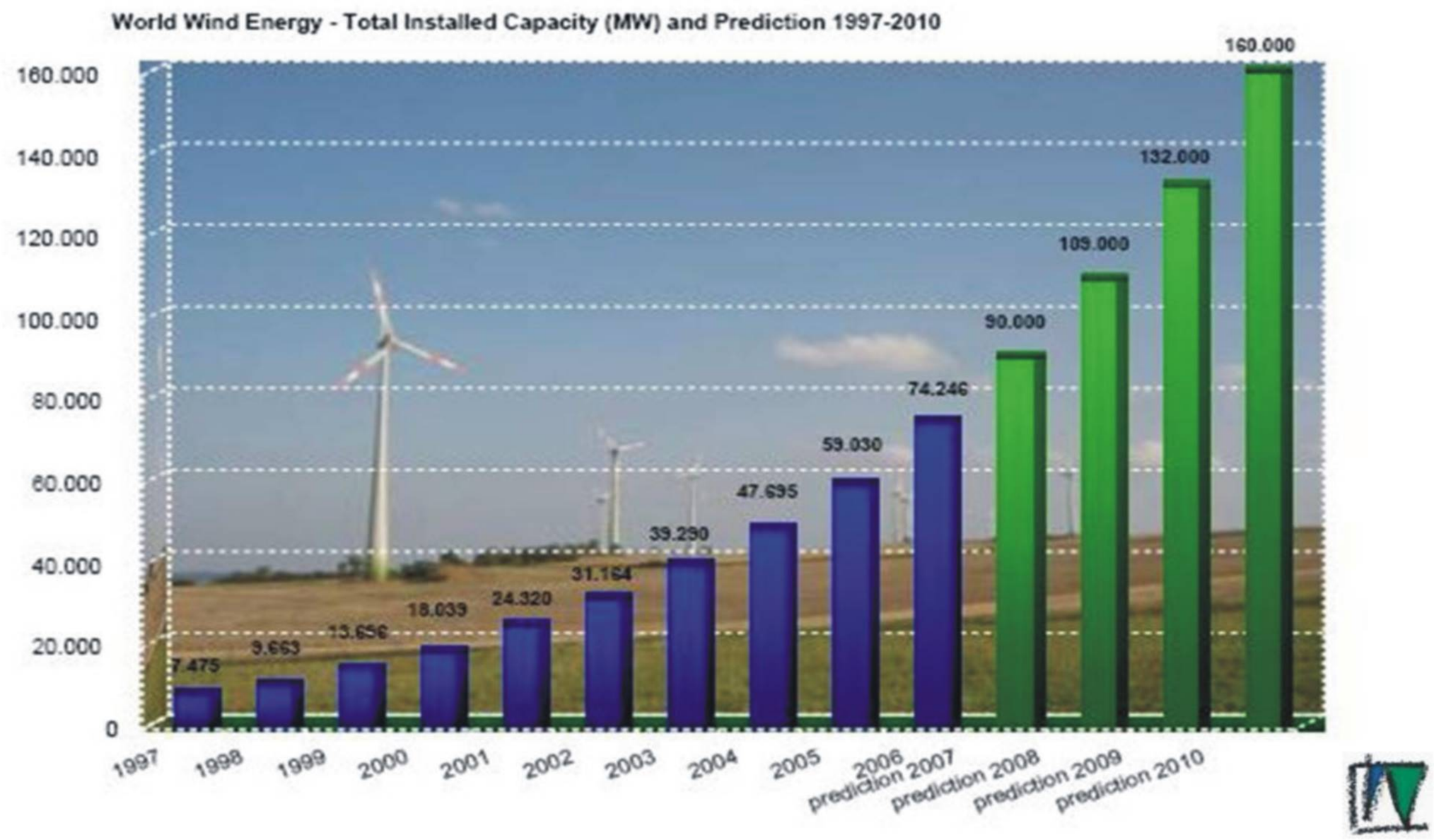
- **Reforesting big areas**
- **Converting Plants into soil humus**

Sun, Wind, Hydro and Biomass
replace
Gas, Oil, Coal and Uranium

Energy Crisis and the Solution:

Solar Century !

World Wind Energy - Installed (blue) & Prediction (green)



Many Thanks
for your Attention !

Climate-protection policies

Promoting renewable energy and chemistry:

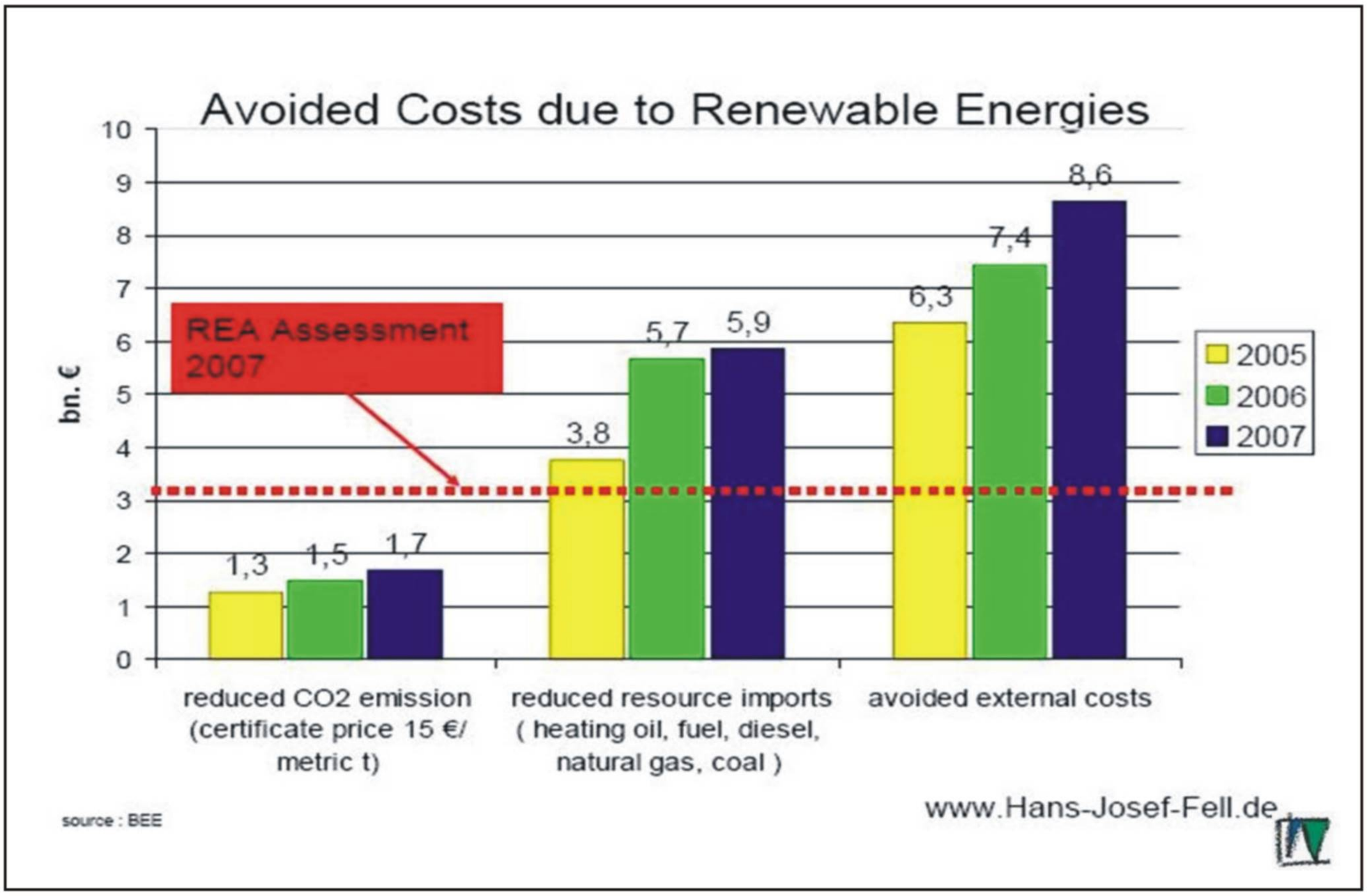
- Laws for feed-in tariffs
- tax exemption for renewables
- canceling subsidies for fossil and nuclear
- research offensive for renewables
- reduce the approval obstacles

No: quota or certificate systems
both are unable to promote the renewables fast

Key components of a successfull feed-in law

- Privileged grid access
- Attractive feed-in tariff for each RE technology (must be high enough for cost-effective RE power production)
- Feed-in cost distributed via electricity price
- No cap on total amount of generated RE power
- Guaranteed feed-in period
- No Cap

- Also important: No obstacles through approval procedures in practice



Sky Sails

intelligent use of wind power

Solar Cooling with Parabol Channel Collectors

Agriculture ←→ Renewables

Natural Nutrition Overseas
March 2009

Table of Contents

I. Food and Energy Crisis + Climate Change

II. What is Natural Nutrition Overseas

III. Potential in Nigeria

IV. Energy: the key to food, living and transportation

V. Technique, Training and Management

VI. Socio Economic Aspects

VII. Interdependencies between Agriculture and Renewables

VIII. NNO's first activities within Nigeria

IX. Outlook

Agriculture ←→ Renewables

I. Food and Energy Crisis + Climate Change

This summit is dedicated to discuss the climate issues especially with regard to the state of Lagos. The intention of this little contribution is to point out the enormous interdependencies between the huge areas food, energy and climate change and how the integrated approach to these topics could contribute in solving these world wide existing issues

- To enable the great goal of creating wealth for everyone we need some real essentials
  - Food and water
  - Energy and transportation
  - Living and education
- For many parts of the world, including the technically advanced economies the challenge and the key to these real essentials lies in the holistic approach to enable nice environments and wealth
  - Enable the infrastructure to create and develop
  - Look at sustainability from alls angles
  - Strengthen the responsibility of the involved stakeholders and shareholders

Basis 3

Agriculture ←→ Renewables

II. What is Natural Nutrition Overseas

NNO is a project managing organisation airming at developing and maintaining projects to produce both food and energy form renewable resources in a sustainable way. NNO brings together the different stakeholders and shareholders both from local resources and from outside the respective areas to enable such sustainable intentions

- Sustainability is viewed as a long lasting interdependence between the three topics
  - Profit
  - People
  - Nature
- Under the roof of NNO numerous expertise from very different sources is combined to achieve these purposes
  - Experience in constructing and operating plants for biomass, biogas, photovoltaic, geothermal, hydro power and wind in the range of several hundred megawatts
  - Management experience in setting up and operating such undertakings
- International relationships are in place to facilitate the necessary steps
  - Markets which are open for organic products
  - Investors which are more and more willing to invest into sustainable projects and into countries not so well developed in a technical sense

Basis 4

Agriculture ←→ Renewables

III. Potential in Nigeria

When I first came to Nigeria last year I was overwhelmed by the unimaginable potential of this country with regard to the unused and unexplored natural resources. They may serve for so many applications like food, energy, pharmaceutical and chemical industry to just name some

- Biomass exists in abundance and is wasted in very many cases and serves for
  - Food for domestic and foreign markets
  - Production of energy including vegetable oil, fertiliser, biogas and electricity
- These resources include the endless supply of
  - Wind and solar power all over the country and the year
  - In some cases water
- And all above: Most of the biomass is still organic and shall be kept organic

Agriculture ←→ Renewables

VI. Energy: the key to food, living and transportation

Energy in the very different appearances are the key to many human activities. Some of the most essential needs are clean water, production of food and post harvest processing. Not to forget the production of fertiliser, local transportation and information. So energy is the real basis to all this

- Energy supply is somehow unreliable and urges industries to look for alternative sources. Usually inefficient and noisy Diesel engines are used. Inefficient because they produce electricity to not only run electrical apparatus but also to air condition rooms. One could utilise the access heat to air condition rooms
- Energy is too cheap to attract people investing into energy plants on large scale, but
  - Local solutions may be very attractive
  - Using energy in a more intelligent way may help to make investment profitable even if prices are to low

Agriculture ←→ Renewables

V. Technique, Training and Management

Well educated and highly motivated people can be found all over the country. To enlarge the outcome from agricultural activities, to produce energy from renewable resources and to market the products for both domestic use and export some techniques and managerial skill are required

- Techniques include hardware and software like
  - Agricultural machinery for cultivating, harvesting and post processing
  - Systems for producing, storing and distributing energy
  - Accounting including cost accounting and marketing
  - Certification according to ISO 9000 series
- The different systems require trained and motivated people to
  - Operate, maintain and improve all the systems
  - Explore and discover new applications and systems
  - To proliferate these abilities to other places
- Managerial skills will be helpful to
  - Strengthen awareness and accountability
  - Set up and maintain appropriate certification according to ISO 9000 series
  - Management experience in setting up and operating such undertakings

Basis 7

Agriculture ←→ Renewables

VI. Socio Economic Aspects

When we talk about rural development we always have in mind that people who are living in the areas will be asked to remain in their respective environments. This can only be achieved when they are offered a working infrastructure as well as acceptable and well paid jobs to enable them to create wealth on their own

- Infrastructure can be partially achieved in partnering with Governments and include
  - Clean water, electricity and roads
  - Schools and medical treatment
- The live of the people may be eased and made more agreeable through state of the art techniques including
  - Refrigerators, television, internet and many others
  - Private transportation like motorbikes and cars
  - Working machines like tractors, harvesters and the whole chain of post harvest processing systems
- Encourage people to attend all kinds of development possibilities by
  - Enabling the attendance of post education training courses
  - Facilitating the self development
  - Encouraging the set up of own small businesses like contract farming, service shops and all the other possible options

Basis 8

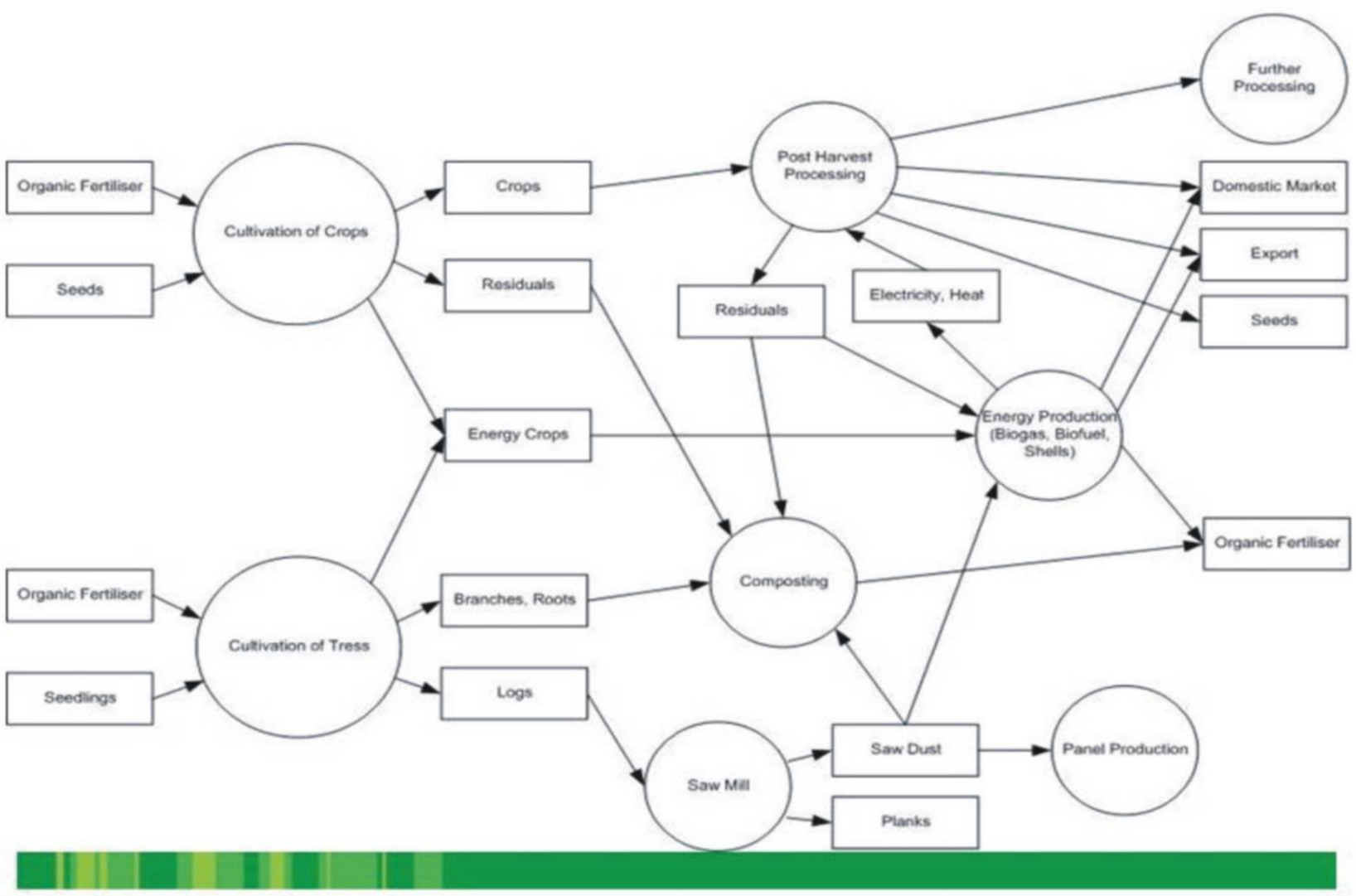
Agriculture ←→ Renewables

VII. Interdependencies between Agriculture and Renewables

Having a closer look at agricultural activities and production of energy from renewable sources reveals tremendous interdependences between these two areas. Especially the field of biomass shows the circularity between such products and "waste" deriving hereof

- Biomass residuals from food production may be used to
  - Produce energy in biogas and biomass plants
  - Compost alls residuals to fertiliser
- Crops may be alternately cultivated to
  - Produce food and post harvest process the outcome
  - Convert crops into energy to enabling the agricultural activities
  - Convert crops into energy for human usage or transport
- Local people are responsible for the whole chain and maintaining the required quality standards to
  - Keep the standards agreed upon (i.e. organic food)
  - Produce the necessary goods to maintain the chain
  - Reduce transports to the must only

Basis 9



Stromerzeugung und -lieferung 10

Agriculture ←→ Renewables

VIII. NNO's first activities within Nigeria

After many investigations and NNO and sister company NNN (Natural Nutrition Nigeria) decided together with Government of Ondo State to explore the huge potential of wasted palm tree products. Therefore a MOU under PPP ideas has been signed recently and Government and we are just about to set up the necessary steps to start within the very near future

- Firstly we will crack and separate the palm nuts under hygienic conditions to
  - Avoid rancidity and the forming of aflatoxine
  - Supply the local market with pure palm kernel oil (PKO)
  - Keep everything organic

- The second activity will be the exploration of the nowadays wasted palm kernel shells to
  - Convert them into activated carbon for cleaning water and medical applications
  - Charcoal them according to blacksmith specifications
  - Convert them into electricity through co-firing or modern conversion techniques

- Finally we will explore all the other possibilities around the so valuable palm tree (elaeis guineensis)
  - Usage of fibres for insulation
  - Enhance productivity of pal oil production
  - Improve the planting of the trees including the aspects of biodiversity and reduction of water consumption

Agriculture ←→ Renewables

IX. Outlook

NNO aims to realize an integrated approach to food and energy in Nigeria on a large scale. Thus Nigeria could become a leading precursor in solving the most urgent challenges of our world. With increasing wealth, clean energy and an intact nature Nigeria could impressively prove its progressiveness and will to further develop. Besides Nigeria could become an example of how to become an example of how to create wealth out of its resources and keep it within the own country.

And, everyone is invited to participate

Presentation by
Dr. F.K. Salau
At the Lagos State maiden summit on climate change
Held at the Eko Hotel and Suites
Victoria Island Lagos
From 23rd - 26th March 2009

Personal Introduction

- Ph.D Political Science\Economics\Sociology
- Staff of InWEnt (Capacity building International) since 2001
- Travelled to Germany in 1970 at the age of 21
- 1970 was a very critical time in Germany environmentally.

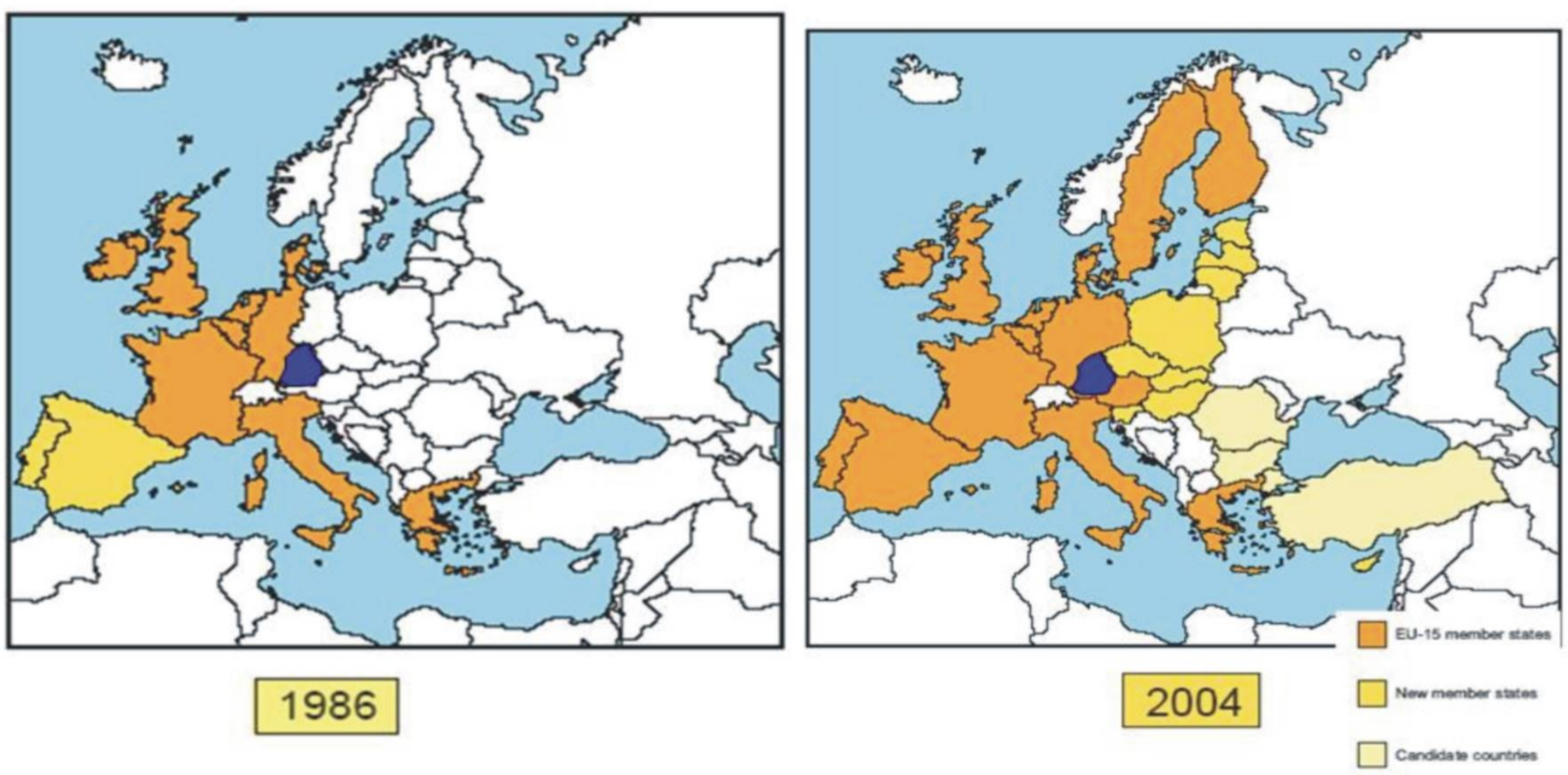
Environmental Awareness in Germany

- The pollution of rivers and lakes in Germany became an issue of great concern in the end of 1960s and beginning of 1970s.
- Causes of Pollution: unsustainable industrial and agricultural production, high traffic volume etc. Several industrial accidents occurred (especially in chemical plants and other factories).
- Environmental problems were particularly visible, with many lakes covered with polluted foam.
- All these increased the environmental awareness.

1969: Beginning of German National Policy on Environment

- Laws on environment existed in the 11 states of the then Western Germany before 1969, e.g. Air pollution Laws, Laws against Water pollution
- The federal parliament in October 1969 made the solving of environmental problems one of the primary tasks of the government.

State of Bavaria: Partner of Lagos State



State of Bavaria.....

Major cities Munich, Nuremberg

Area 70.549 km² (largest Federal State of Germany)

Population 12.5 million (8th place in the EU)

GDP (2007) € 434,0 billion (7th place in the EU)

Exports (2007) € 154 billion

State of Bavaria.....

- The State of Bavaria took the chance of environmental debate to modernise its industrial structure
- MoE was established in 1970. This was instrumental in transforming Bavaria from a mainly agricultural to a modern industrial state.

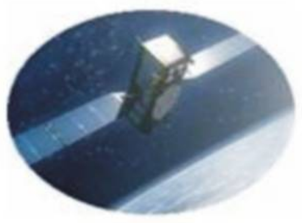
- Bavaria today is the center of environmental excellence in Germany.

Bavaria's High-Tech Clusters

Environmental Technology

Aerospace

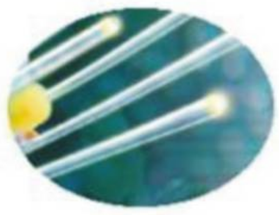
Allianz Bayern Innovativ
Cluster-Offensive



Satellite Navigation

Medical Technology

Biotechnology



Information & Communication Technology

Agenda partnership with Lagos State

- This Lagos Summit has emphasized 3 following points among others:

  Mitigation of and adaptation to Climate Change is in the first case a national, regional and local challenge

  In order to be sustainable Climate Change Policies must take account of other human development policies (like food and health policy etc.)

  Since Climate Change issue is trans-boundary in nature, no country can solve the problems alone. **In other words, international cooperation is a very crucial factor**

Agenda Partnership between Lagos and Bavaria

- Agenda 21: Basis for collaboration Lagos and Bavaria.

- The question whether or not to seek international cooperation is irrelevant. AGENDA calls for cooperation between various environmental stakeholders as equal partners.

Cooperation for Capacity Building

- In year 2000 two staff of Lagos Island Local Government have undergone courses and practical experience on waste sorting, sewage treatment, street cleaning, portable water treatment etc. in Bavaria
- In the last four years about 14 mid-level officers participated in the training programme.
- The focus of the training programme for 2009 will be on Renewable Energy (10)

Capacity Building International (InWEnt)

- InWEnt designed on behalf of the Bavarian Government the training programme for the representatives of the public, private sector and NGOs from Lagos State
- InWEnt provides these training courses in the following three major fields which are relevant to climate change and sustainable development:

Human Development

The process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively.

Capacity Building international (InWEnt)

Organisational development

The elaboration of management structures, processes and procedures, not only within organizations but also when it comes to the management of relationships between different organizations and sectors (Public, private and community).

Institutional and legal framework development

The elaboration of management structures, processes and procedures, not only within organisations but also when it comes to the management of relationships between different organisations and sectors (Public, private and community).

Success....

- Alumni have been assigned responsible duties in their various organisations
- This international collaboration is a good proof that Lagos state has the political will to stand up to climate change (Alumni involved)

Road Map (Lagos-Bavaria Collaboration)

- **Focus hitherto, has been on the State of Bavaria but there are other opportunities at the Federal level which should be tapped. (Active participation in German-Nigerian aid negotiations at the federal level!_)**

The German Federal Ministry for economic cooperation (BMZ) attends to the challenge of climate change. Even though there is room for more efforts

In 2007 BMZ spent a total of $700million for climate change action in developing cooperation (mitigation and adaptation)

In 2008 it doubled to $1.4 billion

In addition the German government through the Federal ministry of Environment planned in 2008 to fund climate protection activities in developing countries also by earmarking the proceeds of selling emission reduction permits. ($180 million).

Conclusion

In conclusion international collaboration is necessary and should be followed as an important strategy to solve the problems of climate change

Thank you for your attention

LIST OF LGA/LCDA DELEGATES FOR THE SUMMIT

S/N	L0CAL GOVERNMENT	NAMES OF PARTICIPANT
1	ALIMOSHO (5)	Hon. Adesola Adekunle, Mr. Salami Abiodun Lookman, Hon. Onaolapo Akinwale, Hon. Jelili Sulaimon, Hon. Ogunkoya Oludare.
2	AMUWO- ODOFIN (4)	Com. Ayodele Adewale, Hon. Bello Lukman, Mr. Wale Ogunbakin, Mr. T.A. Yekinni.
3	AYOBO-IPAJA (6)	Prince Bisi Yusuf, Hon. Odeseye Kayode, Elder Adamson Adesola, Mr. K.a. Olaniyan, Mrs. F.O. Peter, Hon. Dele Ayorinde.
4	AGEGE (7)	Hon. Jubreel Abdulkareem, Hon. Sulaimon Odueso, Hon. Temidayo Adeyemi, Mrs G.o. Olaopin, Hon. S.I. Akerele, Hon. Aruna Ogunsola, Mr. Sangolana
5	AGBADO OKE-ODO(6)	Hon. Pastor Kenny Okunmujide, Hon. Shola Popoola, Hon. Folarin O.o. Mr. K. A. Yusuf, Mrs. A. A. Otenaike, Mr. A. O. Aiyegbusi
6	AJEROMI –IFELODUN (6)	Hon. Kamal Bayewu, Hon. A. Sulaimon, Mr. A. A. Adekunle. Hon. Lateef Simba, Hon. Bola Badmus, Hon. Waheed Abiola
7	APAPA (6)	Hon. Ayodeji Joseph, Hon. B. C. Dada, Hon. Idowu Olayinka .J, Hon. Adele .O, Hon. A. Lawrence, Mr. Falade R.A.
8	AGBOYI KETU (4)	Otunba (Mrs) Arobieke, Hon. Raji, Mr. Johnson .T. A, Hon. Sina Ibrahim,
9	APAPA- IGANMU (2)	
10	BADAGRY WEST (6)	
11	BARIGA (5)	Hon. Sulaimon. O. A, Hon. Mejolagbe Akin, Hon. Dare Martins, Rev. Ajayi O. A, Mrs T.M. Onikoyi
12	BADAGRY (6)	Hon. Husitode Moses, Hon Dosu, Balogun.s.s, Mr Taiye Demawu, Oyetayo D. K., Moses Kuyimo, Bakare. S. A.
13	EGBE-IDIMU	Hon. Waheed Bello, Hon. Olowopejo Sanyaolu, Hon (Mrs) Akerele, Hunwi. S. S, Mrs Ayorinde, Mrs Hundeyin.
14	EJIGBO (2)	Hon. Muritala Fausat, Mrs S. O. Olatunde
15	EREDO (5)	Hon. S. O. Adelaja, Hon. Oladega.s, Hon. Josua, Mr. A. A. Oladepo, Mr. M. A. Fajumo
16	ETI-OSA (2)	Hon. M. T. Badru, Hon. Lanre Ibrahim

LIST OF LGA/LCDA DELEGATES FOR THE SUMMIT

S/N	LOCAL GOVERNMENT	NAMES OF PARTICIPANT
17	IKOSI ISHERI (4)	
18	IGANDO-IKOTUN (5)	Hon. M. A. Ola, Hon. Odutan Kazeem, Hon. B. Salako Adams, Hon. Wahab. A. Ajibola, Mrs. E. O. Onibudo
19	ITIRE-IKATE (5)	Mr. Hakeem Bamgbola, Mr. Ahmed Apatira, Miss Amusa, Mrs Kehinde Fasuyi, Mr. Saliu Sanusi
20	IFELODUN (10)	Hon. Taiwo Adenekan, Hon. Wahad Adigun, Hon. Babs Olaleye, Hon. Muftau Lawal, Mr. R.O. Pedro, Mrs S.B. Akinriade, Mr. R.A. Tella, Hon. Kabiru Lawal, Hon. Mutiu Fatai, Hon. Lamidi Alade.
21	IBEJU- LEKKI (5)	Prince Bayo Balogun, Kemi Suraka, Ganiyu Lawal, Adesewa Adeboyejo, Onanuga Babatunde
22	IKEJA (5)	
23	IKOYI-OBALENDE (6)	Hon. Adewale Adeniji, Hon. Lanre Lampejo, Hon. Rasaki Omolaja, Hon. Salaudeen Onikoyi, Mr. N.A. Shobaloju, Mr S.A. Akingbehin
24	IGBOGBO-BAYEKU (6)	Hon. Adegbega B. B. Basanya, Hon. O. Olusanya, Hon. M.A. Bisiriyu, Dr (Mrs) B. P. Adejola, Mrs. I.A. Ajai
25	IKOSI- EJINRIN (5)	Hon. G. A. Adetola, Hon. M. Badmus, Hon. M. Adelaja, Mrs A. O. Sanya, Mr. M. Yisa
26	ISOLO (7)	
27	IKORODU NORTH (5)	Mrs. I. O. Longe, Mr. A. T. Iyiola, Mrs. T. T. Salami, Mrs Adewumi Okeowo Shukura, Mr. Badejo Taiwo
28	IKORODU (5)	Anipole S. A, Akin Osisanya, Kehinde Oduloye, Mrs Amoku Mosa, Mrs Ehimusan
29	IKORODU WEST	Hon. Jide Banjoko, Hon. Idowu Aro, Hon. Aluko Segun, Dr. Saheed W .O , Mr. Onishabi A.T.
30	IMOTA (2)	Hon. Ibikunle Adebogun, Hon. K. Ogunowo
31	IJEDE (4)	
32	KOSOFE (2)	Prince Ademuyiwa Adedeji, Hon. Omotayo Okunneye
33	LAGOS-ISLAND (CITY HALL) (6)	
34	LAGOS-ISLAND EAST (6)	
35	LAGOS MAINLAND (5)	Hon. Oladele R. A. Adekanye, Hon. Emilaja Jubril, Hon. Babatunde Ayeni, N.A. Arubaba, Mr. F. Adeyinka

LIST OF LGA/LCDA DELEGATES FOR THE SUMMIT

S/N	LOCAL GOVERNMENT	NAMES OF PARTICIPANT
36	LEKKI (10)	Hon.(Alh.) T. A. Ajayi, Mr. E. A. Ashaolu, Hon. Y. A. Karamo, Hon. Raheem Olanija, Mrs. O. A. Ajayi, Alh. T. T Akinleye, Mr S. O. Salami, Hon. F. A. Asumo, Hon. Bello Abas Jimoh, Mr K. A. Oyefuga
37	MOSAN-OKUNOLA (6)	
38	MUSHIN (7)	Hon. Adepitan, Hon. Bamogboye, Mrs. R. Bello, Mr. S. Omotayo, Mr. L Olajide, Mr. R. O. Olowonyo,
39	ODI-OLOWO (7)	
40	OTO–AWORI (6)	Mr Bolaji Kayode Robert, Prince Waliu Adeniyi Ashafa, Hon. Moses Olaleye, Hon. Aishat .A. Anomo, Hon. Murotala Abu, Hon. S. O. Akanbi
41	OJOKORO (5)	
42	OJO (3)	
43	OJODU (6)	Hon. James Abiodun Faleke, Hon. Julius Oloro, Hon .S. Kokumo, Mr. Whenayon Hundeyin, Alhaji .L.L. Otukoyi, Mrs .Q.A. Pedro
44	ORILE-AGEGE (10)	Hon. Taofeek .A. Adaranijo, Hon. J.S. Babatunde, Afolanbi Ayantayo, Segin Omotayo, Dare Itogbe, Mrs Toyin Abanikannda, Hon. Fatai Ajibola, Hon. Wasiu Yusuf, Mr. A. Akindele
45	ORIADE (5)	Hon. T.I. Sanusi, Hon. R.A. Jimoh, Hon. A. Lawal, Mr .T.I. Akinlesi, Mr. M.B. Yakubu
46	OSHODI-ISOLO (4)	Hon. Afeez Ipesa – Balogun, Hon. Ganiyu Mejindade, Hon (Mrs) Sanni Banke, Mr. P.O. Williams.
47	SOMOLU (13)	Hon. Omogbolahan Bagostowe, Engr. Abiodun Orekoya, Hon. (Dr). P. Salu, Hon. Bode Ajose Hon. Niyi Bankole, Hon. Dayo Adefuye, Hon. Segun Adebiyi, Hon. Bosun Oke, Hon. Gbenga Abdulai, Mr. F.O. Awobijo, Mrs. A.A. Ogabi, Mr. E. A. Olusanya, Mr. F. F. Shonde.
48	SURULERE (5)	Dr. R. D. Folami, Mr. Tajudeen Ajide, Rev. Funmi Braithwaite, Mrs Godo. S. F, Hon. Gholahan Oduntan
49	YABA (5)	

LIST OF MEMBERS OF THE LAGOS STATE HOUSE OF ASSEMBLY

1.	Hon. Ikuforiji Sabit Adeyemi	Rt. Hon. Speaker
2.	Hon (mrs) Tejuoso Adefunmilayo	Deputy Speaker.
3.	Hon Kolawole Taiwo Musibau	Majority Leader.
4.	Hon. Avoseh Hodewu Suru	Minority Leader.
5.	Hon. Dr. Balogun Razaq Mobolaji	Chief Whip
6.	Hon. Dr. Adeyeye Ajibayo	Deputy Majority Leader
7.	Hon Akande Lola Fibisola	Deputy Chief Whip
8.	Hon. Ogunkoya Adesina.	
9.	Hon. Akinloye Babtunde	
10.	Hon.fafunmi Oludayo Saka.	
11.	Hon. Sadiq Abayomi Yisa.	
12.	Hon. Adejare S.b.	
13.	Hon. Ogunkoya John Adesina.	
14.	Hon. Ademoye Adekunle	
15.	Hon Osinowo Sikiru Adebayo.	
16.	Hon Ayeni Lawrence Babatunde.	
17.	Hon Sotimuwa Rotimi Olasiji	
18.	Hon. Alawaiye- King Wahab	
19.	Hon. Ayinla Bolaji Yusuf	
20.	Hon. Osun Moshood Olarewaju	
21.	Hon. Taiwo Adio Saheed	
22.	Hon.abiru Rotimu Lateef.	
23.	Hon. Olowo Rotimi Emmanuel.	
24.	Hon Olatunji Edet Omowumi.	
25.	Hon Agunbiade Sanai Oyeniran.	
26.	Hon. Lawal Kabir Olajide.	
27.	Hon.ogala Babtunde.	
28.	Hon. Alogba Musimu Atolani.	
29.	Hon. Adelabu Adewumi Onibiyo.	
30.	Hon. Mrs Adeniyi- Adegeye Ajoke.	
31.	Hon. Adeola Solomon Olamilekan.	
32.	Hon. Egberongbe Mufutau Adewale	
33.	Hon Mrs Badmus- Olujobi Bola.	
34.	Hon Layode Ibrahim Olarewaju	
35.	Hon. Babatunde Jimoh Adewole.	
36.	Hon. Osunsanya Kolapo Korede.	
37.	Hon,.taofeek Adedoyin Adeniyi.	
38.	Hon. Omisore Ahmed Ipoola	
39.	Hon Obasa Mudasiru.a.	
40.	Hon Ahmed Ayoola Sakiru.	

LIST OF EXECUTIVE COUNCIL MEMBERS, LAGOS STATE

1. His Excellency, Babatunde Raji Fashola (SAN) Governor, Lagos State
2. Her Excellency Princess Sarah Sosan, Deputy Governor Lagos State.
3. Princess Adeniran Ogunsanya Adenrele, Secretary To The State Government-
4. Alhaji Balogun Yakubu Abiodun, Head Of Service Lagos State.
5. Mr. Babalola Olanrewaju Mikhail, Chief Of Staff Governor's Office.
6. Prince Adeniji-Adele Ademola Adebayo, Honourable Commissioner Of Youth Sport & Social Dev.
7. Mrs. Orelope Adefule Joke, Honourable Commissioner Women Affairs And Poverty Alleviation.
8. Dr. Kasali Tola, Honourable Commissioner Special Duties
9. Mr. Akabueze Ben, Honourable Commissioner Economic Planning And Budget.
10. Mr. Enoch Kolapomoye Ajiboso, Honourable Commissioner Agric And Co-operatives.
11. Prof.Badejo Bamidele Abiona, Honourable Commissioner Of Transportation.
12. Mr Sanwo-Olu Jide, Honourable Commissioner Establishment And Training.
13. Dr. Idris Jide, Honourable Commissioner For Health.
14. Mr.Onabokun Dele A, Honourable Commissioner For Housing.
15. Mr. Afikuyomi Tokunbo, Honourable Commissioner For Tourism And Inter- Government Relations.
16. Mr Bamidele Opeyemi Michael, Honourable Commissioner For Information And Strategy
17. Prince Agunloye Rotimi Ojo, Honourable Commissioner Local Government And Chieftaincy Affairs.
18. Shashore Olasupo (SAN), Honourable Commissioner For Justice-
19. Dr.Hamzat Kadri Obafemi, Honourable Commissioner For Science And Technology.
20. Abosede Fransisco Bolaji, Honourable Commissioner For Physical Planning And Urban Development.
21. Prince Adesegun Abiodun, Honourable Commissioner For Water Front & Infrastructural Dev.-.
22. Oyekan Rotimi, Honourable Commissioner For Finance.
23. Hon. Olanrewaju Sesan Ayidele, Special Adviser On Environment.
24. Mr. Danmole Mohammed Oyinlola, Special Adviser Central Business District-
25. Mr. Ipaye Ade Rahman, Special Adviser On Taxation Ministry Of Justice.
26. Mr. Ajose Akinsanya, Special Adviser Deputy Governor's Office.
27. Dr. Dolapo Badiru, Special Adviser, Youth Sport And Social Development.
28. Engr. Johnson Ganiyu Abiodun, Special Adviser Works And Infrastructures .
29. Mr. Segun Ayobolu, Special Adviser On Information And Strategy.
30. Hon. Hamzat Toyin Olatunde, Special Adviser On Health.
31. Dr. Adewale Elijah Olu, Special Adviser On Education.
32. Mr. Afolabi Kofo Abayomi, Special Adviser On Special Duties.
33. Hon. Abdul Lateef Abdulhakeem, Special Adviser On Political And Legislative Matters
34. Mr. Adebanjo Oluwafemi Bandele, Special Adviser On Establishment And Training.
35. Mr. Kalejaye Adeboye Paul, Special Adviser Rural Development.
36. Mr. Opeifa Kayode Isiak, Special Adviser On Transportation.
37. Mrs. Oworu Olusola, Special Adviser On Commerce & Industry.
38. Chief Ifemade Samuel Olalekan, Special Adviser On Local Government Matters

LIST OF PRIVATE SECTORS PARTICIPATING FOR THE SUMMIT

S/N	NAMES OF COMPANY/ORGANIZATION	NAMES OF PARTICIPANTS
1	DRAIN DUCKS	MR AKEEM .A. APATIRA(GENERAL MANAGER)
2	GLOBAL TREE PLANTING	MR. IMEH JOHNNY.
3	JKK	TUNDE YUSUF
4	JKK	JIDE SOBAKIN
5	UACN	OYIRIZA OBUREBU,IDOWU SAROMI
6	CARBON EXCHANGE AFRICA	MRS. TOKUNBOH JAKANDE, AYO OWOSENI & KOREDE ADEYEMI

LAGOS STATE MINISTRY OF HOUSING PARTICIPANTS

1.	MR. JIMOH AJAO	SPECIAL ADVISER
2.	ENGR. P.O. BAMIGBOSE- MARTINS.	PERMANENT SECRETARY
3.	MRS. ENIOLA YONWUREN	DIRECTOR(FINANCE&ADMIN.)
4.	ENGR.O.A.OLAYINKA	DEPUTY DIRECTOR(ENGR. SERVICES)

1.	OMOWUNMI AKINNIFESI	NYSC
2.	OKHAREDIA IMONITIE JONATHAN	NYSC

COMMUNICATIONS
WATERSHED
0803 307 8966