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Addressing the Sustainable Development and Climate Change Challenges Together: Applying the Sustainomics Framework

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Excellencies, Eminent Colleagues, Honored Guests and Friends,

I thank the Beijing Forum for inviting me to address this distinguished audience, representing the cream of the intellectual community and their special guests. I am indeed very privileged and pleased to be here today.

Both the topic and timing are most appropriate. The intellectual community has a key role to play in effectively addressing the two major challenges of the 21st century-sustainable development and climate change. Climate change is an emerging issue of major worldwide concern to everyone on the planet. It threatens to exacerbate the formidable problems of development we already face-like poverty, food security, sickness, and water and energy scarcities. How can we re-energize and re-organize ourselves to plan, coordinate and implement the necessary responses on a global scale?

Global warming is a reality. In Darfur, where several hundred thousand people have died in recent years, climate change has already exacerbated water and land shortages (due to growing desertification), undermined agriculture, and fueled conflict for these scarce resources among the poor. On the opposite side of the globe, many Pacific islands (and the Maldives)—often only centimeters above sea level—are threatened with inundation by rising seas. In the distant north, melting of the sea ice is affecting polar wildlife, and undermining the already precarious livelihoods of native peoples.

These grim warnings of climate change underline the need to better understand the phenomenon and address the consequences. The latest Fourth Assessment Report of the UN Intergovernmental Panel on Climate Change (IPCC) shows that global warming is unequivocal and almost certainly caused by recent human activities that have increased greenhouse gas (GHG) emissions. It also indicates that climate change will continue into the foreseeable future and likely intensify, with potentially disastrous consequences for the planet earth and its inhabitants.

The scientific facts

We know that for over 10,000 years, carbon dioxide concentrations in the atmosphere were stable at about 280 parts per million by volume (ppmv). However, following the industrial revolution, these concentrations rose rapidly, now exceeding 380 ppmv. Over the past 100, this excess carbon dioxide, together with other minor greenhouse gases (GHG) like methane and nitrous oxide, have warmed the planet's surface an average of 0.75℃. The rate of warming is accelerating. There is other convincing evidence of climate change too—including a systematic rise in the mean sea level (of about 16 cm. during the past century), melting of ice in polar areas and glaciers, increased damage caused by extreme weather events, less precipitation in dry areas and more precipitation in wet areas, and significant shifts in ecological cycles and animal behavior.

The IPCC predicts that in the absence of a serious effort to curb emissions, by 2100, carbon dioxide concentrations will be about twice the pre-industrial level (i.e., over 500 ppmv). The average global temperature will increase about 3℃ above current levels (the range being 1.1—6.4℃), and the mean sea level will rise 35—40cm.

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Extremes of climate and precipitation will worsen, and the melting of ice will accelerate (because of the greater warming of polar regions). Even if emissions were sharply curbed, the IPCC estimates that temperatures would rise at least 1.5℃ more by 2100. The European Union has made a value judgment that 2℃ (corresponding to 450—500 ppmv) is the tolerable risk threshold.

The most vulnerable groups will be the poor, elderly, and children, including those living in rich countries. The most affected regions will be the Arctic, sub-Saharan Africa, small islands, and Asian mega deltas. High risks will be associated with low-lying coastal areas, water resources in dry tropics and subtropics, agriculture in low-latitude regions, key ecosystems (like coral reefs), and human health in poor areas. Moreover, extreme weather events will worsen, especially tropical cyclones and heat waves.

One major outcome of such impacts is that prospects for achieving many key MDG targets, already in some doubt, will become even more remote. Food security will be especially threatened.

Risks to current development prospects and envisioning a brighter future

First, our current focus (Figure1) is on surface indicators of poverty, inequity, exclusion, conflict, mis-governance and environmental harm, driven by forces like globalization and conventional market-oriented policies based on the "Washington Consensus". Present trends pose significant risks leading to a breakdown in global society, due to the inability of reactive and defensive policies to cope with existing multiple, interlinked crises, exacerbated by fresh problems like climate change. We tend to address different problems myopically and in a piecemeal manner (the "silo" mentality). A recent example is the promotion of corn-ethanol to solve the oil problem, which worsened food security arising from a drought-driven worldwide grain shortage. While policy reforms are proposed to correct for market deficiencies, issues arising from both the immediate drivers and underlying pressures are not being addressed systematically within a framework aimed at long term sustainability.

Figure 1 Current Risks and Future Vision

Second, a transitional step forward is possible today, by influencing key immediate drivers of change, including consumption patterns, population, technology and governance—and thereby shaping global trends and managing market forces. With known practical measures that make current development more sustainable, we can move

gradually towards the ultimate goal of sustainable development. The emphasis is on early action, to overcome the huge inertia of "supertanker earth", and begin steering it away from its risky current path towards safer waters using existing experience and tools. I proposed a practical framework called "sustainomics" to begin this transition, at the 1992 Rio Earth Summit.

Third, we might envision a long term goal based on a truly global SD paradigm and sustainable lifestyles. Here we need to work on the underlying pressures linked to basic needs, social power structure, values, choices, and knowledge base. Deep changes are necessary, driven by social justice and equity concerns, through inspired leadership, a networked, multi-stakeholder, multi-level global citizens movement, responsive governance structure, improved policy tools, advanced technologies and better communications (including the internet).

Human response options

To break the destructive cycle between climate and development, the immediate step forward lies in crafting strategies that address both problems simultaneously. This is because the two issues are highly interconnected—climate change affects development prospects and development paths determine the future climate.

At the global level, countries need to act in a concerted fashion to reshape human activities on an unprecedented scale. But sadly, current trends have fallen short of expectations. The 1992 UN Framework Convention on Climate Change (UNFCCC), accepted by over 190 countries, provided a promising start. It seeks "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"... "on the basis of equity and in accordance with (nations') common but differentiated responsibilities and respective capabilities." It notes that "developed countries should take the lead in combating climate change" and recognizes "the specific needs and special circumstances of developing countries." While accepting the "right to promote sustainable development," the UNFCCC invokes the precautionary principle, stating that "where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent climate change."

To implement the UNFCCC, participating countries agreed in late 1997 on the Kyoto Protocol, which came into force in February 2005. It specifies that by 2012, Annex I (industrialized) countries will collectively reduce their emissions 5 percent relative to 1990 levels, and Non-Annex I (developing) countries are exempt from mandatory emissions reductions. Currently 174 countries have ratified this agreement, although the United States (the largest GHG emitter) has rejected it.

Nevertheless, global GHG emissions have risen over 70 percent from 1970 to 2004, with major increases since Kyoto. The "Road Map" agreed at the UNFCCC Bali meeting in late 2007, set out the agenda and timetable to craft a post-Kyoto mitigation agreement—along with helping poor countries adapt to climate change (with improved financial and technical help)—but participants failed to agree on specific mitigation targets.

At the national level, however, the outlook is more hopeful, since practical methods now exist for integrating climate change responses into sustainable development strategies. Indeed, the existence of these tools should help to dispel the concern of many policymakers that tackling climate change might divert resources that are sorely needed to deal with more immediate development problems such as growth, poverty, food security, ill health, unemployment, and inflation.

The two specific ways that humans can respond to climate change are through adaptation and mitigation. Adaptation is aimed at reducing the vulnerability of human and natural systems to the impacts of climate change stresses, while mitigation is aimed at lowering GHG emissions, or even removing them—to reduce radiative forcing of the atmosphere and the intensity of future climate change.

Equity is a key issue when considering the adaptation and mitigation burdens of climate change. To date, the great bulk of greenhouse gases (GHG)—chiefly carbon dioxide, from burning fossil fuels and deforestation—have been emitted by the rich countries. In, 2004, for example, average per capita GHG emissions in industrial countries were fourfold greater than those in developing countries. But the poor countries will be most affected by climate change and need to boost their energy use to alleviate poverty and promote development. For now, developing countries need to focus on vulnerability and adaptation as a priority, especially to protect their poor, while rich countries (which are better endowed financially and technically), should lead the mitigation effort and also assist poorer countries in both their adaptation and mitigation work. Middle income countries will need to join the mitigation effort over time, as they become richer.

Adaptation responses

Present adaptation efforts need to improve, since long-term unmitigated climate change is likely to exceed the adaptive capacity of natural, managed (agricultural), and human systems. Natural organisms and ecosystems tend to adapt autonomously (for example, migration of animals as habitats change and growth-cycle changes in plants), but many may not survive if the rate of temperature rise is too rapid. Humans are capable of pre-planned (or anticipatory) adaptation, although reactive measures are often necessary. Proven adaptation methods exist, but need to be more widely disseminated and systematically implemented. Examples include building dikes against sea level rise, developing temperature or drought resistant crops, and widening hazard insurance coverage. Many similar technical, managerial, policy and behavioral measures could be adopted in both public and private domains, to increase the long-term adaptive capacity of communities and nations.

The effectiveness of pre-planned adaptation is shown in the case of coastal areas threatened by flooding and storms as temperatures rise. With 2℃ warming, about 55—90 million more people will be affected each year, if expenditures on coastal protection remain constant. However, these numbers may be drastically cut down to between 2 and 10 million by marginally raising annual coastal protection spending to match GDP growth rates.

Mitigation responses

Current mitigation efforts also need to improve-for example, by reducing the emission intensity of energy use, or increasing carbon dioxide absorption through forestation. They would not only result in lower GHG concentrations but also provide other benefits like improved health due to reduced air pollution, lower energy demand leading to greater energy security, and better energy availability for poor and rural areas. Currently known mitigation technology and policy options could stabilize GHG concentrations in the 450—550 ppmv range within the next 100 years. The estimated median costs of mitigation measures to achieve the 550 mark ppmv might amount to about 1.3% of world GDP by 2050 (equivalent to an annual GDP reduction under 0.1% per year up to 2050), although the cost of stabilization at the 450 ppmv level may exceed 3% of 2050 GDP.

We have already begun the mitigation process through the Kyoto flexibility mechanisms—such as the Clean Development Mechanism, joint implementation, and emissions trading—which permit industrial countries to transfer part of their Kyoto emissions reduction obligations to other nations, in exchange for payments. Consider a Clean Development Mechanism project implemented in a developing country, where the incremental cost of planting a forest to absorb carbon would be only $10 per ton C. The absorbed carbon would be credited to an industrial country, and set off against it's own mitigation obligations under the Kyoto Protocol-which might otherwise have involved retro-fitting an existing power plant for $50 per ton of carbon. This process would be efficient since the mitigation is done at least cost. Further, the money transfer from a rich to a poor country would be equitable, provided the developing country received more than the minimum payment of $10 per ton C (to cover costs)—that is, sharing the $40 cost saving. Recent compensation levels have ranged from $5—10 per ton C in developing countries to about $50 within Europe.

Sustainomics—a practical framework for action

Decision makers are invariably pre-occupied with immediate problems like growth, poverty, food security, disease, unemployment, and inflation. The best chance to grab their attention is to integrate climate change adaptation and mitigation measures into national sustainable development strategies. Fortunately, many practical ways to do just that have been developed over the past 15 years—one promising approach known as "sustainomics", involves three basic principles:

· First, making development more sustainable (MDMS) becomes the main goal, while sustainable development is defined as a process (rather than an end point) for improving the range of opportunities that will enable individual human beings and communities to achieve their aspirations and full potential over a sustained period of time, while maintaining the resilience of economic, social and environmental systems. MDMS is a step-by-step method that is more practical and permits us to address urgent priorities without delay, because many unsustainable activities are easier to recognize and eliminate (like conserving energy and reducing pollution).

· Second, the three elements of the sustainable development triangle need to be given balanced treatment. These elements include the social (focusing on equity, inclusion, empowerment and values), the economic (dealing with growth, efficiency and stability), and the environmental (concerned with natural resource degradation and pollution).

· Third, the thinking should transcend traditional boundaries (involving disciplines, space, time, and stakeholders). Trans-disciplinary analysis is essential, since issues and solutions cut across conventional academic disciplines. Problems like climate change also span the whole planet, play out over centuries, and concern every human being on earth.

How might these principles be applied? For example, the MDMS approach suggests how a long-term consensus might evolve to reconcile mitigation costs and development aspirations. Figure 2 shows a typical graph of environmental risk (represented by GHG emissions per capita) against a country's level of development (measured by GNP per capita). A typical developing country may lie along the curve AB, while an industrialized nation could be at C. MDMS indicates the way forward. Ideally, industrial countries (exceeding safe limits for "dangerous" climate change) should mitigate and follow the future growth path CE, by restructuring their development patterns to delink carbon emissions and economic growth. The poorest and most vulnerable countries must be provided an adaptation safety net, to survive climate change impacts. Meanwhile, middle income countries could adopt innovative policies to "tunnel" through (along BDE), by learning from past experiences of the industrialized world—the tunnel would lie below the safe limit. They should be encouraged (with technical and financial assistance) to simultaneously continue to develop (and grow) more sustainably, by following a less carbon-intensive growth path that also reduces climate vulnerability.

The sustainomics framework also provides policy makers with a variety of practical tools—both new methods and conventional ones applied innovatively. They help to not only identify and implement the most desirable "win-win" climate policies that simultaneously yield economically, environmentally and socially sustainable paths, but also resolve trade-offs among conflicting goals.

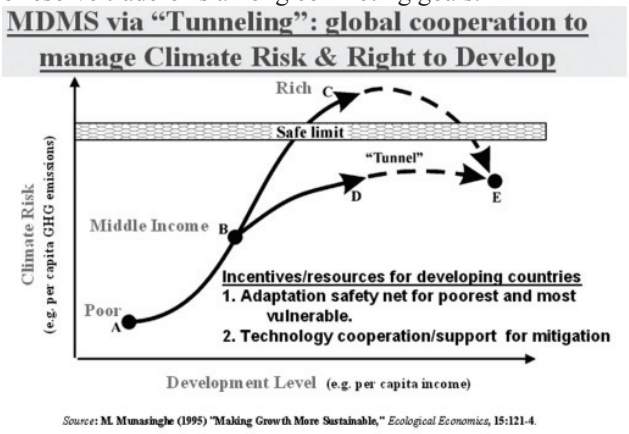

Figure 2 Developing countries can "tunnel" to avoid the carbon-intensive growth path of rich countries

Source: Munasinghe (2007)

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At the national level, tools include macro—and sectoral modeling, environmentally adjusted national income accounts, poverty analysis, and the Action Impact Matrix (AIM—described below). At the project level, other useful methods are available for sustainable development analysis—like cost-benefit analysis, multi-criteria analysis, and environmental and social assessment. At all levels, the choice of appropriate sustainable development indicators is also vital. The range of policy instruments includes pricing, taxes and charges, regulations and standards, quantity controls, tradable permits, financial incentives, voluntary agreements, information dissemina-tion, and research and development.

A recent example of macro-analysis shows the complex trade-offs involving economic, environmental and social goals, while using complementary measures to resolve problems. In West Africa, growth inducing macropolicies

(including structural adjustment) interacted with imperfections in the economy to increase GHG emissions and worsen climate impact vulnerabilities. Such imperfections (like policy distortions, market failures, and institutional constraints) make private decisions deviate from socially optimal ones. Macro-modeling showed that rapid aggregate economic growth, promotion of timber exports, subsidies for land-clearing, and open access forests, have combined to cause accelerated deforestation, thereby exacerbating rural poverty, harming the local environment, increasing GHG emissions and undermining adaptation. Implementing complementary measures (like eliminating land-clearing subsidies and enhancing forest protection) helped to address the problems and improve mitigation and adaptation prospects—most importantly, without reversing the growth-promoting macro-policies. In Figure 2, the highly peaked path ABCE could result from economic imperfections and environmental externalities. Corrective policies would help to reduce such distortions and permit movement through the sustainable tunnel BDE. Such a tunnel path is also more economically optimal (e.g., like a "turnpike" growth path).

Another sector-based example involves energy pricing. It would be economically efficient to set energy prices at marginal cost. Adding environmental externality costs (appropriately valued), including a carbon tax, would further reduce energy use and mitigate GHG emissions. From the social viewpoint, it would be equitable to earmark some of these tax revenues to help the poor who cannot afford to meet their basic energy needs, and to fund adaptation by those who suffer adverse impacts. Otherwise, simply raising prices could become a way of rationing energy in favour of the rich, while worsening the plight of the poor.

A country application to Sri Lanka (AIM, sector and project evaluation)

Among the various sustainomics tools mentioned above, the Action Impact Matrix (AIM) is a unique method that shows how to practically integrate climate change and sustainable development. This approach also has been used successfully in several other countries. It identifies and prioritizes the two-way interaction: how (a) the main national development policies and goals affect (b) the key adaptation and mitigation options; and vice versa. The AIM approach analyses key economic-environmental-social interactions to identify potential barriers to making development more sustainable. It also helps to determine the priority macro policies and strategies in economic, environmental, and social spheres that facilitate the implementation of adaptation and mitigation to overcome the effects of climate change. Thus, such a matrix helps to promote an integrated view, meshing both development decisions and climate change effects.

The AIM methodology relies on a fully participative stakeholder exercise. Up to about 50 experts are drawn from government, academia, civil society and the private sector—representing various disciplines and sectors relevant to both sustainable development and climate change. They usually interact intensively over a period of about two days to build a preliminary AIM. This participative process is as important as the product (that is, the matrix), since important synergies and cooperative team-building activities emerge. The collaboration helps participants to better understand opposing viewpoints, resolve conflicts, promote cooperation and ownership across decision-making agencies, and facilitate the implementation of the agreed policy remedies.

Agriculture, water and food security

Application of the AIM approach in Sri Lanka showed major climate vulnerabilities arising from food security, agriculture and water. A more detailed study of this issue using a Ricardian agriculture model was applied to identify how past output changes in important crops like rice, tea, rubber and coconut had depended on natural variations in climate (mainly temperature and rainfall). Then, a downscaled regional climate model was used to make detailed temperature and precipitation predictions specific to Sri Lanka. The combined results of both models showed that the impact on future rice cultivation would be negative and significant (almost 12 percent yield loss by 2050) —affecting poor farmers in the dry zone, where incomes are lowest. Meanwhile, some areas in the wet zone, where tea is grown and incomes are higher, would experience gains (+3.5 percent yield by 2050).

These findings raised several important policy issues. Rice is the staple food and a large portion of the population depends on rice farming. Thus, adaptation measures are essential to protect national food security, protect livelihoods and reduce the vulnerabilities of the rural poor in the dry zone. Meanwhile, the differential impacts of climate change on poor farmers and richer landowners have income distributional and equity implications that also

need to be addressed. Finally, population movements from dry to wet zones are a potential risk that policy makers need to deal with.

Disaster and Health Vulnerability

The AIM also identified coastal zone vulnerabilities, due to sea level rise and storm surges. The 2004 Asian Tsunami (although not climate related) had many similar effects. In Sri Lanka, it killed 35,000 people in the space of a few hours (1 in every 500 people on the island). Lessons learned from this devastating experience have helped to frame future adaptations measures, especially the role of social capital in increasing community resilience. Other climate-linked areas of concern in Sri Lanka, currently under detailed study, include mosquito-borne disease like malaria and dengue, and waterborne (diarrhea) diseases.

Renewable energy

A different AIM was generated to study links between mitigation and development goals. Small hydro was identified as a promising renewable energy option on the first round. In subsequent detailed analysis, the mitigation potential of 22 specific small hydro sites wa s assessed in relation to 3 sustainable development indicators. The economic indicator was cost, the social indicator was number of people resettled (due to inundation of homes by dam storage), and the environmental indicator was a biodiversity loss index (also due to inundation). All indicators were measured per tonne of carbon mitigated at each site (due to the fossil fuel use displaced by the hydroelectric energy generated). This analysis shows the differences between the sustainability-based approach and one which emphasized only a single criterion like cost-benefit analysis.

Concluding Remarks

Ladies and gentlemen, let me conclude on an optimistic note. Climate change and sustainable development are interlinked problems that pose a serious challenge to humanity. Although the issues are complex and serious, both problems could be solved together, provided we begin immediately. We know enough already to take the first steps towards making development more sustainable, that will transform the risky “business-as-usual” scenario into a safer future. I believe that the intellectual community can and will help to re-energize and re-organize humanity to plan, coordinate and implement the necessary responses on a global scale.