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UNEP Year Book 2009 Makes the Green Economy Case

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Nairobi, 16 February 2009--The importance of realizing a Global Green New Deal and the urgent need for a transition to a low carbon and resource efficient Green Economy are spotlighted in the UNEP Year Book 2009, launched today at an international gathering of environment ministers.

The Year Book, compiled at the request of the UNEP Governing Council, presents the hard facts and worrying trends while also underlining some of the transformational and innovative ideas already being piloted in both the developed and developing world.

Achim Steiner, UN Under-Secretary General and UNEP Executive Director, said: "The Year Book serves as a reminder to the international community as to why a Green Economy is so urgently needed from the bubbling up of methane gas in the Arctic to the shrinking availability of croplands".

"But it is also about optimism and the power of positive policies: from the way a building in Africa passively cools itself by mimicking termite mounds to the way some countries and cities are pioneering industrial symbiosis—co-locating businesses and factories to recycle and re-use wastes as raw material inputs, saving finite natural resources, millions of dollars and the planet too," he added.

Highlights

Waste

- Over two billion tones of waste are being generated throughout the world annually with someone in a developed economy throwing away around 1.4 kg of solid waste refuse daily.
- This is however leveling off perhaps as a result of waste minimization and recycling measures.
- Developing nations, in particular rapidly developing economies are producing more waste with China expected to produce 500 million tones of solid waste a year, and India about 250 million tonnes by 2030 based on current trends.

Construction and Buildings

There are some positive developments in particular in the building and construction sector, not least in energy efficiency improvements aimed at cutting the estimated 30 to 40 per cent of global greenhouse gas emissions linked with the built environment.

- A world-wide survey conducted by McGraw-Hill Construction Analytics found that one third of industry professionals believe more than 10 per cent of domestic construction is already moving to higher resource efficiency.

- A further 50 plus per cent said principles of resource efficiency will be applied to 60 per cent of their projects in the next five years.
- Canada, France and the United Kingdom are among several countries that have launched programmes to make buildings energy neutral—the buildings generate via technologies such as solar and combined heat and power systems as much energy as they consume
- The United Kingdom for example has launched a voluntary industry agreement aimed at cutting by half (12.5 million tonnes) in 2012 the amount of construction waste going to landfill. It could recover materials worth an estimated \$1 billion.

The Year Book highlights how copying nature—so called biomimicry—can offer intriguing solutions. The Eastgate building in Harare, Zimbabwe has passive, self-cooling systems modeled on termite mounds.

The building, a mixture of offices, shops and car parking, uses an average of 90 per cent less energy than a comparable structure saving more than \$3.5 million since opening in the 1990s.

'Materials substitution' is another emerging field with researchers around the world in a race to produce cement and concrete that can be made at temperatures lower than the current 1,000 degrees C.

- The Massachusetts Institute of Technology are currently looking at using magnesium compounds—a waste material of many other industrial processes—as a substitute for conventional concrete's calcium-silicate-hydrate particles.
- Others are looking at using substitutes based on silicon and aluminum harvested from waste by-products such as coal ash and iron slag. They have the potential to cut CO2 emissions from cement industry by an estimated 20 per cent, while utilizing an industrial waste and producing a final product less prone to weathering—the kind of multiple economic and environmental benefits at the heart of the Green Economy initiative.

Dematerialization is another term in the emerging area of industrial ecology. At its simplest it can be captured in consumers demanding less packaging for example on products. A producer of unbleached cotton, who uses fewer resources, might also be able to charge a higher price and certainly achieve higher profit margins.

Industrial symbiosis, or what is known in China as the Circular Economy, is an off-shoot of this concept. The idea is to co-locate businesses and facilities in such a way that their wastes are raw materials for other nearby ones.

- Pioneering Industrial Symbiosis Network in Kalundborg Denmark, now has more than 25 industrial waste management processes integrated in one system.
- The United Kingdom's Industrial Symbiosis Programme involves more than 8,000 participant companies.

- It has diverted more than four million tonnes of business waste from landfills.
- Eliminated over 350,000 tonnes of hazardous waste from the environment.
- Saved over nine million tonnes of water, avoided the use of 6.3 million tonnes of virgin raw materials and reduced carbon emissions by over 4.5 million tonnes.
- Generated \$208 million in new sales for members and saved them nearly \$170 million.
- Chicago in the United States and Shanghai in China have adopted similar symbiosis projects.

China's Circular Economy initiative is also looking at labeling products for their resource consumption backed up by tough penalties for companies who use processes, materials and techniques on a so called 'eliminated' list.

- If items on the eliminated list are used, the government can confiscate the equipment, materials or product; impose fines of up to \$30,000 or shut the enterprise down.
- Imported items on the 'eliminated' list must be returned and a fine of up to \$150,000 can be imposed under the plan.
- If the importer cannot be identified, then the carrier can be made responsible for returning the items or paying for their disposal.
- Banks or other financial institutions are also banned from supporting enterprises that manufacture, import or distribute items on the 'eliminated' list.

Transport

Transport accounts for over 20 per cent of global greenhouse gas emissions. In 2005 there were an estimated 650 million vehicles on the road with that number expected to double by 2030.

- The Indian city of Chennai is working with the Sustainable Mobility and Accessibility Research and Transformation initiative (SMART) at the University of Michigan in the United States in order to tackle the twin economic and environmental challenges of congestion and pollution.
- Railway and bus systems are to be kitted with wireless technology so that thousands of computer and software industry commuters can work en route.
- At the stop closest to work, the commuters can choose from privately-run, low-polluting shuttle buses; taxis; rental cycles or walking paths.
- The system uses the commuters' mobile phones to forecast anticipated transport and traffic conditions and needs. Eventually commuters will be able to use their

phones to check up on the transport networks and choose the most efficient mode based on prevailing conditions.

Industrial Water

Currently close to 880 million people lack adequate access to clean water and 2.5 billion are without improved sanitation in their homes. By 2030, close to four billion people could be living in areas suffering severe water stress mostly in South Asia and China.

Industry uses 10 per cent of water in low and middle-income countries and up to close to 60 per cent in high-income ones.

- A Finnish paper mill has switched from chemical to thermo-mechanically treated pulp and installed a biological wastewater treatment facility—water savings of 90 per cent have been achieved.
- An Indian textile manufacturer has switched from using aluminum to zinc in synthetic fabrics—water consumption has been cut by 80 per cent with the cleaner waste water produced suitable for irrigation uses on nearby farms.
- By separating process water from sewage water, a Mexican sugar cane company has cut water use by 90 per cent.
- A Spanish company, managing 300km of highways in Sao Paulo state, Brazil has designed the roads to funnel rainwater into 250 containment dams with a capacity of 2 million cubic metres. The system allows the rainwater to seep slowly into the ground, assisting in replenishing the Guarani aquifer while saving money in terms of reduced road maintenance.

While some progress is being made, the Year Book underlines the scale of the challenge facing the world towards the end of the first decade of the 21st century.

Climate Change

2008 had the second smallest area of Arctic sea-ice left following the summer thaw since satellite monitoring began in 1979. The National Snow and Ice Center in the United States found that the minimum sea-ice cover, which occurred on 12 September, was somewhere over 4.52 million square kilometers.

“While 2008 saw 10 per cent more ice cover than in 2007, the lowest figure on record, it was still more than 30 per cent below the average for the past three decades. Taken together, the two summers have no parallel,” says the Year Book.

- For the second year in a row, there was an ice-free channel in the Northwest Passage through the islands of northern Canada.
- 2008 also witnessed the opening of the Northern Sea Route along the Arctic Siberian coast—the two passages have probably not been open simultaneously since before the last ice age some 100,000 years ago.
- The Greenland ice sheet, which could raise sea levels by six metres if it melted away, is currently losing more than 100 cubic km a year—faster than can be explained by natural melting.

- Losses from the West Antarctic ice sheet have increased by 60 per cent between 1996 and 2006.
- Losses from the Antarctic Peninsula increased by 140 per cent.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) estimated that sea levels might rise by between 18cm and 59cm in the coming century. But many researchers now believe the rise even higher in part as a result of new assessments of ice sheets in Greenland and Antarctica.

- One study estimates a sea level rise of between 0.8 and 1.5 metres, while another suggests a sea level rise of two metres in the coming century from outflows of ice from Greenland alone.
- A one metre rise in sea levels world-wide would displace millions of people. Around 100 million people in Asia, mostly Bangladesh, eastern China and Vietnam; 14 million in Europe and eight million each in Africa and South America.

The Year Book argues that urgent action is needed to curb greenhouse gas emissions, not least because some of the natural carbon storage systems or 'sinks' may be losing their absorption capacity raising the spectre of a runaway greenhouse effect.

- Studies in 2008 indicates that one key 'sink'—the oceans—are now soaking up 10 million tones less CO₂.

The Year Book also flags up increasing concern among scientists about releases of greenhouse gases such as methane from the Arctic as ice melts and permafrost thaws in part as a result of new studies indicating that the western Arctic is warming 3.5 times more than the rest of the globe. This concern has taken on even greater importance as a result of two recently published studies.

- A study focusing on North America suggests that upwards of 60 per cent more carbon could be stored in the permafrost than previously supposed.
- An international study has now doubled the amount of soil-carbon in the permafrost across the entire Arctic.
- Marine researchers have discovered more than 250 plumes of methane bubbling up along the edge of the Continental shelf northwest of Svalbard.
- The International Siberian Shelf Study has found higher concentrations of methane offshore from the Lena River delta.
- Researchers calculate that, once underway, thawing of the east Siberian permafrost—thought to contain 500 billion tones of carbon—would be irreversible and that over a century 250 billion tones could be released.

Monitoring of methane levels in the atmosphere indicate that concentrations rose in 2007 and 2008 after nearly a decade of stability. Intriguingly higher concentrations were detected in both the northern and southern hemispheres.

Meanwhile, the Year Book raises concerns over another carbon sink—forests. Rising temperatures may be stressing trees leading to photosynthesis and thus carbon sequestration halting sooner in summer months. Stressed forests may also be more vulnerable to pollution, disease and pests, again undermining their carbon storage potential.

The Year Book also focuses on new research from the Amazon.

- A doubling of CO₂ could warm the oceans to such a point that rainfall in the Amazon could decline by 40 per cent.
- Overall an estimated 53 per cent decline in vegetation growth could occur.
- Forest loss on this scale could in turn raise temperature 'locally' by up to eight degrees C triggering further droughts and putting pressure on the Amazon River, the world's largest river that carries one fifth of the world's river water.

The melting of the world's icy regions, including mountain glaciers is also triggering other hazards above and beyond the very serious threats to water supplies if glaciers melt away: nearly a billion people in South Asia rely on seasonal melt waters from the Himalaya-HinduKush mountain system for example.

- Hazardous substances, deposited from the atmosphere and locked away in glaciers, are now being re-released.
- The pesticide DDT is turning up in unanticipated amounts in Adelie penguins that live in parts of the Antarctic coastline.
- Organic pollutants are being carried back into the environment from melting glaciers in the Rocky Mountains of North America.
- Polychlorinated biphenyls (PCBs) can be found downstream of European glaciers.

Disasters and Conflicts

The Year Book also discusses the links between natural disasters, environmental degradation, conflicts and human or social vulnerability as well as the importance of disaster preparedness—issues becoming of increasing concern in a climate-constrained world.

- While geological disasters such as earthquakes and volcanoes have remained fairly constant over the past century, hydro-meteorological disasters such as storms, floods and droughts have increased dramatically since 1950.
- The frequency of these events has increased by an average of 8.4 per cent a year between 2000 and 2007.
- Another new assessment says that the total number of disasters has increased from about 100 events per decade in the period 1900-1940 to almost 3,000 per decade by the 1990s.
- A further study puts the total number of disasters between 2000 and 2005 at 4,850 and links this to both 'technological disasters' such as train wrecks and building failures as well as weather events.

The Year Book spotlights Cyclone Nargis that struck Myanmar with a peak wind speed intensities of 215km per hour on 2 May 2008 leaving more than 140,000 people dead or missing and 2.4 million people homeless and 'catastrophically affected'.

- As with the 2004 Indian Ocean tsunami, the loss of 'environmental infrastructure' made coastal communities more vulnerable.
- In the early 20th century, mangrove forests covered an estimated more than 242,000 hectares in the Irrawaddy River Basin, but by the end of the century just over 48,500 hectares remained with the loss linked to clearance for charcoal and latterly for agriculture and shrimp farms.

Ecosystems

The 2005 Millennium Ecosystem Assessment concluded that 60 per cent of the Earth's ecosystems—from forests and soils to coral reefs and grasslands—are damaged or being degraded.

The Year Book underlines that this trend is continuing through 2008.

Increasing demand for food and agricultural production is, under current systems and economic models, triggering a dramatic increase in land under the hoe and the plough.

Today farmland covers nearly a quarter of the planet's surface.

- Entire forest systems have effectively disappeared in at least 25 countries and have declined by 90 per cent in another 29 countries.

Marine fisheries are in a state of stagnation and have been that way for nearly a decade.

- Since the onset of industrial fisheries in the 1960s, the total biomass of large, commercially-targeted marine fish species has declined by a 'staggering' 90 per cent says the Year Book.
- Annual economic losses as a result of over-exploitation and near depletion of the most valuable fish stocks are estimated in 2008 at \$50 billion.

Biofuels and their impacts on food production, poverty and ecosystems can trigger polarized views with opportunities for income diversification and a way of reducing pressures on cropland possible in small-scale rural models.

At industrial scales, different crops can have different impacts. A new study has assessed the impact on water use in 2030 based on growing industrial-scale energy crops under current trends.

- An estimated 50 billion litres of maize-based biofuel produced in North America would require 20 per cent of the region's irrigated water supplies
- Producing just under 34 billion litres of sugar-cane derived biofuel in Brazil would require eight per cent of irrigated water supplies.

- Rapeseed-derived biofuel made in the European Union has perhaps the lowest potential water footprint. Producing just over 20 billion litres of fuel would require just one per cent of the EU's irrigated water.

The Year Book points out that it is the poor, and especially the rural poor who depend on healthy and functioning ecosystems.

- An estimated 90 per cent of rural poor depend on forests for at least a portion of their income.
- In rural Africa, small-scale agriculture is the principal source of income for some 90 per cent of people.
- Nature-based income accounts for more than half of the total income stream for the world's rural poor.

Better and more intelligent management of ecosystems and their goods and services will become increasingly critical as the century unfolds and the population climbs to over nine billion by 2050.

- On current projections the availability of cropland per person is set to drop to 0.1 hectares requiring a rise in agricultural production “unattainable through conventional means”.

Soil degradation, linked with intensification, has now and already affected all but 16 per cent of the world's croplands—healthy croplands are now confined to temperate areas of the midwestern United States, central western Canada, Russia, central Argentina, Uruguay, southern Brazil, northern India and northeast China with a scattering across the Tropics.

- One possibility is to manage land and landscapes as ‘mosaics’ in which food production is one of several central ecosystem services.

So called eco-management as it is now being termed can date back in some cases millennia from the grasslands of Europe to the indigenous peoples of the Americas who managed woodlands to create meadows for deer grazing.

- The Terra Preta soils of central Amazonia have three times more soil organic matter, nitrogen and phosphorous and 70 per cent more charcoal when compared with adjacent soils—the soils were generated by pre-Columbian native populations by adding “charred residues, organic wastes, excrement and bones” to the soils.

Market mechanisms and financial instruments have a role to play including payment for ecosystem services.

Clearing of forests continues at some 13 million hectares annually, equal to an area half the size of the United Kingdom. Tropical forest loss accounts for an estimated 17 per cent of greenhouse gas emissions.

- Countries are currently assessing the inclusion of funding for forests in the UN climate change arrangements to be agreed in Copenhagen later this year under the term Reduced Emissions from Deforestation and Forest Degradation.

Granting fishing communities and fishers rights and responsibilities in a fishery may also be a way forward.

- Surveys of various rights-based catch shares for example in Canada, Chile, New Zealand, Mexico and the United States, indicates that they reduce the risk of fishery ecosystem collapse while boosting livelihoods.

Harmful Substances and Hazardous Waste

2008 has been a year of food and product-contamination crises.

- In March Italy was rocked by incidents involving dioxin-contaminated mozzarella cheese. Dioxins, substances linked with cancer, are by-products from a range of industrial processes including combustion.
- The cases, centering on the region of Calabria, were tracked by authorities to suspected contamination of pastureland.
- In September, China was involved in incidents where milk including baby formulas was found to be contaminated with the toxic chemical melamine.
- In Japan in October two major companies recalled noodle products after discovering insecticide contamination.
- Days later the country's largest meat processor recalled products after discovering that underground water used at a plant near Tokyo contained levels of cyanide compounds.
- Meanwhile in December in Ireland, the authorities recalled pork products again after dioxin contamination via tainted feed.

Over the past two decades, arsenic contamination has been detected in a growing number of countries in South Asia, says the Year Book.

- About 30 per cent of private wells in Bangladesh show high levels of arsenic, at over 0.5 milligrams per liter, and more than half of the country's administrative units are affected by contaminated drinking water.
- The Year Book indicates that deforestation is aggravating the situation in the Amazon. Here forest soils naturally contain up to three times more mercury than pastureland with deforestation releasing mercury to the air and to rivers.

.Notes to Editors

The UNEP Year Book 2009 can be found at <http://www.unep.org/geo/yearbook/yb2009>

It can be purchased at Earthprint www.earthprint.com

To read previous UNEP and GEO Year Books, visit <http://www.unep.org/geo/yearbook/>

The 25th Session of the UNEP Governing Council/Global Ministerial Environment Forum takes place in Nairobi on 16-20 February 2009
<http://www.unep.org/gc/gc25/>

For more information on UNEP's Green Economy Initiative, visit
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For More Information Please Contact

For More Information Please Contact Nick Nuttall, UNEP Spokesperson and Head of Media, on Phone: + 254-20 7623084; Mobile in Kenya: + 254 (0) 733 632755; Mobile when traveling: +41 79 596 57 37; Email: nick.nuttall@unep.org

Or Anne-France White, Associate Information Officer, at tel: +254 20 762 3088, Mobile: + 254 738 652793, or e-mail: anne-france.white@unep.org