

## Loss of top animal predators has massive ecological effects



US researchers have discovered that the decline of large predators and herbivores in all regions of the world is causing substantial changes to Earth's terrestrial, freshwater and marine ecosystems.

In a paper, 'Trophic Downgrading of Planet Earth', published in the journal *Science*, the researchers show that the loss of apex consumers from ecosystems may be humankind's most pervasive influence on nature. The study, conducted by an international team of 24 scientists, illuminates the patterns and far-reaching impacts of predation and herbivory on the structure and dynamics of global ecosystems. The researchers relied on both experimental and observational evidence.

"By looking at ecosystems primarily from the bottom up, scientists and resource managers have been focusing on only half of a very complex system," notes co-author Dr James Estes, professor of ecology and evolution at the University of California at Santa Cruz. "There is an urgent need for interdisciplinary research to forecast how a continued loss of top-level consumers will further harm the planet's ecosystems."

The paper documents some of the negative effects that the widespread loss of these animals has already had on Earth's biosphere, climate, biodiversity and vegetation:

The reduction of lions and leopards from areas of sub-Saharan Africa caused the baboon population to swell. This

unexpectedly increased transmission of intestinal parasites from baboons to humans as the primates were forced to forage closer to human settlements;

As large ungulates recovered from a devastating rinderpest epidemic in the Serengeti in Africa, herbivory increased, and the frequency of wildfire declined in that region;

Industrial whaling in the 20<sup>th</sup> century resulted in the loss of large numbers of plankton-consuming great whales, which are now known to sequester carbon into the deep sea through deposition of faeces. The result has been the transfer of about 105 million tons of carbon into the atmosphere that would have been absorbed by whales, contributing to climate change.

"We must assume going forward that significant changes to the ecosystem are occurring when large predators and herbivores are removed from the top of the food web, and, thus, that efforts to manage and conserve nature must include these animals," notes co-author Dr Ellen Pikitch of the Institute for Ocean Conservation Science at Stony Brook University, New York. "An old paradigm has shifted, and those who question this theory now have the burden to prove otherwise."

## Parties come together to promote green future for Africa

The African Development Bank (AfDB) and global conservation group World Wide Fund for Nature (WWF) have teamed up to promote green economy and development issues in Africa.

Both organisations signed a cooperative framework to this effect in Geneva in July. The heads of the two organisations agreed to highlight the growing links between environmental protection and sustainable development, and the need to work on such issues as climate adaptation and mitigation, biodiversity and ecosystems.

AfDB President Donald Kaberuka emphasised the bank's strong

commitment to sustainable development and climate change mitigation and articulated the potential of this partnership: "This cooperative agreement is not built on financial interest but truly on the synergistic potential and comparative advantage of the two organisations and their capacity to echo Africa's voice."

The partnership will address some of Africa's most urgent sustainability issues, with an initial collaboration that focuses on three areas: developing win-win partnerships with emerging economies and strengthening South-South cooperation; catalysing knowledge-sharing and knowledge products for green growth and sustainable development; collaborating on energy and water resource management as well as climate change.

"We are confident that our partnership with AfDB will deliver tangible results for people across Africa and the ecosystems upon which their future depends," said Jim Leape, DG of WWF International. The two leaders agreed to focus first and foremost on a few concrete, practical and innovative initiatives, targeted to their strategic directions. They plan, for example, to collaborate on a joint publication taking stock of Africa's biodiversity and footprint, to be released in time for the Rio+20 Earth Summit in 2012. They also plan to leverage support for a successful outcome at the upcoming climate change negotiations in Durban this December.

Source: WWF

## Indian Ocean pirates hinder climate observations

Australian scientists have sought the help of the United States and Australian navies to plug a critical gap in their Argo ocean and climate monitoring programme caused by Somali pirates operating in the western Indian Ocean.

"We have not been able to seed about a quarter of the Indian Ocean since the increase in the piracy and that has implications for understanding a region of influence in Australian and south Asian weather and climate," reported CSIRO

Wealth from Oceans Flagship scientists Dr Ann Thresher. Over 30 nations contribute to the multi-million Australian dollar Argo project, in which 3 000 robotic instruments provide near real-time observations of conditions such as heat and salinity in the top 2 000 m of the ocean.

Australia ranks second among countries based on the number of profilers providing data, with more than 325 profilers reporting to international data centres from the Indian, Pacific and Southern Oceans and the Tasman Sea. At nearly 2 m in length the drifting profilers, or 'floats', are programmed to drift at 1 000 m for ten days, then fall to 2 000 m and sample as they ascend to the surface to upload their data to satellites.

Although the Argo project offers shipping and defence benefits, its primary objective is to monitor ocean heat and salinity patterns that drive the climate and monsoonal systems which bring rain to Australia. Dr Thresher said the programme was heavily reliant on commercial shipping and research and chartered vessels to deploy the instruments. "With the region north of Mauritius being a no-go area for most vessels due to piracy activity, we have approached the US and Australian navies to assist us in deployments of around 20 profilers, including ten provided by the UK Argo project.

A 20-m South African yacht, *Lade Amber*, is under charter to CSIRO and has successfully deployed 7 instruments near Mauritius in the Western Indian Ocean. Her working area, however, was severely restricted by pirate activity in this area and the positions of several profilers had to be changed to accommodate these restrictions. She will deploy another 15 instruments as she transits between Mauritius and Fremantle, where she will pick up another 39 floats for deployment northwest of the Australian North West Shelf – an area thankfully free of piracy.

Source: CSIRO



## Humanity can and must do more with less – UNEP

By 2050, humanity could devour an estimated 140 billion tons of minerals, ores, fossil fuels and biomass per year – three times its current appetite – unless the economic growth is ‘decoupled’ from the rate of natural resource consumption, warns a new report from the United Nations Environment Programme (UNEP).

Developed countries’ citizens consume an average of 16 t of those four key resources per capita (rising up to 40 t/year in some countries). By comparison, the average person in a country such as India consumes only 4 t per year. Already the world is running out of cheap and high-quality sources of some essential materials such as oil, copper and gold, the supplies of which, in turn, require ever-rising volumes of fossil fuels and freshwater to produce.

According to UNEP’s International Resource Panel, improving the rate of resource productivity faster than the economic growth rate is the notion behind ‘decoupling’. That goal, however, demands an urgent rethink of the links between the resource use and economic prosperity, buttressed by a massive investment in technological, financial and social innovation, to at least freeze per capita consumption in wealthy countries and help developing nations to follow a more sustainable path.

The trend towards urbanisation may help as well, experts note, since cities allow for economies of scale and more efficient service provision. Densely-populated places consume fewer resources per capita than sparsely populated ones thanks to economies in such areas as water delivery, housing, waste management and recycling, energy use and transportation, they say.

“People believe environmental ‘bads’ are the price we must pay for economic ‘goods,’” notes UN Under Secretary-General and UNEP Executive Director Achim Steiner. “However, we cannot, and need not, continue to act as if this

trade-off is inevitable. Decoupling is part of a transition to a low carbon, resource efficient Green Economy needed in order to stimulate growth, generate decent kinds of employment and eradicate poverty in a way that keeps humanity’s footprint within planetary boundaries.”

According to Steiner, next year’s Rio+20 meeting represents an opportunity to accelerate and scale up these ‘green shoots’ of a Green Economy, which are emerging across the developed and developing world.

To access the report, *Decoupling Natural Resource Use and Environmental Impacts from Economic Growth*, Visit: [http://www.unep.org/resourcepanel/decoupling/files/pdf/Decoupling\\_Report\\_English.pdf](http://www.unep.org/resourcepanel/decoupling/files/pdf/Decoupling_Report_English.pdf)

## Namibia’s satellite centre to warn of disaster threats

A new satellite data centre in Namibia will help farmers prepare for droughts, floods, bushfires and pests.

The Earth Observation and Satellite Applications Research and Training Centre (EOSA-RTC) was launched earlier this year in collaboration with the African Monitoring of the Environment for Sustainable Development programme. It is located at the Polytechnic of Namibia and comprises a satellite receiving station and data centre, which will provide data useful for agriculture.

The data, which will be provided free to farmers’ associations and government departments, will include water indices, rainfall estimates, and maps of soil moisture content. Reliable data is essential to preparing for natural disasters. Earlier this year Namibia was hit by record floods, although rainfall is generally scarce.

“Rain is important for Namibia. Mistakes based on wrong information can be costly. For subsistence farmers, it can mean the difference between having food or not,” notes Marina Coetzee, a researcher at EOSA-RTC. “We will use the satellite to detect and map unknown small water bodies. We will also store normalised different vegetation indices

and then further process them into a variety of value-added products.”

Namibian researchers have already been assessing raw data obtained directly from satellites. However, the new centre will now provide specific, useful indices coming from the data, making interpretation easier.

Source: *SciDev.Net*

## Bangladesh and the Netherlands to share flood research

Flood-prone Bangladesh and the Netherlands have revealed plans to exchange research findings and share experience on managing floods.

A five-year research programme worth US\$1-million aims to strengthen the capacity of institutions and communities to deal with moderate and extreme floods. The programme is being hosted by the Wageningen University and the Bangladesh University of Engineering and Technology.

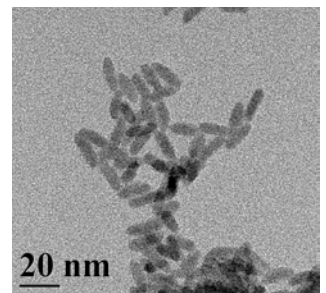
It will allow the scientists to share experiences and come up with a framework that will link disaster risk reduction, climate change adaptation and flood management. Funds will go towards four PhD research projects that will analyse flood policies and strategies in the two countries, and one project aimed at putting research findings into practice through local workshops.

Source: *SciDev.Net*

## Quantum dots degrade in soil, releasing their toxic guts – study

Quantum dots made from cadmium and selenium degrade in soil, unleashing toxic cadmium and selenium ions into their surroundings, a University of Buffalo study has found.

The research, accepted for publication in the journal *Environmental Science and*



*Technology*, demonstrates the importance of learning more about how quantum dots – and other nanomaterials – interact with the environment after disposal, says Prof Diana Aga, who led the study. Quantum dots are semiconductor nanocrystals with diameters of about 2 to 100 nanometres. Though quantum dots are not yet commonly used in consumer products, scientists are exploring the particles’ applications in technologies ranging from solar panels to biomedical imaging.

According to Prof Aga, as the use of quantum dots increases, so will their presence in the environment. “We can conclude from our research that there is potential for some negative impacts, since the quantum dots biodegrade. But there is also a possibility to modify the chemistry, the surface of the nanomaterials, to prevent degradation in the future,” she notes.

Working in the laboratory, the research team tested two kinds of quantum dots: Cadmium selenide quantum dots, and cadmium selenide quantum dots with a protective, zinc-sulphide shell. Though the shelled quantum dots are known in scientific literature to be more stable, Prof Aga’s team found that both varieties of quantum dots leaked toxic elements within 15 days of entering soil.

In a related experiment designed to predict the likelihood that discarded quantum dots would leach into groundwater, the scientists placed a sample of each type of quantum dot at the top of a narrow soil column. The researchers then added calcium chloride solution to mimic rain. It was found that almost all of the cadmium and selenium detected in each of the two columns remained in the top 15 mm of the soil, indicating that, under normal circumstances, quantum dots resting in top soil are unlikely to burrow their way into underground water tables.

Source: *University of Buffalo*