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Bees Under Bombardment

From Chemicals to Air Pollution, New UNEP Report Points to Multiple Factors Behind Pollinator Losses

Geneva/Nairobi, 10 March 2011 - More than a dozen factors, ranging from declines in flowering plants and the use of memory-damaging insecticides to the world-wide spread of pests and air pollution, may be behind the emerging decline of bee colonies across many parts of the globe.

Scientists are warning that without profound changes to the way human-beings manage the planet, declines in pollinators needed to feed a growing global population are likely to continue.

- New kinds of virulent fungal pathogens—which can be deadly to bees and other key pollinating insects—are now being detected world-wide, migrating from one region to another as a result of shipments linked to globalization and rapidly growing international trade

- Meanwhile an estimated 20,000 flowering plant species, upon which many bee species depend for food, could be lost over the coming decades unless conservation efforts are stepped up

- Increasing use of chemicals in agriculture, including 'systemic insecticides' and those used to coat seeds, is being found to be damaging or toxic to bees. Some can, in combination, be even more potent to pollinators, a phenomenon known as the 'cocktail effect'

- Climate change, left unaddressed, may aggravate the situation, in various ways including by changing the flowering times of plants and shifting rainfall patterns. This may in turn affect the quality and quantity of nectar supplies.

These are among the findings of a new report published today by the UN Environment Programme (UNEP), which has brought together and analyzed the latest science on collapsing bee colonies.

The study, entitled *Global Bee Colony Disorders and other Threats to Insect Pollinators*, underlines that multiple factors are at work linked with the way humans are rapidly changing the conditions and the ground rules that support life on Earth. It

shows humans' large dependency on ecosystem services even for such vital sectors as food production.

It indicates that bees are early warning indicators of wider impacts on animal and plant life and that measures to boost pollinators could not only improve food security but the fate of many other economically and environmentally-important plants and animals.

The authors of the report call for farmers and landowners to be offered incentives to restore pollinator-friendly habitats, including key flowering plants including next to crop-producing fields.

More care needs to be taken in the choice, timing and application of insecticides and other chemicals. While managed hives can be moved out of harm's way, "wild populations (of pollinators) are completely vulnerable", says the report.

Achim Steiner, UN Under-Secretary-General and UNEP Executive Director, said: "The way humanity manages or mismanages its nature-based assets, including pollinators, will in part define our collective future in the 21st century. The fact is that of the 100 crop species that provide 90 per cent of the world's food, over 70 are pollinated by bees".

"Human beings have fabricated the illusion that in the 21st century they have the technological prowess to be independent of nature. Bees underline the reality that we are more, not less dependent on nature's services in a world of close to seven billion people".

Bees and the Green Economy

Next year nations gather again in Rio de Janeiro, 20 years after the Rio Earth Summit, to evolve international efforts to achieve sustainable development including through accelerating and scaling-up a transition to a low carbon, resource-efficient Green Economy.

Part of that transition should include investing and re-investing in the world's nature-based services generated by forests and freshwaters to flower meadows and coral reefs.

"Rio+20 is an opportunity to move beyond narrow definitions of wealth and to bring the often invisible, multi-trillion dollar services of nature—including pollination from insects such as bees— into national and global accounts," said Mr Steiner.

"Some countries, such as Brazil and India, have already embarked on that transformation as part of a partnership between UNEP and the World Bank. It is time to widen and embed this work across the global economy in order to tip the scales in favour of management rather than mining of the natural world and that includes the services of pollinators," he added.

The new report on bee colony disorders has been led by researchers Dr Peter Neumann of the Swiss Bee Research Centre and Dr Marie-Pierre Chauzat of the French Agency for Environmental and Occupational Health Safety. The team also

included Dr Jeffrey Pettis of the United States Department of Agriculture's Agricultural Research Service.

Dr Neumann said: "The transformation of the countryside and rural areas in the past half century or so has triggered a decline in wild-living bees and other pollinators. Society is increasingly investing in 'industrial-scale' hives and managed colonies to make up the shortfall and going so far as to truck bees around to farms and fields in order to maintain our food supplies".

"This report underlines that a variety of factors are making these man-made colonies increasingly vulnerable to decline and collapse. We need to get smarter about how we manage these hives, but perhaps more importantly, we need to better manage the landscape beyond, in order to cost-effectively recover wild bee populations to far healthier and more sustainable levels," he added.

Highlights from the Report
Regional Losses
Declines in managed bee colonies date back to the mid 1960s in Europe but have accelerated since 1998, especially in Belgium, France, Germany, Italy, the Netherlands, Spain and the United Kingdom.

In North America, losses of honey bee colonies since 2004 have left the continent with fewer managed pollinators than at any time in the past 50 years.

Chinese bee keepers, who manage both western and eastern species of honey bees, have recently "faced several inexplicable and complex symptoms of colony losses in both species".

A quarter of beekeepers in Japan "have recently been confronted with sudden losses of their bee colonies".

In Africa, beekeepers along the Egyptian Nile have been reporting signs of 'colony collapse disorder' although to date there are no other confirmed reports from the rest of the continent.

Multiple Factors
Habitat degradation, including the loss of flowering plant species that provide food for bees, is among the key factors behind the decline of wild-living pollinators.

- An Anglo-Dutch study has found that since the 1980s, there has been a 70 per cent drop in key wild flowers among, for example, the mint, pea and perennial herb families.

Parasites and Pests, such as the well known Varroa mite which feeds on bee fluids, are also a factor.

Other parasites include the small hive beetle, which damages honeycombs, stored honey and pollen. Endemic to sub-Saharan Africa, it has spread to North America and Australia and "is now anticipated to arrive in Europe".

- Bees may also be suffering from competition by 'alien species' such as the Africanised bee in the United States and the Asian hornet which feed on European honey bees. The hornet has now colonized nearly half of France since 2004.

Air pollution may be interfering with the ability of bees to find flowering plants and thus food.

- Scents that could travel over 800 metres in the 1800s now reach less than 200 metres from a plant

Electromagnetic fields from sources such as power lines might also be changing bee behaviour. Bees are sensitive as they have small abdominal crystals that contain lead.

Herbicides and pesticides may be reducing the availability of wild flowers and plants needed for food and for the larval stages of some pollinators.

- Other impacts include poisoning of pollinators and the weakening of honey bees' immune systems

- Laboratory studies have found that some insecticides and fungicides can act together to be 1,000 times more toxic to bees

Some insecticides, including those applied to seeds and which can migrate to the entire plant as it grows, and others used to treat cats, fish, birds and rabbits, may also be taking their toll.

- Studies have shown that such chemicals can affect the sense of direction, memory and brain metabolism in bees

The management of hives may also be adding to the problem.

Some of the treatments against pests may actually be harmful to bees and a growing habit of re-using equipment and food from dead colonies might be spreading disease and chemicals to new hives.

Transporting bees from one farm to another in order to provide pollination services increasingly unavailable from nature could be an additional factor. In the United States, trucks carrying up to 20 million bees are common and each year over two million colonies travel across the continent.

- Mortality rates, following transportation, can be as much as 10 per cent of a colony

Notes to Editors

The full report, *Global Bee Colony Disorders and other Threats to Insect Pollinators,* can be downloaded at:
http://www.unep.org/dewa/Portals/67/pdf/Global_Bee_Colony_Disorder_and_Threats_insect_pollinators.pdf

The report is part of the UNEP Emerging Issues series, which is available at: http://www.unep.org/dewa/EarlyWarning/tabid/4435/Default.aspx

UNEP is host to a wide ranging partnership—The Economics of Ecosystems and Biodiversity (TEEB) —which is estimating the economics of nature and the returns to communities and countries from improved management of these assets.
For more information, please visit: http://www.teebweb.org/

The Green Economy in the context of sustainable development and poverty eradication is one of the two major themes of the UN Conference on Sustainable Development 2012 (UNCSD 2012) or Rio+20.
For more information on UNCSD 2012, please visit: www.uncsd2012.org

UNEP Green Economy Initiative: www.unep.org/greeneconomy

For more information, please contact:

Nick Nuttall, UNEP Spokesperson/Head of Media, on Tel: +254 (0)733632755 or when travelling +41 79 596 5737, E-mail: nick.nuttall@unep.org

Isabelle Valentiny, Information Officer, UNEP Regional Office for Europe, on Tel. + 41 22 917 8404, Mobile + 41 79 251 8236, E-mail: isabelle.valentiny@unep.org