Climate Change: Boom or Bust for Biodiversity

By Ed Stoddard

JOHANNESBURG, South Africa (Reuters) – Will climate change trigger mass extinctions or will new life bloom in its wake: Some of the scientific scenarios are apocalyptic and see a warmer world leading to the most profound changes since the demise of the dinosaurs.

The biodiversity and nature impacts (of global warming) are well documented…All the signals are there: birds migrating earlier, flowers blooming earlier, seasons changing," said Jennifer Morgan, director of the climate change program for the conservation group WWF International.

Global warming (news – websites) could wipe out a quarter of all species of plants and animals by 2050, according to one international study.

Others see a wetter and hence greener world as a result.

Australian scientists said this month that a hotter planet could induce more rainfall, encouraging the growth of plants that soak up greenhouse gases.

Many scientists say any benefits to forest growth could not offset threats to biodiversity from human pollution, the spread of roads and cities or rising sea levels tied to global warming.

Few scientists dispute the basic premise of the "greenhouse effect," which holds that human-induced carbon dioxide emissions are trapping heat in the Earth's atmosphere.

The debate intensifies when scientists attempt to forecast how fast and how far global temperatures will rise as a result.

CLIMATE CHANGE IN THE PAST

One dramatic thesis asserts that humanity has been altering the Earth's climate for the past 8,000 years because of large-scale forest clearance for agriculture, which released huge amounts of greenhouse gas into the atmosphere.

In a paper published last year in the journal "Climactic Change," William Ruddiman of the University of Virginia in Charlottesville argued that on the eve of the Industrial Revolution two centuries ago, people had already raised the global temperature by an average of 0.8 degrees centigrade.

"The first phase is that of negligible human impact which stretches back, say, a million years ago. And then you have this middle phase which begins 8,000 years ago with early agriculture and greenhouse gas levels rising slowly," Ruddiman told Reuters by telephone.

"And since the Industrial Revolution there is a real acceleration (in greenhouse gas emissions) and as a result a stronger effect on climate," he said.

Ruddiman says that pre-industrial greenhouse gas emissions warmed the planet sufficiently to stop an ice age in its tracks.

And the cause – widespread forest clearing – would almost certainly have had an impact on biodiversity, though Ruddiman himself has not speculated on this angle, and declined to be drawn in it as it is not his field of expertise.

Habitat destruction is widely regarded by many ecologists as the biggest man-made reason for species loss or extinction. Forest clearing in Europe 5,000 years ago would not be like the mechanized felling of tropical forests today.

It may in fact have initially contributed to diversity as early farmers would probably have left a variety of habitats in their wake, such as fields bordering on forests, which could have benefited many species.

There is an intriguing flip side to this story.

ANOTHER THEORY

Ruddiman maintains that this pre-industrial warming trend was at times reversed by reforestation in the northern hemisphere – a process set in motion by mass human deaths caused by pandemics of bubonic plague and or other diseases.

His argument: The plague led to widespread abandonment of farms during the Roman Empire and most spectacularly in the mid 14th century, when at least one-third of Europe's inhabitants perished in its wake between 1347 and 1350.

Cultivated land also fell into disuse in the Americas because of smallpox, which devastated Native American populations as a result of their initial contacts with Europeans.

The result was that forests grew back and absorbed big enough quantities of greenhouse gases while they were at it to affect global climate patterns.

"Land-use modelers note that abandoned cropland and pasture reverts to full-forest carbon levels in 50 years or less," Ruddiman wrote.

Historical records indicate that reoccupation of farms occurred in less than a century if the plagues quickly abated, but could be delayed by a century or two if repeated outbreaks kept population levels low."

This, he maintains, may have been a factor behind the "Little Ice Age" between 1300 and 1900.

In short, the causes of human-induced climate change – never mind its effects – have probably already affected life on Earth in ways that scientists are only beginning to understand.

And in today's world of 6 billion people – compared with 200 million to 400 million 2,000 years ago, according to U.N. estimates – the causes of climate change may be having a far greater impact than at any other time in human history.

Pollution linked to the burning of greenhouse fossil fuels and the destruction of tropical rain forests is, in the view of most ecologists, taking a serious toll on the environment.

The impact of drastic climate change itself on biodiversity may hold surprises which have not yet been imagined.

Assignment: Using information from this reading assignment, and other sources, write a letter to your state Assemblyperson explaining how global warming might impact at least one specific population of organisms. **You may** include how it has already impacted that species, **but you must** write about what might happen if warming continues (i.e., make a prediction).
Treat this assignment like an English assignment. Proofread your final draft and make corrections in spelling and grammar. Uncorrected grammar and spelling errors can lower your grade on this assignment.