Wild Cats and Climate Change

John Seidensticker

The 1,300 km² lowland, secondary, tropical forest in Way Kambas National Park on Sumatra’s (Indonesia) southeast coast normally receives 286 mm of rain per month. But during the 1997 El Niño, the park received less than 10% of normal. Neil Franklin (2002) observed seawater intruding in the waterways 16 km in from the coast; fires burned over 55% of the park; poaching pressure increased; and the total estimated tiger density was 4.6/100 km² in 1997, 2.6 in 1998, 1.1 in 1999, then 2.6 in 2000. While some tigers died in the fires, the results of the fires on prey populations and direct mortality from poaching could not be separated. The park is a habitat island surrounded by human settlement and cultivation; options for connecting it through corridors with other protected areas such as Berbak, Tesso Nilo, or Bukit Barisan are no longer available. For now, Way Kambas continues to limp along. A new El Niño event will again threaten, or even overwhelm, the small populations of Sumatran tiger, rhino, elephant, clouded leopards, flat-headed cat, golden cat, and fishing cat, and the multitude of other plants and animals that live in this tiny vestige of what was once the great lowland rainforest of Sumatra. Way Kambas is set up for a catastrophic event and there isn’t much anyone can do about it.

Unlike Way Kambas, the temperate deciduous and boreal forests of the Russian Far East (RFE) are extensive. We have estimated there is 269, 979 km² in the RFE-China Tiger Conservation Landscape (Dinerstein et al. 2006); the largest habitat patch is 183,237 km². The area of land actually occupied by the remaining 500 or so Amur tigers is about 160,000 km² (Miquelle et al. 1999). Like Way Kambas, the region is severely threatened by wild fires that appear to peak during El Niño events, and are expected to intensify with global warming. Tatiana Loboda is modeling the “Impacts of climate and land use change on wildfire frequencies and the Amur tiger” for her PhD at the University of Maryland. This is one part of a major joint University of Maryland, University of Virginia, and Wildlife Conservation Society project funded by NASA.

With global warming, scientists are finding Amur tigers living further north than they have in the past (A. Kulikov, pers. comm. 2007). Tigers adjust their range occupancy in response to that of their primary prey – deer, especially red deer, and wild pigs. The distributions of deer and pigs and tigers is thought to be related to winter snow depth (Miquelle 1999), which appears to be decreasing.

We find big cats moving north following the deer in North America. Ramona Maraj (pers. comm. 2006), senior carnivore biologist for the Yukon Department of Environment, tells me they are sighting cougars more often in the southern Yukon as they see increasing numbers of white-tailed and mule deer responding to climate warming in the Yukon. We expect Canada lynx to change their range in response to warming climates. Nils Stenseth et al. (2004) modeled how differential snow conditions, such as surface hardness determined by the frequencies of warm spells, influenced lynx interactions with the snowshoe hare. Variation in snow conditions are influenced by North Atlantic Oscillation (NAO)-linked periodicity. Changes in the NAO in periodicity and intensity will alter spatial, ecological, and genetic structuring of the lynx population Stenseth et al. (2005) predict.

The tigers living in the 10,000 km² Sundarbans mangrove forest will probably not survive the expected rise in sea level with global warming. This forest is the interface where the great rivers Ganges, Brahmaputra, and Meghna join the Bay of Bengal. But the Sundarbans will also be negatively impacted by changes in glacier and snow melt in the Himalayas. Himalayan glaciers, only exceeded by the polar ice in volume, are often called the water towers of the Ganges plain, are melting as a consequence of global warming. This is of course a concern for all the people living on the Ganges plain. It is also of great concern for those interested in the conservation of snow leopards, the cat of high altitude Himalaya and central Asia. Changes in river hydrology with reduced runoff will impact the forests and elephant grasslands found along the outer range of the Himalayas, in the Sivalik Hills, and the associated narrow strips of lowland forests in the bhabar and the terai. This is a 49,000 km² Tiger Conservation Landscape stretching a 1000 km, from Corbett National Park in India to Chitwan National Park in Nepal (Dinerstein et al. 2006), parts of which were so artfully described by Jim Corbett.

With these few examples, we see that, depending on the species of wild cat, there will be loss of critical habitats and range fragmentations, contractions, and expansion resulting from climate change. We have no choice but to learn to live with and work with these changes. I suspect most wild cats will not fare well, but we know so little about most wild cat species that making predictions is speculation. I do think we can confidently predict that the domestic cat will be just fine.

References
Stenseth N. C., and 8 co-authors. 2005. Snow conditions may create an invisible barrier for lynx. PNAS 101, 10632-10634.

Courtesy of John Seidensticker and Linda Swenan, Interim Board President, Wild Felid Monitor (wildfelidmonitor@gmail.com).

1 Smithsonian’s National Zoological Park; <seidenstickerj@si.edu>
According to a new analysis by Climate Central, 40 of the lower 48 states have experienced an upswing in downpours since 1950. The biggest increases have been in the Northeast and Midwest, which have seen 31 percent and 16 percent more extremely wet days, respectively. This animation shows the timing of the top 10 precipitation days at more than 3,000 locations across the country. Climate change affects us all, but the Arctic is “ground zero.” Here are the stories of some of the species on the front line of climate change. Climate change can decrease snow cover, melting it away or reducing overall snowfall. This threatens the survival of lemmings and the predators (and their young) that depend on them. © Kevin Schafer / WWF. There is no doubt that climate change is going to change the world as we have known it. The following are just a few of the ways that climate change is impacting our world and will likely continue to impact life on Earth into the foreseeable future. #1 Increased drought, floods, and wildfires. As the world warms, there is currently an ongoing shift in weather patterns such as precipitation patterns, and an increase in erratic weather. Climate change increases intense flooding, which probably reduces plant growth on balance because the water supply for plants is less slow and steady, and floods can erode soil? Climate change can also make dry periods more severe, which increases the risk of wildfires. While the net effect of such fires on wild-animal suffering is unclear, fires eliminate a lot of stored plant energy in a non-sentient way, thereby preventing many future decomposer animals from being born. Domesticating wild cats would not have been an easy process, however. The Near Eastern wildcat, from which almost every breed of household cat alive today is thought to originate, is notoriously shy and spends most of its life as a solitary animal. But the new research provides some hints about how our human ancestors may have done this. By comparing the genomes of 22 domestic cats from around the world with those of European wildcats and Near Eastern wildcats, researchers identified 13 key genes that differed, including genes involved in the reward centres of the brain and the development of neurons that are key to producing dopamine – the so-called pleasure hormone.