Royal Bengal Tiger: Threatened species

As human populations expand and natural habitats shrink, people and animals are increasingly coming into conflict over living space and food ... Tiger poaching is positively correlated with human-tiger conflict.

DR. MD. MIZANUR RAHMAN

THE majestic Royal Bengal Tiger is roaming near the brink of extinction. Once, the tiger ruled over a major part of the globe ranging from the Pacific to the Black Sea and from Ural Mountains to the Mountain Agung. It is an irony of fate that tiger is facing an onslaught of poaching throughout its range. The main factor contributing in the decline of cat population is habitat degradation. But poaching has put them in a vulnerable condition to survive. Right now tigers occupy only 7% of their historic range and they live in small islands of forests surrounded by a sea of human beings. Over the past few centuries tigers lost more than 80% of their natural habitats and what remain are only small fragments under heavy anthropogenic pressure.

Habitat loss: Anthropogenic disturbances envelop the forests as small pockets maintaining poor level of tiger population. In this circumstance tigers in one area can no longer breed with tigers in adjacent areas due to separation of one area from other by human settlements, infrastructures, villages, agricultural farms, roads, dams, fences and industry. Massive deforestation has forced tigers into small, scattered islands of remaining habitat. Tigers are bound to repeatedly interbreed with the same small group, eventually weakening the gene pool and leading to reproductive problems, birth defects and mutations. Consequently most tigers barely survive in tiny isolated and genetically unsustainable populations. Small islands of habitat are more accessible to poachers than continuous natural vegetation. Tigers also suffer from severe loss of natural prey due to habitat loss.

Habitat fragmentation: Large-scale habitat fragmentation is a major long-term threat to the survivability of the Royal Bengal Tiger population in the Sundarbans. At the beginning of the last century, tigers roamed across the whole Indian subcontinent. Their former range has been narrowed down due to increasing habitat loss and fragmentation. Tigers need large territories for moving, feeding, resting, preying and mating. Tigers love to reside in the larger patches. Many parts of the Sunderbans have become critically fragmented to the point where they are considered unlikely to maintain rich level of diversity.

The "edge" effect: Deforestation and degradation of forest creates many "edges", where there were dense forests in the past. Edges are windier, drier, warmer and less shady compared to the interior forest. These changes in microclimate disturb the tigers' distributions. The edges are treated as "ecological traps" wherein tigers are hunted by the poachers. Tigers prefer forests having medium dense canopy and few edges. Edges can be dangerous for the tigers when a forest shares an edge with agricultural lands or human settlements or suburban areas. This edge effect is frequently observed in Sharonkhola and Shyamnagar range of Sundarbans.

Destruction of riparian patches: The riparian forest is one that is located along bank of rivers, channels, lakes or other surface water bodies. The tiger uses such forests for resting, hunting, eating and drinking. Spotted deer, sambar, barking deer and wild pig are frequently visible along river bars and shorelines. The loss of riparian vegetations specially Nipa Palm (Golpata) Mangrove Date Palm (Hanthal) and Bain (Avicennia marina), has resulted in a great loss of tiger habitat in the Sundarbans.

Lack of buffer zones: There are no established buffer zones around the core zones of Sundarbans to provide further protection for the tigers. The buffer zone can provide the cats safeguard against further poaching. Buffer zones are not highly protective but limited to extract natural resources. Buffer zones are treated as imperative efforts in the conservation biology. It also provides an arena for genetic exchange between subpopulations.

Lack of tigers' corridors: A biological corridor connects two core areas for roaming of wildlife. Tiger corridor can connect up many isolated and fragmented groups. This corridor also protects the tigers from poachers. A long tiger corridor ranging from Fatra forest of Kuakata to Shyamnagar range of Shatkhira district can boost the cats' population and genetic diversity.

Habitat matrix: Tigers use matrix habitats for movement and feeding. The forest matrix often acts as a corridor for roaming across the landscape. They are capable of using matrix habitats, at least when large forest tracts are nearby. The surrounding matrix of the remnants serves as temporary habitats of tigers. The absence of scattered trees is hazardous for the tigers to connect the landscapes.

Territorial fight: A male tiger uses a few kilometers area for roaming and hunting, called a territory. The size of a territory depends on the abundance of prey. In Indian subcontinent, a male tiger only needs from twelve to ninety-five square kilometers, whereas it is 500 square kilometers in the Russian Far East. Female territories are usually smaller. Several tigers may use the same route at different times. Several females may live in the territory of a male. Both male and female tigers demark the territory by the alignment of rivers or canals and by spraying a mixture of urine and scent gland secretions on bushes and tree barks along their route. They also leave scratch marks on tree barks and excretory droppings on prominent places, and make 'scrapes' on the ground to provide olfactory and visual clues to their presence. A male protects its own territory deadly against other male tiger's trespass and fight fiercely to keep its territory free from other male's invasion. A male usually has more than one female in its territory. Every female guard individually its own small territory within the male's large territory to rear cubs. Young and old males are pushed to the degraded forests where there are scarcities of prey. The stronger male adult wins the battle often killing the weaker.

A tiger killed by poachers using toxic substances at the Chandpai range, Mongla.

Inbreeding depression: Individual female tiger loves to move freely and breed more widely. Right now tigers roam across the remaining pockets instead of wide territory. The exchange of genes is highly limited in these pockets. The subpopulations are becoming smaller and more isolated. The loss of genetic diversity causing a tremendous population reduction is one of the biggest challenges of tiger conservation.

Human-tiger conflict: Human populations are increasing much faster than the average global rate across most of the tiger habitats including the Sundarbans. Human-tiger conflict is a severe problem all over the world. As human populations expand and natural habitats shrink, people and animals are increasingly coming into conflict over living space and food. People lose their livestock and sometimes their lives. The cats are often killed by the neighbouring people as revenge or to 'prevent' future conflicts. This conflict not only threatens the tiger, but poses a major problem for communities living in or near tiger habitat. Most of the local communities living around tiger habitats depend on forests for various services. These increasing entrances have increased the frequency of tiger attacks in the recent time. Unsustainable activities within forests also further degrade the habitats of tigers and their prey. Tiger poaching is positively correlated with human-tiger conflict.

Climate change: As sea levels rise, Sundarbans has been overexposed to salt water. Sea level rise and coastal erosion are also shrinking the tigers' ranges. The Sundarbans consists of low-lying swamps dotted with hundreds of small islands criss-crossed by water channels. Already it has lost 28% tiger habitat due to global warming over the last four decades. The cat loses bearing due to increased storminess. It is predicted that the cats are suffering from various diseases by drinking saline water. One-metre rise of sea level will destroy the whole ecosystem of Sunderbans.

Poaching and piracy: Illegal hunting of herbivores like deer and wild boar significantly reduces prey availability for cats. Abundance of preys has shrunk considerably over past 15 years in most parts of the world. Humans are the cause of 75%-85% mortality of tigers. Tigers are usually killed for their fur and for their body parts. These are widely used as traditional medicine despite the fact that any part of tiger's body has no medicinal value. Tigers' hides are being used for decoration and ceremonies by a variety of Asian cultures.

Food shortage: The tiger is facing food shortage all over the world as poaching of the spotted deer has been increased in recent years. It will be difficult for the tiger to survive with this food shortage. When it does not get sufficient prey inside the forest, it strays into locality in the vicinity and hunts cattle and also hurts or hills humans, which in turn results in counter killing of the big cats by the angry people.

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Forecasting floods: La Niña Impact

In Bangladesh, where structural solutions to flooding are not sustainable, the current flood forecasting system needs to be enhanced with ENSO-based seasonal climate information.

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LAST year I wrote an article (published on August 7, 2010 in The Daily Star) with a title 'how likely is flooding this year'. That article was actually prepared in April 2010, when the onset of La Niña was clearly visible. I mentioned that some readers' will be surprised to read this article as I was writing about a probabilistic outlook of monsoon flooding when the country was extremely dry and hot with a serious shortage of rainfall. Readers were surprised, but they admitted that a flood of moderate strength did occur last year. It didn't inundate the urban thoroughfares of Dhaka, but it inundated many suburban and rural areas.

This is the beauty of probabilistic forecasting techniques where you can make forecasts for at least 3-6 months in advance with reasonable accuracy. Based on the science of seasonal forecasts (i.e., correlations between La Niña and flooding in Bangladesh) a moderate flood was likely to occur in Bangladesh during August-September of 2011; and it is occurring. This was clearly visible from last April; some scientist may argue that it was well perceived even from January 2011. However, the weakening phase of La Niña created an uncertainty about the strength of flooding (either normal or above normal). I hope that the related flood forecasting, warning, and disaster management agencies in Bangladesh were fully aware about this flooding well ahead of time.

After two years of La Niña (2009-11) (weak-to-moderate strength), we are now having ENSO-neutral phase. While as per definition the phase is neutral, the atmospheric component (i.e., trade winds) is still active. This is not very normal, but we still have some lingering effect of La Niña. This is causing more rainfall in the greater Ganges-Brahmaputra-Meghna (GBM) basin system, which, in turn, flooding some areas in the following few days. So, the country is experiencing a moderate flood this year.

Submerged crop field in moderate flooding

CAUSAL CONNECTION BETWEEN LA NIÑA AND SEASONAL FLOODING

The climate (i.e., rainfall, streamflows, and sea level) of Bangladesh are sensitive to El Niño-Southern Oscillation (ENSO) climate cycle. In a strong El Niño year, the whole basin experiences lower than normal rainfall. The deficiency of rainfall causes the Bangladeshi rivers to become drier because of low-flow and, as a result, the country faces severe drought. On the other hand, when the year is La Niña then there is a significant increase in rainfall over the greater Ganges-Brahmaputra-Meghna (GBM) basins causing flooding along the whole catchments. This, in turn, severely floods Bangladesh, as it is the lowest riparian country in these basins.

Other than a few exceptions, it is clear that Bangladesh faces major catastrophic flooding during the La Niña years. For example, the highest flood years recorded were 1955, 1974, 1987, 1988, 1998, 2004, and 2007. It is also noticeable that, other than 1987 and 2004, all were La Niña years. The two El Niño years (i.e., 1987, 2004) were of moderate to weak strength and the reasons for flooding during these two years require further research. It is possible that the onset and the maturity stages of the ENSO cycle and other local and global oceanic and atmospheric factors may have contributed to this flooding.

Similarly, the driest years recorded were: 1977-78, 1982-83, 1985, 1986, 1989, 1990-92, 1994, 1997, and 2001. It is also evident here that, except for 1985, 1989, and 2001, all were El Niño years. The three La Niña years (i.e., 1985, 1989, and 2001) were of very weak strength (or ENSO neutral phase). This is also again a subject for further research and similar onset and the maturity stages of the ENSO cycle may be responsible too.

FLOOD FORECASTS AND WARNING SYSTEM

At present, Bangladesh has a flood forecasting lead-time of approximately only 3-7 days. The Flood Forecasting and Warning Center (FFWC) of the Bangladesh Water Development Board (BWDB) is responsible for monitoring flooding in the country. The forecasting procedure at the FFWC is comprised of several stages; these include real-time rainfall and water level data collection, meteorological forecasting and boundary estimation, flood forecasting by numerical modeling, and flood warning dissemination by daily bulletin. The quality of the 3-7 days lead time forecasts has been recognized as positive for hazards management during the flooding season. The dissemination network of the FFWC is also very instrumental. However, the short lead-time of these forecasts made it of limited use for the agricultural sector. To better use this for the agricultural sector, the most viable solution is to produce long-lead seasonal forecasts, the demand of which is significantly increasing in Bangladesh, and disseminate these through the appropriate channels.

Although the seasonal forecasts have been used successfully for hazards management and increased agricultural productivity in one-quarter of the globe, the scientific research on these forecasts is just beginning in Bangladesh. It is essential to adopt a comprehensive approach for developing a knowledge base on seasonal forecasts; the sooner is better!

CONCLUSIONS

Scientific advances have led to the ability to generate skilful ENSO forecasts, and substantial progress has been made in understanding regional impacts of the ENSO cycle. However, as compared to 1950-1975, the number of ENSO (El Niño and La Niña) events has considerably increased in 1976-2000 and extreme weather events have frequently been observed in recent decades. This trend is likely to continue further, may be with more frequent ENSO (El Niño/La Niña) events. At this stage there is no easy answer on 'how to face the future challenges', but some immediate responses are necessary. As an immediate response, ENSO-based seasonal climate forecasts can play an important role to help meet some of these future challenges.

In this regard, the writer would like to highlight his experience arising from the operational seasonal forecasting schemes in the US-Affiliated Pacific Islands (USAPI). Like Bangladesh, the climate variability and change in the USAPI region is also sensitive to ENSO (El Niño/La Niña) events. Currently, an operational 'climate forecasting and warning response' scheme is fully instrumental in the USAPI region. It started in 1994 and is fully operational since 2004. This operation scheme has considerably reduced the vulnerability to climate hazards for the island communities. It has successfully empowered the underrepresented people in atmospheric sciences.

In Bangladesh, where structural solutions to flooding are not sustainable, the current flood forecasting system needs to be enhanced with ENSO-based seasonal climate information. This will offer an environmentally friendly, non-structural, and cost-effective decision options regarding its flood management and agricultural adaptations.

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