Asian Elephant

WWF WILDLIFE AND CLIMATE CHANGE SERIES

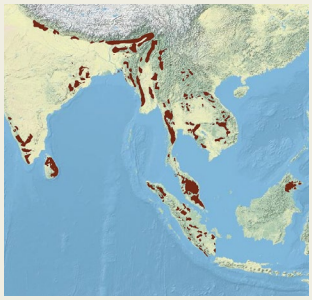
This assessment is one in a series resulting from a WWF study that assesses the vulnerability of numerous species to the effects of climate change. For each species, we also recommend climate-adaptive management strategies.

ASIAN ELEPHANTS *(Elephas maximus)* occur across a range of diverse habitats and feed on a variety of abundant vegetation. These traits contribute to their resilience to a changing climate.

However, a number of traits make them vulnerable to a changing climate, including a declining population size, sensitivity to high temperatures, invasive plant species outcompeting their regular food sources, and susceptibility to disease. Asian elephants also have a low adaptive capacity due to a limited dispersal ability (stemming from increasing habitat fragmentation), a long generation time, a slow reproductive rate and only moderate amounts of genetic variation within the species.

Of most concern for elephants is their need for high amounts of fresh water and the influence this has on their daily activities, reproduction and migration. Other threats—such as habitat loss, human-elephant conflict and poaching—remain high, and have the potential to increase due to the effects of climate stressors on humans and resulting changes in livelihoods.

Priorities for climate-informed Asian elephant conservation should include securing fresh water; maintaining and increasing suitable, connected habitat; controlling the spread of invasive plant species; and increasing monitoring for disease and other causes of mortality. It is also essential to create improved conditions in which people can adapt to current and future changes in climate, and continue to focus on reducing threats such as human-elephant conflict.



Asian elephant range

DETERMINING SPECIES VULNERABILITY

The study identified the key vulnerabilities of a species based on four factors:

SENSITIVITY: the inability of the species to persist, as is, under changing climatic conditions. To assess sensitivity, we looked at IUCN Red List status, geographic range, population size, temperature tolerance, reliance on environmental cues (for reproduction, migration, hibernation), symbiotic interactions, diet, abundance of food sources, freshwater requirements, habitat specialization and susceptibility to disease.

ADAPTIVE CAPACITY: the ability of the species to respond to changes in climate. To assess adaptive capacity, we looked at dispersal ability, generation time, reproductive rate and genetic variation.

EXPOSURE: the extent of climatic change and variation that the species encounters and is projected to encounter.

OTHER THREATS: any other relevant threats, such as habitat destruction, poaching, human-wildlife conflict and pollution, as well as the human responses to climate change that exacerbate these threats.

CLIMATE VULNERABILITY OF THE ASIAN ELEPHANT

Vulnerability Levels: H = High M = Medium L = Low U = Unknown

SENSITIVITY

H IUCN Red List Status
Endangered[1]

L Geographic Range
Large. Currently occur in 13 countries in South and Southeast Asia, with an approximate range of 439,000 km².[2]

M Population Size
Medium. 39,000–45,000 as of 2010 estimates, with a declining trend.[2]

M Temperature Tolerance
Medium. Typically live in warm climates with average annual temperatures up to 35°C.[3] Elephants possess a number of mechanisms to cope with warm temperatures, but they have been shown to experience heat stress when exposed to very high temperatures (up to 45°C).[4]

M Does the species rely on environmental cues for reproduction?
Yes. Mating and births occur during varying times of the year,[5] but in many areas births may peak following the monsoon.

H Does the species rely on environmental cues for migration?
Yes. Given the species' high requirements for water, elephants move in response to water stress.

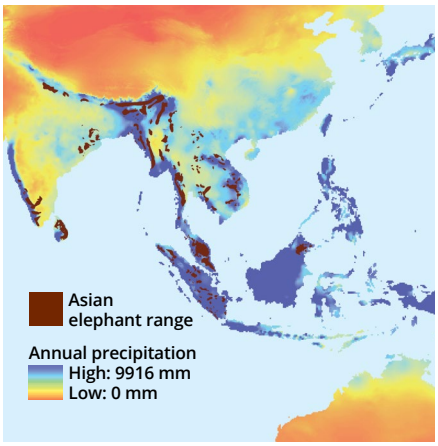
L Does the species rely on environmental cues for hibernation?
No. Does not hibernate.

L Does the species have any strong or symbiotic relationships with other species?
No. No obligate symbionts.

L Diet
Generalist. Feeds on a wide variety of plant species, including grasses, woody plants and some cultivated crops.

M Abundance of Food Source
Medium. Adults can eat approximately 150 kg daily.[5] Invasive plants such as *Lantana* sp. are, however, having a negative impact on elephant habitat, primarily through a reduction in grass cover and other preferred plants.[6]

H Freshwater Requirements
High. Drinks up to 225 liters per day.[5]



Asian elephants are highly dependent on fresh water. This map shows the overlap between the range of the Asian elephant and areas of high annual precipitation for the years 1961–1990.

L Habitat Specialization
Generalist. Occurs in grassland, tropical evergreen forest, semi-evergreen forest, moist deciduous forest, dry deciduous forest and dry thorn forest, in addition to cultivated and secondary forests and scrublands.[7] Occurs from sea level to over 3,000 m altitude, and possibly higher at some sites.[7]

M Susceptibility to Disease
Medium. Susceptible to a number of diseases including septicemia, hemorrhagic septicemia (Pasteurellosis), anthrax, foot and mouth disease, elephant pox, rabies, tetanus, encephalomyocarditis virus, pneumonia, dysentery, tuberculosis, endotheliotropic elephant herpes virus and a number of parasites.[5]

ADAPTIVE CAPACITY

M Dispersal Ability
Medium. Males and family groups typically move 10–20 km a day,[8] and home ranges in excess of 600 km² have been recorded.[9] Their habitat however is becoming increasingly fragmented, limiting their ability to disperse.[10]

Generation Time
H Long. 20–25 years.[1]

M Reproductive Rate
Medium. 22-month gestation period.[5] Most females give birth for the first time at 15–16 years of age,[11] with birth intervals between 2.5 and 8 years depending on conditions.[5]

M Genetic Variation
Medium. Low overall genetic diversity, suggesting a small long-term effective population size.[12] Low MtDNA diversity within the different populations in India (approximately half of the entire species population).[13]

EXPOSURE

M What degree of climate variability is the species currently exposed to?
Medium. Precipitation is highly seasonal, with distinct wet vs. dry seasons impacted by the monsoon. Some populations are exposed to wide temperature variability, ranging from near freezing to over 40°C.

M What level of change in temperature and precipitation is projected across the species' range?
Medium. South and Southeast Asia are projected to get warmer, and extreme heat events are projected to increase in magnitude and frequency.[14] Annual precipitation is projected to increase during the wet season, and decrease during the dry season in South Asia. There is little consensus on rainfall projections for Southeast Asia; however, heavy rain events are projected to increase in magnitude and frequency, and the frequency of drought is also projected to increase.[14]

OTHER THREATS

H Other Threats
High. Habitat loss, degradation and fragmentation[8,10] due to agriculture, aquaculture, mining, roads, conflict, etc. Increasing human-elephant conflicts. Poaching, but to a lesser extent than for the African elephant (though reliable estimates of the number killed are scarce).[15]

RECOMMENDED CLIMATE-ADAPTIVE MANAGEMENT STRATEGIES

Based on the vulnerability assessment, we recommend these climate-adaptive management strategies for Asian elephants:

1. Secure fresh water in areas that are experiencing drought or are projected to experience drought. This could include providing separate and additional water sources for wildlife, people and livestock, to reduce conflict over water.
2. Monitor and control invasive species like *Lantana* sp., which may further thrive under changing climatic conditions.
3. Monitor disease, particularly pathogens to which elephants may not have had previous exposure.
4. Increase monitoring of population range shifts, changes in phenology, changes in population abundance, changes in behavior and the correlation of any of these with changes in weather and climate.
5. Increase the extent of protected areas to include stepping stones, movement corridors and climate refugia; improve management and restoration of existing protected areas to facilitate resilience.[16]
6. Outside protected areas, provide and restore movement corridors (including across country borders) and adequate space for elephants to roam.
7. Reduce pressures from other threats, many of which are likely to be exacerbated by climate change, through increasing the capacity of humans to manage the effects of climate change. Examples include
   - Promote changes in farming practices that will reduce human-elephant conflict. For example, support eco-friendly agriculture and better crop selection for the projected climate. This could result in increased yields on less land, and thus reduce encroachment into elephant habitat.
   - Minimize habitat loss and fragmentation caused by poor land use, development, etc., on unprotected land.
   - Monitor trends (such as an increase in poaching) that might indicate that communities facing increased hardships are turning to methods of earning income that adversely affect elephants and other wildlife.
   - Help people adapt to the changing climate by promoting alternative livelihoods that conserve ecosystem services and do not negatively impact elephants.

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For more information, please contact Nikhil Advani at *nikhil.advani@wwfus.org*
For this and other species assessments, visit worldwildlife.org/wildlife-and-climate

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