Source : www.thehindu.com Date : 2019-06-24

# REMOTELY SENSED INDICES UNRELIABLE IN INFORMING ELEPHANT FORAGE

Relevant for: Environment | Topic: Biodiversity, Ecology, and Wildlife Related Issues

Out of reach: Grazing elephants that cannot reach up to the level of the canopies mostly feed on the grassy species. | Photo Credit: Kabini Elephant Project

A field study by researchers from Bengaluru shows that a popularly used index that remotely estimates density of vegetation does not yield a reliable estimate of food abundance for elephants in tropical forests. In fact, researchers show that this index has a negative correlation with graminoids (grassy food – grasses, sedges and rushes – preferentially consumed by elephants) in tropical forests.

For both academic and practical purposes, there is the practice of remotely monitoring vegetation in an area and representing it in terms of maps and parameters. One such parameter used is the normalized difference vegetation index (NDVI) which is measured remotely from satellite data. This has been used to estimate the amount of food abundance available to herbivorous animals, for example, elephants. The NDVI is used, for instance, in attempts to track the presence of elephants using the vegetation they consume. However, this work clearly establishes that this can be misleading, and field-based studies are the ones which can yield definitive results. The work is published in the journal *Biotropica.*

“There is a need to establish this, because the obvious has not been understood,” says Ajay Desai who is a consultant to World Wildlife Fund, India, and an expert on Asian elephants.

The researchers were led by T.N.C Vidya from the Evolutionary and Organismal Biology Unit of Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru.

They carried out the study in the Nagarhole National Park, in the Nilgiris-Eastern Ghats in southern India and sampled five 20m X 5 m vegetation plots along each of 17 transects (lines along which the regions to be sampled can be marked out) in the wet season in 2011 and 22 transects in the dry season. The transects included three forest types: moist deciduous, dry deciduous and teak forests. “We found that the abundance of food plants is not correlated with NDVI. This should be a prerequisite before using NDVI as a proxy of food abundance,” says Hansraj Gautam, the first author of the paper, who is also at JNCASR.

The NDVI is a simple indicator which tells how much of the ground is covered with vegetation. It basically calculates the difference between the red and near infrared components of light reflected by objects, from, say, a satellite. Since healthy vegetation strongly absorbs red and reflects near infrared light, this difference can indicate the presence of healthy vegetation and map it into a colour code.

“We found that NDVI was negatively correlated to grasses. This means grass abundance tends to be low in locations where NDVI is high and vice-versa,” says Dr Vidya. Though this is counterintuitive, she explains why this occurs: “While canopy cover and shrub abundance contribute positively to NDVI, they negatively affect grass abundance. Because of the poor correlation, NDVI cannot be reliably used as a measure of forage abundance in a multi-storeyed forest with a low proportional abundance of food species.” Grasses form a large component of food of elephants and also ungulates (hoofed animals) like deer, sambar and gaur.

“NDVI is extremely useful… and has been used to inform the ecology of various species, from elephants and red deer to mosquitoes and birds. But it is known to perform badly to help assess changes in primary productivity of plants under a dense canopy,” says Nathalie Pettorelli, a conservation ecologist from Zoological Society of London and an expert on remote sensing and management of natural resources. “The results do not surprise me… this pattern was shown in other settings [in Poland, in deciduous forests],” she adds.



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