Daily News Juice

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1. How elephants are counted, why methods need a rethink

Background

The Environment Ministry has shelved its elephant census report, 'Status of Elephant in India 2022-23', citing a delay in the census in the Northeast. The report on the current status of the national heritage animal in the rest of India has been printed but its release is now on hold until at least June 2025.

States	2012	2017	2022-23	Change
Tamil Nadu	4015	2761	3136	13.6%
Karnataka	6068	6049	6013	-0.6%
Kerala	6117	5706*	2785	-51.2%
Maha (W Ghat)	4	6	27	350%
Western Ghats	16204	14522	11961	-17.6%
WB (South)	0	194	31	-84%
Jharkhand	688	679	217	-68%
Odisha	1930	1976	912	-54%
Chhattisgarh	247	247	451	82.6%
Madhya Pradesh	0	7	97	1286%
Maha (Gadchiroli)	0	0	36	NA
Andhra Pradesh	41	65	120	84.6%
Central & Eastern	2906	3168	1864	-41%
Uttarakhand	1346	1839	1792	-2.6%
Uttar Pradesh	291	232	257	11%
Bihar	0	25	13	-48%
Shivalik-Gangetic	1637	2096	2062	-1.6%
Haryana	0	7	0	NA
Himachal Pradesh	0	7	0	NA
A&N	0	25	NA	NA
India (Except NE)	20747	19825	15887	-20%
Arunachal Pradesh	890	1614	Pending	NA
Assam	5620	5719	1031^	NA
Megalaya	1811	1754	Pending	NA
Nagaland	212	446	Pending	NA
Mizoram	0	7	Pending	NA
Manipur	0	9	Pending	NA
Tripura	59	102	Pending	NA
WB (North)	647	488	423^^	NA
North East	9239	10139	9866#	NA

Elephant numbers are down

Data from the unreleased report show a sharp decline in elephant populations in the eastcentral and southern landscapes. The slide in numbers is especially dramatic in Southern West Bengal (84%), Jharkhand (64%), Odisha (54%), and Kerala (51%).

The report identifies "mushrooming developmental projects" such as "unmitigated mining and linear infrastructure construction" as a significant threat to the species.

The Environment Ministry has pointed out that the elephant census employed refined methodologies, suggesting that these numbers may not be comparable with the outcomes of previous censuses that have been conducted every five years since the 1990s.

However, the new counting methods may not fully explain the fall in elephant numbers. "The new method based on DNA profiling has not brought down the numbers in the northern (Shivalik Hills and Gangetic Plain) landscape where the latest figure (2,062) closely aligns with the outcome of the previous census (2,096)," a wildlife biologist based in Bengaluru pointed out. "So, the drastic fall in numbers elsewhere can't be dismissed as a fallout of methodological variation," the biologist said.

Old counting methods

Until 2002, elephants were counted in India by the "total direct count" method, which means a simple head count of elephants that were sighted. This method has "limited or no scientific basis for large landscapes or populations", the latest census report says.

In 2002, the "indirect dung count method" was introduced in the southern states. Enumerators walked in pre-designated straight lines through the forest and recorded elephant droppings and the "dung decay rate". The data were extrapolated to estimate elephant density in an area by factoring in the "defecation rate" of elephants.

Around the same time, the "total direct count" method was modified to "sample block counts" — or a survey of limited areas of 5 sq km each to maximise the probability of detection and enumeration of all elephants in that block. Elephant densities in the surveyed blocks were then extrapolated to estimate populations in larger areas.

Elephants and tigers

On the occasion of World Elephant Day (August 12) in 2021, Environment Minister Bhupender Yadav announced that the government would "harmonise population estimation methods along more scientific lines" by "converging elephant and tiger population estimation" for the first time.

In this method, the entire forest area is broken down into similar-sized cells or blocks (say, A, B, C, and D) where ground surveys are conducted to look for tiger signs (pug marks, droppings, etc.) and identify tiger-occupied forest cells (say, A, B and D).

The survey also assesses a range of "co-variates" — common variable factors such as the quality of vegetation, availability of prey, distance from water/ nightlight, degree of human disturbance etc. — to determine the relative tiger-holding potential of these blocks. For example, if A has the highest tiger potential with a score of 100, the indexed score for B and D could be, say, 75 and 50.

Mark-recapture method

For logistics, camera traps are set up only in a limited area (say, B). After each round of photography, the tigers that are snapped are identified using their unique stripe patterns.

The next step employs the statistical method of "mark-recapture", which relies on the number of common — recaptured — individual tigers photographed in two consecutive rounds. The bigger the population, the lesser the chances of a tiger being recaptured, and vice versa.

Based on this, estimators derive a tiger number and density (number per 100 sq km) for forest cell B, which is then extrapolated for forest cells A and D where no camera was set up. If, say, the tiger density estimated in B is 12, in A and D, using their co-variate scores, it would be 16 and 8.

The Synchronous All India Elephant Estimation 2022-23 (SAIEE 2023) differed from this tiger census method in only one aspect: it used a genetic mark-recapture model.

The elephant hide has no unique markings like tiger stripes. So elephant dung samples collected during ground surveys were analysed in the lab to identify unique elephants by differentiating individuals based on eleven microsatellite loci (genetic markers).

Why the delay hurts

Irrespective of the refinement in census methodology and the delay caused by logistical limitations, the results that are already available should not be held back, experts said. "This helps neither science nor governance. This is precious data obtained by spending public money. The five-year census cycle is overdue. There is no reason why available data should not be in the public domain and guide policies," a former member of the Environment Ministry's National Board for Wildlife said.

An elephant researcher familiar with the census efforts in Assam and Arunachal Pradesh said the Northeast numbers are unlikely to salvage the downward trend. "If modelled correctly, the results from the Northeast will also show a 20-25% fall or correction, whatever you call it. The government is only buying time," he said.

A retired forest officer from Odisha said the delay could prove costly for elephant populations in distress. "While habitat loss and conflict are common threats to elephants across India, certain risks are landscape-specific. In Odisha, for example, it is mining and low-hanging power lines. The drastic fall in our elephant numbers should have triggered intervention by now," he said.

Why the numbers matter

In 2023, Karnataka, Tamil Nadu, and Kerala used a protocol combining the block count and dung count methods, which, the unreleased report said, "finds corroboration through genetic mark-recapture methods used in SAIEE 2023" — suggesting its potential scalability for future large-scale adoption in combination with genetic mark-recapture in selected sites.

The 2017 elephant census report had underlined why it was "desirable to maintain some level of continuity with the previous population estimations to make a meaningful comparison with past figures to infer broad trends".

Absolute numbers for elephants or tigers have no meaning beyond news headlines, a senior forest officer from Karnataka said. "We estimate populations to know how a species is doing in the wild. So continuity is important for comparison. When we claim to have drastically improved the method, we have to accept the new baseline data as a reality check without worrying about the optics."

Relevance: GS Prelims & Mains Paper III; Environment Source: Indian Express

2. What is the National Agriculture Code, currently being formulated by Bureau of Indian Standards

Introduction

The Bureau of Indian Standards (BIS) has begun the process of formulating a National Agriculture Code (NAC), on the lines of the existing National Building Code and National Electrical Code. What is the NAC, and why is it needed?



What is the National Agriculture Code?

The BIS is the national body which sets standards for different products across various economic sectors. In agriculture, it has already set standards for machinery (tractors, harvesters, etc.) and various inputs (fertilisers, pesticides, etc.)

However, there are still many areas not covered by the BIS standards. For example,

there is no standard for agriculture practices like preparation of fields, micro irrigation and water use. Thus, for a long time, policymakers have felt a need for a comprehensive standards framework, like the one now being formulated by the BIS.

The NAC will cover the entire agriculture cycle, and will also contain a guidance note for future standardisation. The code will have two parts. The first will contain general principles for all crops, and the second will deal with crop-specific standards for the likes of paddy, wheat, oilseeds, and pulses. The NAC will serve as a guide for farmers, agriculture universities, and officials involved in the field.

What will the NAC cover?

In addition to standards for agriculture machinery, the NAC will cover all agriculture processes and post-harvest operations, such as crop selection, land preparation, sowing/transplanting, irrigation/drainage, soil health management, plant health management, harvesting/threshing, primary processing, post-harvest, sustainability, and record maintenance. It will also include standards for input management, like use of chemical fertilisers, pesticides, and weedicides, as well as standards for crop storage and traceability.

Crucially, the NAC will cover all new and emerging areas like natural farming and organic farming, as well as the use of Internet-of-Things in the field of agriculture.

What are the stated objects of the National Agriculture Code?

According to the BIS, the objectives are:

• To create an implementable national code covering recommendations for agriculture practices taking agroclimatic zones, crop type, socio economic diversity of the country and all aspects of agrifood value chain into consideration;

• To act as an enabler of quality culture in Indian agriculture by providing the required reference to policy makers, agriculture departments and regulators for incorporating the provisions of NAC in their schemes, policies, or regulations;

• To create a comprehensive guide for the farming community to ensure effective decision making in agricultural practices;

• To integrate relevant Indian Standards with recommended agricultural practices.

• To address the horizontal aspects of agriculture such as SMART farming, sustainability, traceability and documentation; and

• To aid in the capacity building program organized by agriculture extension services and civil society organisations.

What is the proposed timeline for this project?

The BIS has already formulated a strategy to standardise practices. It has formed working panels for 12-14 specifically identified areas, which will include university professors and R&D organisations. These panels will draft the code, with a tentative deadline for the NAC set as October 2025.

After this, the BIS plans to provide training to farmers on the NAC and its standards.

What are Standardized Agriculture Demonstration Farms? How are they important?

Apart from drafting the NAC, the BIS has also taken an initiative for setting up of 'Standardized Agriculture Demonstration Farm' (SADF) in selected agriculture institutes in the country. These farms will serve as experimental sites for testing and implementing various agricultural practices and new technologies in accordance with Indian Standards, according to the BIS.

For the development of these specialised farms, the BIS plans to sign Memorandum of Understanding (MoUs) with premier agricultural institutes. "We have identified 10 prominent agricultural institutes, and will sign MoUs with them for the development of SADFs... These MoUs have been shared, and are currently being finalised. Two MoUs have already been signed," Tiwari said. One of these two institutes is the Pantnagar-based Govind Ballabh Pant University of Agriculture and Technology (GBPUAT).

According to the officials, the BIS will provide financial assistance to these institutes for setting up the SADFs, where anyone including officials responsible for extension activities, farmers or industry people can come and learn. Tiwari said that China has already successfully demonstrated the working of such SADFs.

Relevance: GS Prelims & Mains Paper II; Governance Source: Indian Express

3. Why you should care about scientists mapping the fruit fly's brain

Introduction

Scientists recently said they have successfully mapped the entire brain of an adult fruit fly, marking the first time that researchers have been able to create such a detailed survey of an adult animal. The neurological milestone is a step toward one day making a detailed map of the human brain that will help in understanding and probably treating mental health conditions such as Parkinson's and depression.

Nine papers, describing the research in detail, were published in the journal Nature. Hundreds of scientists and citizen scientists worldwide contributed to the work.



Map Of Fruit Fly Brain, Revealing 139,000 Neurons Using Al

How was the adult fruit fly brain mapped?

Scientists began mapping in 2013 by dunking the brain of an adult fly in a chemical bath, hardening it into a solid block, according to a report by The New York Times. "They shaved an exquisitely thin layer off the top of the block and used a microscope to take pictures of it," the report said.

Researchers then shaved another layer and took a new picture — in total, 7,050 sections were imaged and 21 million photos were taken to map the entire brain. The first high-resolution picture of the brain was produced more than a decade after the work kicked off.

What did the work reveal?

Scientists were able to detail more than 50 million connections between more than 139,000 neurons — brain nerve cells. They also classified the cells into 8,453 distinct types, making it the biggest catalogue of cell types in any brain.

These achievements gave numerous insights into the brains of fruit flies. Scientists analysed what different types of cells do, how the fly's eyes process motion and colour information, and discovered a large assemblage of "hub neurons" that may speed up information flow.

Why is this significant?

The mapping of the fruit fly's brain can also give information about not just other animals but also humans. Although the human brain is far more complex than that of a fruit fly, the logic or "source code" at work when neurons communicate and interact with one another is similar.

The mapping has also raised the hope that someday scientists will be able to map the entire human brain as well. That is necessary to better understand how human brains work and how mental disorders come about. Scientists also hope it can help more philosophical questions — What is love? What are dreams?

Relevance: GS Prelims; Science & Technology Source: Indian Express

4. Why has Israel invaded Lebanon — and what to make of the war so far

Introduction

Early on October 1, the Israel Defense Forces (IDF) launched "limited, localized, targeted ground raids" against Hezbollah infrastructure in South Lebanon. Many of the personnel involved in the raid were incrementally re-deployed from Gaza to the Israel-Lebanon border over this year.



Since then, Israel has expanded its operation, repeatedly bombing the capital Beirut, and targeting a possible successor to Hassan Nasrallah, the leader of Hezbollah who was killed last week. Lebanon's Health Ministry said on Saturday morning that more than 2,000 people have died in Israeli attacks across the country.

Hours after the IDF began its offensive, Iran fired a barrage of ballistic missiles at Israel. As Israel considers its response to Iran, the Lebanon gambit is crucial for its strategic interests.

Why did Israel choose to invade now?

For Israel, there has never been a larger geopolitical window to press against Hezbollah, the Iran-backed Shia military and political

group, than now. Through Israel's year-long war in Gaza, the United States has provided steady tailwinds in the form of sustained arms supplies, despite some political dithering. In the region, Israel's new Arab partners have restricted themselves to rhetorical criticism and diplomatic efforts for a ceasefire. This did not change as Israel expanded its target profile across states, with the Arab nations offering no punitive threats, whether economic or political.

With Iran's new moderate government focused on economic recovery and sanctions relief by engaging the West, Israel's first major gambit was to kill Ismail Haniyeh, the political leader of Hamas, in the heart of Tehran. The harsh punishment that Supreme Leader Ayatollah Ali Khamenei promised in response never came, with Iran choosing "strategic patience" instead. To Israel, it confirmed that a window for escalation indeed exists, as it expanded air strikes to eliminate top leaders of the so-called "axis of resistance" — Iranian overseas proxies Hezbollah, Hamas, and the Houthis — leading to Nasrallah's assassination. This hunt has not stopped, as the IDF's air strikes on Beirut show.

Hezbollah has long been the biggest and most proximate manifestation of the Iranian threat, located in the north at Israel's jugular. Israel's long-time objective has been to push Hezbollah to the north of the Litani river in Lebanon, where the UN Security Council's Resolution 1701 mandates it to be. Defence Minister Yoav Gallant had underlined this objective as early as on December 6, 2023 — and having destroyed Hezbollah's senior leadership, the IDF now looks to decimate its rank and file.

Where does Hezbollah stand in the current situation?

While Israel holds the geopolitical and military advantage, Hezbollah too has evolved significantly since its last war with Israel in 2006. The group has gained crucial combat experience in Syria and Iraq over the past decade, fighting an array of rebel and jihadist forces. Fighting alongside the Russians and Syrian government forces, Hezbollah was credibly viewed as the most effective fighting force in Syria, exhibiting strong discipline and training. It has stockpiled a very large arsenal of rockets and missiles, and the IDF estimates it has 25,000 active fighters, with tens of thousands in reserve.

Hezbollah is also the only force that has effectively forced an Israeli withdrawal from any Arab territory in this century, by fighting the IDF to a stalemate in 2006, and bogging down Israeli military units in urban guerrilla warfare. That Hezbollah retains its battlefield effectiveness despite the loss of senior command was evident when the IDF lost eight soldiers on October 2, its biggest single-day setback since the two sides began exchanging fire a year ago.

What does each side — Israel and Hezbollah — aim to achieve in this war?

Each side sees 'victory' differently.

Israel's casus belli is the "return of (displaced) citizens of Northern Israel to their homes". The military necessities to service this are vague enough for Israel to withdraw whenever it determines Hezbollah to have been degraded enough in South Lebanon. However, the IDF's widening evacuation calls signal an intent to exploit the window for escalation toward the "decisive victory" it has long sought (as David Daoud, a Senior Fellow on Israel, Hezbollah, and Lebanon at the Foundation for Defense of Democracies, noted in 2016).

For Hezbollah, the threshold for 'victory' is far lower — it is merely survival. As Nasrallah once asserted, "as long as there is one fighter who fires...the resistance (muqawamah) still exists". If Israel looks to push further north into Lebanon to exploit its window of opportunity, the likelihood of a protracted war of attrition will increase. Also, "decisively" eliminating Hezbollah is a far more difficult proposition than doing the same with Hamas in Gaza (where Israel's military objectives are being increasingly questioned).

Hezbollah has integrated itself within Lebanese society and government, outpacing the state's ability to deliver public goods, even though its image has been dented by economic mismanagement and the Beirut port explosion of 2020. With both the UN Interim Force in Lebanon (which includes a 900-strong Indian battalion) and the Lebanese government harshly criticising the Israeli invasion, the IDF also risks providing Hezbollah a fresh plank to consolidate domestic support. The provenance of its popularity was precisely this — to eject Israeli troops from Lebanon.

As the death toll in Lebanon balloons (it is officially 41,000-plus in Gaza), the IDF campaign faces new costs. Thus far, as Hamas sporadically retaliated in Gaza, the cost for Israel was defined in indirect, geopolitical terms — that is, the degree to which Arab states and other allies would tolerate the destruction.

In Lebanon, however, the cost is defined in direct, military terms. Perhaps most significantly, the Lebanese Army has now actively joined the war, fighting the IDF directly — the first military force-on-force engagement in the region in years.

A new phase of the war in the Middle East is playing out in Lebanon, again.

Relevance: GS Prelims & Mains Paper II; International Relations Source: Indian Express