

ME & MY EARTH

RNI:MPBIL/2016/69880



Year: 8 Vol. 4rd Issue:32, Bhopal, Oct. to Dec. 2024 Bilingual Quarterly Magazine

₹70

HAVOC OF LOS ANGELES, CALIFORNIA WILD FIRE



PICTORIAL HAVOC OF CALIFORNIA FIRE



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From The Editorial Desk

Perhaps, the world did not yet recovered from the last major bushfire of Australia that occurred during 2019-2020. Wherein, those fires made unprecedented havoc of severity, burning an estimated 186,000 square kilometers (72,000 square miles) of land. These fires occurred due to prolonged drought, record-breaking heat waves, and strong winds. Online reports say; the fires had a devastating impact on the environment, wildlife, and communities. At least 33 people died, and thousands of homes were destroyed. The fires also had a significant impact on the environment, with an estimated millions of animals killed or displaced. The fires contributed to significant air pollution, with smoke affecting air quality across much of the country.

Now, the recent Los Angeles, California wildfires have occurred as fires creating havoc of burning across Southern California. Series of wildfires in Los Angeles have affected multiple counties. It started from January 7, 2025, burned over * Palisades Fire: 23,713 acres until January 14th it is roughly burning across Southern California. * Eaton Fire: * Acres Burned: Over 14,117 acres. The Ventura County: A total estimated area burned across these counties is roughly 40,588 acres (16,425 ha; 63 sq mi; 164 km²).

Reports say the Santa Ana Strong dry winds have fueled the rapid spread of the fires. However, the California Department of Forestry and Fire Protection provide real-time updates on wildfires. Climate change is increasing the frequency and intensity of wildfires in California. Prolonged drought has dried out vegetation, creating ideal conditions for wildfires. It is difficult to calculate the exact damage of Wildfires causing significant wildlife deaths, but it's challenging to get accurate numbers. Many animals perish directly in the flames, while others succumb to smoke inhalation, burns, habitat loss, and lack of food and water. Thousands of homes and other structures have been destroyed or damaged. The fires continue to pose a significant threat to communities and the environment. Widespread evacuations have been ordered; displacing hundreds of thousands of residents. The impact on sensitive species like mountain lions, deer, and birds of prey is particularly concerning.

Editor

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Kamlesh Malviya, Chief Artist & Designer
H. No. 3457 Bawadiya kalan Bhopal (8120987981)

**Printed By : Navsakshar Printing Press
Zone-2, M.P. Nagar, Bhopal M.P.**

SURVEY REPORT OF MUGGER IN KOTMI SONAR CROCODILE PARK, JANJGIR-CHAMPA, CHHATTISGARH

By- Dr. Rishikesh Sharma

Executive Summary :

Kotmi Sonar Park in Janjgir Champa district of Chhattisgarh in India was founded in the year 2006. There is a water body of 3 km periphery inside the park. It has been a safe abode for crocodile (*Crocodylus palustris*), for the past several years, but in the absence of any detailed studies in the past no specific data is available. Extensive study was recently undertaken to establish proper status of the mugger population density. The present study was also carried out for the status of muggers present in the area. The habitat features, pond profile, activities of tourists data were also collected. A total of 168 Mugger (88 adults, 39 sub adults, 27 Juveniles, 12 Yearlings and 02 Hatchlings) occur in the Crocodile park were also sighted. Some recommendations have been suggested on the basis of observations during the present survey. The survey results provide baseline information which would assist in developing conservation and management action plan for the park.

Acknowledgement :

I (RKS) express my deep sense of gratitude to Shri. Jagdishan, Conservator of Forest, Circle Bilaspur for his survey initiative and support. Without his support this survey wouldn't have been completed and thanks to Madam Premlata Yadav, Divisional Forest Officer, Janjgir-Champa, for inviting me to carry out the survey work. I express my sincere thanks for the support and active participation of Shri Sanchit Sharma (Assistant Conservator of Forest), for his sustained interest and logistics support and encouragement at every step during the survey. I am also thankful to Shri Animesh Singh, Range officer and frontline forest staff for their assistance during the survey. I am also thankful to my survey team members and Dr. Sanjay Parashar, Mr. Suyash Jagat for active participation in the survey. I am grateful to Dr. LAK Singh, former Officer-in-Charge of the Central Crocodile Breeding and Management Training Institute, Hyderabad, for providing me with training materials and advising me from time to time. Lastly, I would also thank Shri. B.C. Choudhary, Retd. Senior Scientific Officer, WII Dehradun, for his valuable suggestions and encouragement for this work.

Background As per the instructions of Divisional Forest Officer, Janjgir-Champa Chhattisgarh, letter no. / expenditure / 01/ 8001 / 2021/ Champa/ dated 29-11-2021, a survey of mugger

in Crocodile Park, Kotmi Sonar was carried out from in December 2021.

Introduction :

Kotmi Sonar Park in Janjgir Champa district of Chhattisgarh in India was founded in year 2006, and finally established as a Crocodile Park for tourists in 2008. The Park provides 57 hectare of total area (Fig 1). Although, there have been reports for occurrence of muggers in Kotmi Sonar Crocodile Park, however no systematic survey has been conducted in this area, so far.

GPS Co-ordinates of Kotmi Sonar Crocodile Park

| Area Covered | GPS Co-ordinates |
|--------------|----------------------------|
| Location 1 | 22.0304008 N, 82.3533580 E |
| Location 2 | 22.0317012 N, 82.3569482 E |
| Location 3 | 22.0281913 N, 82.3587127 E |
| Location 4 | 22.0270799 N, 82.3559383 E |



Fig: 1

Methodology :

To achieve the objectives of the present survey following methods have been used:-

The survey was conducted during December 2021 over a period of 4 days, covering total stretch of Kotmi Sonar Park. A comprehensive study was carried out for identification of different size group of mugger and its habitats. The team along with various support staff travelled by foot from 9:00 AM to 4:00 PM each day. Data sheets were prepared to record field observations, discussions were held with local people and park staff to get information on the presence of muggers in the study area.

Field binoculars (Nikon Aculon A211 10-22x50) were used as optical aids employing the scientific method of observation. The population of Mugger was estimated by direct sighting method for

different age groups according to size class criteria (Table 1), mostly when they basked on land or were seen in water as they surface for breathing. Animals seen were recorded along with sighting time and on data-sheets. Photographic records by Camera were made (Nikon D7500+18-140mm lens) for the sightings of mugger and other animals were recorded on the field map and data sheets mentioning nearest location names etc.

The body size of mugger was determined through eye-estimation. Month of December is usually the most suitable time for Mugger survey, because the animals can be easily noticed when they come out for basking, as the water temperature is low. This period, therefore, has been selected for survey as most of the animals can be counted in single operation.

Participation in the Survey :

The survey was coordinated by Shri Sanchit Sharma, Assistant conservator of Forest, Janjgir-Champa and Shri Animesh Singh, Range officer, Crocodile Park Kotmi Sonar, Chhattisgarh. The team was led by Dr. R.K. Sharma Wetland Expert and member of IUCN/Crocodile Specialist Group, assisted by Dr. Sanjay Parashar and Suyash Jagat. The team also consisted of Foresters and Forest Guards.



Mugger Biology :

Muggers usually eat fishes, frogs, snakes, crustacean, birds and large mammals. They also eat dead animals found in or near to water and helps in keeping the environment clean. The crocodile plays a vital ecological role as master predator in the aquatic habitats where it lives. Crocodile can swallow food whilst submerged without swallowing water, by the contraction of the muscular flaps around the food. The ears comprise of a flap situated on each side of the head. The flaps can be opened or closed to facilitate hearing. The eyes are well developed. A third transparent eyelid is used as a screen when a crocodile goes under water. The metabolic rate of crocodile is controlled by its body temperature, as it is an cold blooded animal it basks under the sunlight to

maintain it's body temperature into a certain range. This unique system allows a crocodile to lie dormant, reduce its metabolic rate and thus utilize the food and oxygen supply in its body very slowly. The male is larger than the female. Sexes are difficult to determine an early age. Crocodiles have two basic nesting patterns, digging a pit in an exposed sand bank and laying eggs in the bottom of it and building a mould nest of a mixture of mud and vegetation and laying their eggs within it. Muggers lay 20-30 eggs in holes during the dry season (March/April) about 40-45 days after mating and incubation for typically 65-70 days. It is listed in schedule 1 Part II under Wildlife (Protection) act 1972, and it categorised as vulnerable.

Status of Mugger and it's Behavior :

Out of the three species of crocodile found in India, the most common and widespread is the broad-snouted mugger crocodile (*Crocodylus palustris*), also known as marsh crocodile, which inhabits all kinds of freshwater habitats such as rivers, lakes, reservoirs, hill-streams, village ponds and manmade tanks. Like all crocodilians, mugger also basks for long hours, if left undisturbed. They bask mostly at the bank of water bodies, rocks and therefore, permit easy vision under general precautions. Basking behavior is very well pronounced during the winter season, and therefore, there is good probability that all animals can be counted in single operation. Under normal conditions, basking sites of mugger do not change and territorial basking behavior in crocodilians form a good clue for census. The Mugger of Marsh Crocodile (*Crocodylus Palustris*) is resident to freshwater habitats ranging from small village ponds and reservoirs to fast flowing Streams and rivers.

Counting of Crocodiles :

Crocodilians are reptilian but are more aquatic than terrestrials. Basking is very striking behavior of crocodilians as they come out of water to regulate body temperature. Being ectothermic (body temperature dependent on the Surrounding environment), they lose body temperature during the cool hours of the night and come out during the day for basking to gain back the temperature. During the winter month, if left undisturbed, crocodiles spend long hours for basking on the bank of the water bodies or on rocks and Islands. During summer months crocodiles avoid the high temperature of the day and spend much of their time floating or submerged in water.

Signs for Tunnels :

Mugger crocodiles avoid extreme temperatures by entering into tunnels dug by them. These tunnels open into water and have narrow mouth. Height of the mouth may be above 30-60 cm. These may be up to 5 meters deep.

Estimation of Body length from direct sighting :

When the entire body is visible, mention approximate total length from eye-estimation, (2) If only the front part of the body, up to the beginning of the tail is visible, it is approximately the snout-vent length (SV) and the total body length is 2SV and (3) If the head (up to the post-occipital scute) is visible in the case of a swimming crocodile, or a just-emerged Mugger, then the total body length (TBL) is about 7 times the head length.

Table-1 Sighting number of Muggers in Kotmi Sonar Crocodile Park

| Name of site | Adult (>1.8m) | Subadult (1.2-1.8m) | Juvenile (0.9-1.2m) | Yearling (0.45-0.9m) | Hatchling (<0.45m) | Total |
|----------------------------|---------------|---------------------|---------------------|----------------------|--------------------|-------|
| Kotmi Sonar Crocodile Park | 88 | 39 | 27 | 12 | 02 | 168 |

Extensive studies have been done in the past in the different rivers of Madhya Pradesh eg. Chambal, Son, Ken Berma & Bamner, Satpura Tiger reserve, for status, population trends, distribution and Nesting ecology. Sharma et.al. 2013, Sharma 2006, Sharma et.al 1995, Sharma et.al 2018, Sharma et.al 2019, Bustard 1999, Sharma and Singh 2015, Patnaik et.al 2008.

During the present survey all the sighted mugger were counted and marked on the field map sheets. Total length of mugger sighted was estimated and noted. Total numbers of muggers sighted in the survey, in all sizes was found to be 168. The adult population was 88 which was 52.38%, population of sub-adults 39 (23.21%), juvenile 27 (16.07%), Yearlings 12 (7.14%) and Hatchlings 02 (1.19%) from the total population. (Table-1 and Fig.2). During the survey few tunnels and holes are visible on mid-islands which was used by mugger for hiding and

breeding purposes. Presence of Yearlings and Hatchlings supports breeding evidences thereby indicating a positive trend in the Mugger population in Kotmi Sonar Crocodile Park



Fig: 2

Training Programme :

Training programme was carried out on 11th December 2021 at Kotmisonar Park in the presence of Shri Sanchit Sharma, Assistant Conservator of Forest, Janjigir Champa and Shri Animesh Singh, Range Officer, Forest Range Baloda. A total of 18 participants in the Training Programme including, ACF, Range Officer, Foresters, Forest Guards and Daily wages employee. During Training Programme detailed conservation and Management aspects of Mugger, turtle, birds and butterfly in Kotmisonar Park were thoroughly explained by Dr. R.K. Sharma, Wetland Expert.



Recommendations :

1. A community based awareness programme has been proposed to increase awareness about aquatic biodiversity and the importance of freshwater ecosystems as a part of holistic management of the Park. It is proposed to conduct focused education and awareness programmes for target groups (e.g., school/college student, children, Local villagers and electronic media etc.)



Mugger basking at the bank

2. Transportation, of rescued muggers for release in the park over long distances should be done carefully. Release boxes should be made essential for comfortable and safe transportation of rescued mugger.

3. Measurement of rescued mugger should be made before release and adopting an internationally used number coding system (as explained during the training program) to individually mark animals that were released in the water bodies of the Park (Pond) or fixed colour tags in tail scute so that if the animals is re-captured in the wild, it can easily be identified.

4. There is a scarcity of basking and nesting grounds, so the artificially created sandy area by sand filling needs to be developed near the bank as well as the 4 islands in the middle of the water body for proper utilization of basking and nesting of muggers. This should be done away from the areas frequented by the tourists. Muggers can easily adjust for co-existence, but they may become fierce during the nesting and nest-guarding time.

5. The Sand filling at the edge of water for suitable basking & nesting purposes for the crocodiles. This should be done at several places. So that, the muggers have scope to avoid too much of territorial competition.

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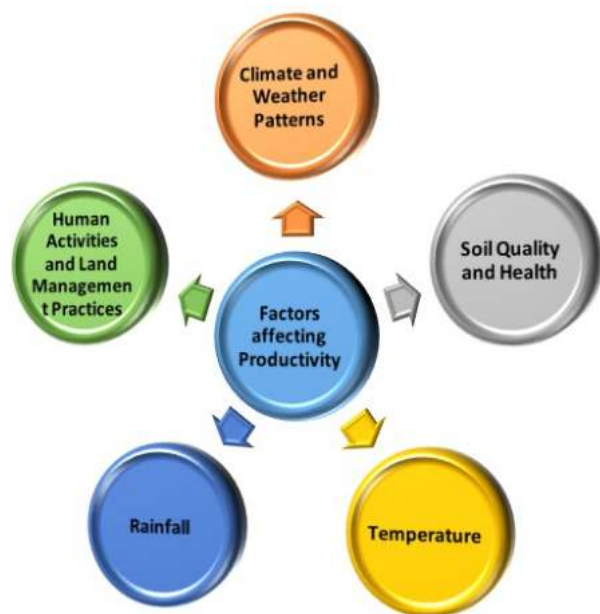
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Morena (M.P.). Notably, he initiated gharial rearing programs and received recognition for wildlife conservation contributions and he continue to play a vital role as a member in IUCN-CSG, TSA, IRDC-GCA amongst others, and have over 100+ publication in various renowned International and national journals and books.

INFLUENCE OF ENVIRONMENTAL FACTORS ON FERTILE SOIL YIELD

By - Vaishali Trivedi¹ and Dr. A.K. Tewari²

Introduction

Fertile land is a vital resource for agricultural productivity, which directly supports food security and the economy of a region. However, the productivity of fertile land is heavily influenced by various ecological factors, including climate, soil characteristics, water availability, biodiversity, and human activities. Productivity of fertile land is influenced by multiple ecological factors, with complex interactions between them. Climate, soil characteristics, water availability, biodiversity, and human activities all play crucial roles in determining land productivity. Water availability is a primary regulator of plant productivity, especially in arid and semi-arid ecosystems (Serafini et al., 2019). In temperate mesic grasslands, soil moisture availability interacts with nutrient supply to influence productivity. Under normal conditions, shoot productivity is primarily limited by soil nutrient supply, but water availability becomes the primary constraint during drought (Serafini et al., 2019). Understanding the interplay between these factors is crucial for sustainable land management and agricultural practices. This article will explore how ecological factors impact the productivity of fertile land and the strategies to mitigate negative effects (Fig. 1.)



1. Ecological factors impacting the productivity of fertile land.

1. Climate and Weather Patterns

Climate is one of the most significant ecological factors affecting land productivity. Temperature, rainfall, humidity, and sunlight significantly impact crop growth and yield across various regions and crops, as evidenced by multiple studies: Rainfall plays a crucial role in crop production, especially in rainfed ecosystems. In Dharmapuri District, India, analysis of 100 years of rainfall data revealed that 56.3% of months had normal rainfall distribution, while 34.1% were drought months. This information helped identify a viable 120-day growing period from August to December for annual cropping (Parasuraman & Mani, 2012). Similarly, in Khulna city, changes in rainfall patterns over four decades showed varying impacts on different seasons, affecting crop production (Arefin Siddikui & Nahida Sultana, 2024). The relationship between these factors and crop yield is not always straightforward. For instance, in Jodhpur district, western Rajasthan, rainfall positively influenced bajra, kharif pulses, and sesamum yields, while mean temperature had a negative impact. Mean relative humidity showed a weak influence on crop productivity (Vyas et al., 1985). In contrast, a study on maize cultivars found that number of leaves was most sensitive to rainfall, minimum temperature, and relative humidity, while plant height and leaf area were more responsive to maximum temperature and sunshine hours, respectively (Makinde et al., 2019). Optimal temperatures and adequate rainfall can enhance crop yields, while extreme weather conditions—such as droughts, floods, and heat waves—can lead to crop failure and soil degradation.

Temperature:

Temperature plays a crucial role in seed germination and early seedling growth across various crop species. Different crops have specific optimal temperature ranges for germination and growth, with extreme temperatures often inhibiting these processes. For instance, *Medicago truncatula* showed distinct quantitative trait loci (QTLs) for germination at sub-optimal (5 or 10°C) and supra-optimal (20°C) temperatures (Dias et al., 2010). *Sophora davidii* exhibited maximum germination (30.67%) at a constant temperature of 20°C (Wang et al., 2016). For *Zostera marina*, the optimal water temperature for seed germination ranged from 10 to 15°C, while seedling growth

was optimal between 20 to 25°C (Abe et al., 2008). Picnomanacarna seeds germinated over a wide temperature range from 5 to 35°C, with highest germination at 20°C constant and 20/10°C fluctuating temperatures (Nosratti et al., 2019). Some crops show adaptability to extreme temperatures. Fiber sorghum, typically requiring temperatures above 10°C for germination, demonstrated high cold-tolerance with 82.4% germination at 8°C for certain cultivars (Patanè et al., 2012). Similarly, many cover crop species were found to be adapted to summer sowing with relatively high optimal temperatures for germination, although some Fabaceae species were more sensitive to high temperatures (Tribouillois et al., 2016).

Rainfall:

Rainfall patterns significantly impact crop health and yield, with both drought and excessive rainfall posing threats to agricultural production. Drought consistently decreases maize yield due to water deficiency and concurrent heat, with greater yield loss for rainfed maize in wetter areas (Li et al., 2019). Excessive rainfall can have either negative or positive impacts on crop yield, varying regionally. In cooler areas with poorly drained soils, excessive rainfall can decrease maize yield significantly, especially under high pre-season soil water storage conditions (Li et al., 2019). The impact of excessive rainfall on crop yield remains less understood compared to drought effects. Observational evidence shows that excessive rainfall can reduce maize yield by up to -34% (-17 ± 3% on average) in the United States, comparable to the up to -37% loss caused by extreme drought (-32 ± 2% on average) from 1981 to 2016 (Li et al., 2019). In dry environments like West Africa, excessive soil water associated with heavy rainfall events can have detrimental effects on cowpea yields, particularly in areas with poorly drained soils (Iizumi et al., 2023). To mitigate the impacts of irregular rainfall patterns, various strategies can be employed. Effective crop planning with appropriate sowing time, short duration crops, and high-yielding drought-resistant varieties can help better utilize monsoon rain and reduce water stress (Manivasagam & Nagarajan, 2017). In arid and semi-arid regions with limited water availability, dry farming techniques and water harvesting methods can be implemented to cultivate drought-resistant crops (Feddes & Bastiaanssen, 1992). The development of crop-specific drought indices can aid in assessing moisture stress and guiding irrigation management decisions (McDaniel et al., 2017).

2. Soil Quality and Health

Healthy soil, rich in nutrients and organic matter, plays a crucial role in supporting robust plant growth through various mechanisms. Soil organic matter (SOM) is

particularly important for maintaining soil quality, improving water-holding capacity, enhancing nutrient cycling, and reducing soil compaction (Reddy, 2016). It also contributes to the development of healthy plants that are more resistant to pests, diseases, and drought stress. Soil microbiomes, including bacteria and fungi, are essential for preserving soil health and promoting plant development. These microorganisms form symbiotic relationships with plants, aiding in nutrient uptake, pathogen defense, and root growth. For instance, mycorrhizal fungi establish symbiotic associations with plant roots, enhancing nutrient and water absorption (Nichols, 2008). Plant growth-promoting rhizobacteria (PGPR) colonize plant roots and positively affect plant growth and physiology by improving soil nutrient turnover (Ciftci et al., 2021). While organic matter additions generally increase microbial activity, they may not always result in more vigorous root systems. A study on Capsicum revealed that treatments inducing longer root systems produced higher crop biomass and yield, suggesting that the pattern of root development can provide insights into plant-microbe-soil interactions (Pandey et al., 2016). The incorporation of biochar, especially when combined with compost and PGPR, has shown synergistic effects on plant growth and disease resistance for various crops (Das & Mitra, 2024).

Soil Erosion:

Wind and water erosion significantly impact soil fertility and crop productivity by removing nutrient-rich topsoil. This process leads to reduced soil organic matter (SOM), nutrient depletion, and decreased water retention capacity, ultimately affecting agricultural sustainability (Srinivasarao et al., 2021). Wind erosion can cause substantial soil loss, with studies showing that removal of 20 cm of topsoil can reduce grain yield by up to 53% (Larney et al., 2000). The loss of fine soil particles, particularly very fine sand and coarse silt, is most susceptible to wind erosion (Chappell & Thomas, 2001; Segovia et al., 2017). This selective removal of smaller particles results in the depletion of essential nutrients, especially nitrogen, as these particles are often nutrient-rich (Chappell & Thomas, 2001). The impact of erosion on soil productivity varies depending on soil type, climate, and management practices (Tanaka, 1990). While some studies have found that commercial fertilizer use can maintain crop yields in eroded soils, SOM levels may remain unchanged, indicating that conventional tillage practices in semi-arid regions may not be sufficient for restoring erosion damage (Allen et al., 2011). However, other research has shown that applying livestock manure can be an effective short-term solution for restoring soil productivity, increasing grain yield by up to 158% in severely eroded soils (Larney et al., 2000). To mitigate the effects of erosion on soil fertility and crop productivity, it is

crucial to implement soil conservation practices, improve technology transfer, and develop drought-resistant crop varieties (Srinivasarao et al., 2021). Monitoring and quantifying soil organic carbon (SOC) loss due to wind erosion is essential for understanding its impact on ecosystem productivity and developing effective management strategies (Yan et al., 2005).

Nutrient Depletion:

Continuous cultivation without proper nutrient replenishment can indeed lead to soil nutrient depletion and reduced productivity over time. This is a significant concern for sustainable agriculture and food security (Majumdar et al., 2016; Zahir et al., 2018). Nutrient mining occurs when crop nutrient removal and losses exceed the soil's inherent nutrient supply. Many farmers currently adopt inadequate and imbalanced nutrient management strategies, promoting nutrient depletion (Majumdar et al., 2016). In sub-Saharan Africa, for example, soils that have been cropped for generations have severely depleted inherent fertility, resulting in decreasing crop yields (Bayu et al., 2005). However, there are effective strategies to maintain and improve soil fertility. The 4R Nutrient Stewardship Principles (right source, rate, time, and method) can help reduce nutrient mining (Majumdar et al., 2016). Integrated nutrient management approaches, combining organic inputs like animal manure with mineral fertilizers, show promise for resource-poor farmers (Bayu et al., 2005; Osman, 2018). Other beneficial practices include crop rotation, cover crops, conservation tillage, and liming acidic soils (Osman, 2018). Proper soil testing and nutrient management planning are crucial for quantifying crop nutrient requirements and soil nutrient-supplying capacity (Havlin, 2020). Soil Contamination: Continuous use of chemical fertilizers and pesticides in agriculture can indeed lead to soil contamination and disrupt the natural microbial balance. These agrochemicals accumulate in the soil over time, causing several adverse effects on soil health and ecosystem functioning (Bhadouria et al., 2020; Kaushik et al., 2018). The accumulation of chemical fertilizers and pesticides in soil negatively impacts soil fertility, water quality, and native microorganisms, particularly beneficial species like cyanobacteria in wetland rice cultivation (Kaushik et al., 2018). These contaminants can persist in the soil, leading to the deterioration of physicochemical and biological attributes of the agricultural ecosystem (Bhadouria et al., 2020). Moreover, they can biomagnify at different trophic levels, posing serious hazards to human health and the environment (Bhadouria et al., 2020; Hossain et al., 2022). To address these issues, alternative approaches such as organic farming methods and the use of biofertilizers and biopesticides are being promoted (Singh et al., 2019; Singh et al., 2020). These eco-friendly practices can help restore

soil health, improve microbial diversity, and enhance nutrient cycling (Parewa et al., 2021; Singh et al., 2020). For instance, organic farming methods have shown to increase soil carbon and nitrogen content, enhance soil fertility, and improve crop productivity while being cost-effective and environmentally sustainable (Kai & Kubo, 2020; Singh et al., 2020).

3. Water Availability and Management

Water availability is indeed a critical factor for plant growth and land productivity, significantly impacting photosynthesis and nutrient transport in crops. Research has shown that water scarcity is a major limiting factor for crop productivity, especially in arid and semi-arid regions (Chtouki et al., 2022; Nimah, 2010). Adequate water supply is essential for maintaining optimal stomatal conductance, chlorophyll content, and photosynthetic efficiency, which directly influence biomass accumulation and nutrient uptake (Chtouki et al., 2022). Interestingly, while water is crucial, its interaction with other factors such as nutrient availability and fertilizer form can significantly affect crop performance. For instance, the effectiveness of polyphosphate fertilizers was found to be greatly reduced under water stress conditions, whereas orthophosphate fertilizers maintained stable positive effects on plant growth parameters (Chtouki et al., 2022). Additionally, nanotechnology-based fertilizers have shown potential in improving water use efficiency and helping plants survive challenging environmental factors such as drought (Al-Juthery et al., 2021).

Irrigation:

Effective irrigation systems can significantly improve land productivity in regions with insufficient rainfall, but they must be carefully managed to maximize water use efficiency. Supplemental irrigation, when combined with rainwater harvesting techniques like ridge-furrow systems, can substantially increase crop yields and radiation use efficiency in semi-arid regions (Ali et al., 2017; Ali et al., 2018). For instance, the ridge-furrow system with 200 mm simulated rainfall and 150 mm deficit irrigation increased grain yield by 19% and water use efficiency by 76% compared to traditional flat planting in semi-arid China (Ali et al., 2017). Maximizing water productivity rather than yield per unit of land may be a more appropriate strategy for dry farming systems where water is the most limiting resource (Oweis&Hachum, 2005). This approach calls for revising conventional water management guidelines to ensure maximum water productivity. Small-scale irrigation systems and water harvesting techniques can be more affordable and effective in dryland developing countries compared to large-scale irrigation projects (Abebe, 2021).

Water Scarcity:

Water scarcity is indeed a major limiting factor for crop production, particularly in arid and semi-arid regions, with significant impacts on food security and livelihoods (Man-Hong et al., 2020; Shi et al., 2022). Drought can severely affect plant productivity by impacting carbon gain, canopy development, and reproductive structures (Davies & Wilkinson, 2012). This leads to reduced crop yields, economic losses for farmers, and food shortages in affected communities (Eze et al., 2022; Shi et al., 2022). Some research suggests that lack of water itself may not always be the primary constraint to crop growth in drought-prone areas. Poor rainwater partitioning and low plant water uptake capacity can reduce on-farm grain yields to just 1/10th of potential yields, indicating opportunities for improvement through better land and water management practices (Rockström&Falkenmark, 2000). The concept of "technological drought" highlights how crop failures or reduced yields can result from an inability to supplement water due to lack of irrigation technology or poor water management, rather than just meteorological drought (HaqueMondol et al., 2022). To address these challenges, various strategies have been proposed. These include improving soil organic carbon content to reduce yield losses during droughts, optimizing irrigation water productivity through crop variety selection and location-specific adaptations (Heinz et al., 2024), and utilizing plant growth-promoting rhizobacteria to enhance crop growth under environmental stress (Ojuederie et al., 2019). Sustainable intensification of agriculture, along with novel crop management techniques and genetic improvements, may help mitigate the impacts of water scarcity on crop production and food security in drought-prone regions (Davies & Wilkinson, 2012).

Water Quality:

Water shortages and poor water quality due to pollution can significantly impact soil health, crop productivity, and food safety. The use of contaminated water for irrigation introduces harmful substances into the soil and crops, leading to various adverse effects (Lu et al., 2015; Suresh & Nagesh, 2015). Irrigation with polluted water can cause excessive accumulation of salts in the root zone, affecting crop yield, quality, and choice of crops that can be grown (Suresh & Nagesh, 2015). Heavy metals, industrial pollutants, and pesticides in contaminated water supplies can accumulate in soil and crops, ultimately entering the food chain and posing serious health risks to humans (Lu et al., 2015; Smith, 2023). For instance, a study showed that maize crops irrigated with polluted river water experienced a 25% decrease in yield compared to those irrigated with borewell water (Suresh & Nagesh, 2015). To address these challenges, various measures can be implemented. These include efficient irrigation water management, integrated pest management,

comprehensive nutrient management planning, and conservation agriculture (Wato, 2020). Additionally, the use of zeolites as soil ameliorants can improve soil properties, alleviate heavy metal toxicity, and enhance fertilizer and water use efficiency (Mondal et al., 2021).

Phytoremediation and phytoaugmentation technologies also show promise in cleaning up contaminated soil and wastewater (Kumar et al., 2020). Ultimately, integrated policies addressing soil and water pollution are crucial for achieving food safety and sustainable agricultural production (Lu et al., 2015).

4. Human Activities and Land Management

Practices Human activities have indeed significantly impacted the productivity of fertile land through various mechanisms. Deforestation, industrialization, and improper agricultural practices are major contributors to land degradation and loss of soil fertility. Deforestation, driven by the need for agricultural land, urban expansion, and resource extraction, has led to a significant reduction in forest cover globally (Forest Degradation Around the World, 2020). This practice not only reduces vegetation but also impacts forest structure, species composition, and ecosystem functions, ultimately decreasing forest productivity (, 2020; Raj et al., 2022). Agricultural expansion, in particular, has radically changed natural landscapes through steppes plowing, deforestation, and the construction of irrigation systems (Bandurin & Bandurina, 2021). While agriculture is a major cause of land degradation, it is also severely impacted by it. Inappropriate agricultural practices, including excessive tillage, overuse of inorganic fertilizers, poor irrigation techniques, and inadequate crop residue management, account for nearly 40% of land degradation in India alone (Bhattacharyya et al., 2023). These practices contribute to soil erosion, nutrient depletion, and loss of soil biodiversity, further reducing land productivity (Abebaw, 2019; Kumar

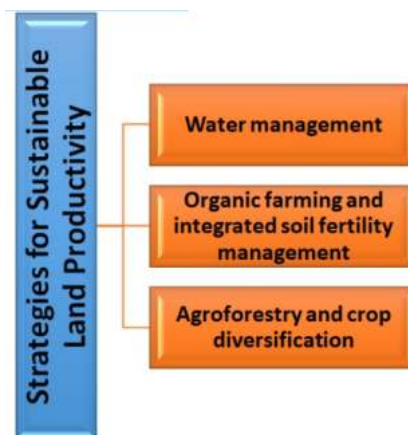


Figure 1. Strategies for Sustainable Land Productivity

et al., 2022).

Strategies for Sustainable Land Productivity
Soil conservation practices are crucial for addressing ecological challenges in agriculture. Conservation Agriculture (CA) principles, including minimum soil disturbance, permanent soil cover, and crop diversification, have proven effective in preserving soil health and enhancing productivity (Kassam et al., 2014; Kumar et al., 2023). These practices reduce soil erosion, improve water retention, and promote biodiversity (Fig. 2.).

Conservation tillage and no-till systems have been successful in controlling land degradation and maintaining soil mulch cover (Kassam et al., 2014). Water management strategies play a vital role in sustainable agriculture. Water-smart farming techniques, such as precision irrigation, rainwater harvesting, and alternate wetting and drying technology, can significantly reduce water consumption and improve crop yields (Frimpong et al., 2023). In arid regions, revitalizing oasis agriculture through precision irrigation and water conservation methods is essential for sustaining biodiversity and ecosystems (Dhawi&Aleidan, 2024). Organic farming and integrated soil fertility management (ISFM) contribute to soil health improvement and reduced environmental impact. These practices minimize the use of synthetic inputs, preserve biodiversity, and promote natural pest control (Adedibu, 2023; Diop et al., 2022). However, it's important to note that some organic farming systems may remain intensive and specialized, requiring further diversification to achieve true sustainability (Rosati et al., 2020). Agroforestry and crop diversification offer transformative potential for sustainable agriculture. Integrating trees with crops and/or livestock can enhance soil fertility, improve microclimatic conditions, sequester carbon, and protect biodiversity (Arshad et al., 2024; Lebrazi&Fikri-Benbrahim, 2022). Agroforestry systems, particularly those incorporating tree legumes, can intensify nitrogen availability in the soil and increase crop yields (Lebrazi&Fikri-Benbrahim, 2022). Crop diversification, including the integration of pulses in CA systems, contributes to resource conservation, soil health improvement, and sustainable crop production (Kumar et al., 2023).

Conclusion

The productivity of fertile land is influenced by a complex interplay of ecological factors, including climate, soil health, water availability, biodiversity, and human practices. Understanding these factors and their interactions is essential for developing sustainable agricultural practices that can maintain and enhance land productivity. By adopting strategies that promote soil conservation, water management, and biodiversity, we can ensure the sustainable use of fertile land for future

generations. Sustainable agricultural practices, such as conservation agriculture (CA) and crop diversification, play a crucial role in maintaining long-term soil fertility and ecosystem health. These approaches not only enhance soil structure and nutrient cycling but also improve water retention and reduce erosion, contributing to overall land productivity. Furthermore, the integration of diverse crops, particularly legumes like pulses, can provide additional benefits such as nitrogen fixation and increased microbial activity in the soil.

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THE HIMALAYAN BLUNDER

-By Dr. Uma Shankar Singh



INTRODUCTION:

The Indian Himalayan Range (IHR), comprising 11 States and two Union Territories, had a decadal urban growth rate of more than 40% from 2011 to 2021. Towns have expanded, and more urban settlements are developing unsustainably. Almost all Himalayan towns, including State capitals, struggle with managing civic issues. For example, cities like Dehradun, Nainital, Srinagar, Guwahati, Shillong, and Shimla, as well as smaller towns, face significant challenges in managing sanitation, solid and liquid waste, and water. City governments are short of human resources by almost 75% and beset with rampant corruption. Cities continue to expand into the peripheries, encroaching on the commons of villages. Srinagar and Guwahati are examples of such expansion, leading to the plundering of open spaces, forest land, and watersheds. In Srinagar, land use changes between 2000 and 2020 showed a 75.58% increase. Water bodies have eroded by almost 25%, from 19.36 square kilometres to 14.44 square kilometres. These areas have been taken over by built-up real estate, increasing from 34.53 square kilometres to 60.63 square kilometres, a rise from 13.35% to 23.44% of the total municipal area. Nearly 90% of the liquid waste enters water bodies without treatment. Over the past few decades, tourism in the IHR has continued to expand and diversify, with an anticipated average annual growth rate of 7.9% from 2013 to 2023. Current tourism in the IHR often replaces eco-friendly infrastructure with inappropriate, unsightly, and dangerous constructions, poorly designed roads, and inadequate solid waste management, which leads to loss of natural resources damaging biodiversity and ecosystem services. The high costs of urban services and the lack of corridors place these towns in a unique financial situation. Current intergovernmental transfers from the centre to urban local bodies constitute a mere 0.5% of GDP; this should be increased to at least 1% of the GDP. Uttarakhand and Himachal Pradesh in the Himalayan region are extremely

eco-sensitive, hundreds of people lose their lives due to landslides along with destruction worth crores of rupees. The hill states are very vulnerable for example, the total area of 55,673 square kilometres of Himachal Pradesh, 38,249 sq. km area comes under high risk and 4,461 square km area comes under very high-risk area for landslides. The number of landslides has increased wildly on account of road construction in the hill states. More than 80 thousand trees have been cut for the highways in Himachal Pradesh and it has led to the reduction in carrying capacity of the area on account of the increasing construction in the tourism sector. A 115,000-megawatt power project has been planned in the Himalayan region, extending from Jammu and Kashmir to Arunachal Pradesh and for the restoration of the ecosystem all such plans need to be dropped immediately. Due to the impact of these power projects, cracks have appeared in people's houses, there has been an increase in natural calamities and water sources have dried up. Urni village in Kinnaur has been sinking continuously since 2009 and its cracks are increasing year by year and the village was hit by a landslide also in December 2022. Both Sikkim and Joshimath are located in the eastern Himalayas and are facing the same challenges and predicaments, Sikkim has been witnessing this hazard for the past one decade. Sikkim is also facing the problems in places like Dikchu, Shipgyer, Ramam in North Sikkim because of tunnels and the National Hydroelectric Power Corporation projects. The area is facing environmental disasters affecting the indigenous community of the region at large and loss of properties equally. Hydel projects, which commenced in the late 1990s in the state, can also be held accountable for the disasters, the expert said. They have affected the main Teesta river basin, where 90 per cent of Sikkim's landmass is dependent hence, due to the construction of a bumper dam on Teesta river, people are facing multiple land erosion in every part of Sikkim and also parts of Siliguri. Similarly, in Uttarakhand Himalayas some 7,000 MW of hydroelectric

projects are either operating or being constructed in this fragile region; back to back; with no respect for the river or its need to flow naturally. The issue is not about hydropower generation or the need for energy or development. It is about the carrying capacity of this fragile region, which is even more at risk because of climate change. This needs to be assessed, but by keeping the river first and our needs next. Otherwise, the river will continue to teach us bitter lessons; it will be the revenge and rage of nature. Humans will be shown as the puny things we are. Apart from the dams, numerous pharmaceutical companies and rampant unnecessary road widening, smart city projects and congested urban planning are putting more pressure on the ecology leading to environmental disasters.

JOSHIMATH IS SINKING:

Joshimath, a key transit point for tourists traveling to Badrinath and Hemkund Sahib, situated at an altitude of 1,890 metres from sea level in the Garhwal Himalayas, has a population of over 20,000. It is located on the Rishikesh-Badrinath National Highway (NH-7) of Chamoli district which falls in Zone V of the Seismic Zonation map and almost sits on the tectonic fault line of Vaikrita Thrust (VT). What really made things worse is the weak foundation of the city. Sitting atop a glacial moraine, which are distinct ridges or mounds of debris that are laid down by a glacier, the town's foundation has no solid rocks. These sediments have voids, making them extremely unstable, geologically. Spread over an area of 2,458 square kilometres, Joshimath is one of the six tehsils (blocks) in Uttarakhand's Chamoli district. Previously, many incidents like landslides, subsidence or sinking and flash flood occurred in and around Joshimath city and multiple major and minor cracks also exposed on roads, walls and floors of houses. From 11 January 2023, major portion of Joshimath city started to sink continuously and major and minor cracks began to appear on roads, floors, ceilings and walls of houses. Around 1000 people have been evacuated from the unsafe area and risky buildings (Biswajit et al., 2023). The place was sitting atop with a disaster of this magnitude waiting to happen, but administration could not assess it. The Joshimath town is situated along a narrow gorge at the confluence of two major rivers; Dhauliganga and Alaknanda and is close to the Main Central Thrust (MCT) fault passing through on the southern side of town. So, it is prone to earthquake and also frequent rainfall. (Yaspal Sundriyal et al., 2023). The reactivation of these fault lines nearly 50-60 kilometres under the surface remains a big mystery. There are many contributory factors



leading to the imbalance in the hill ecosystem but chiefly among them are the rapid rise in construction activities, widening of the Char Dham Yatra road and the National Highway 7, which runs through the town taking tourists and cargo to the holy shrine of Badrinath every year. Joshimath's problems with slope instability have gotten worse as a result of unplanned construction that didn't take bearing capacity into account (USDMA, 2022). The widening of the road brought more and more hotels springing up in and around Joshimath therefore, religious tourism also spiked. Prime minister's visit to Kedarnath and Badrinath joined a record number of 41 lakh pilgrims that thronged the shrine thereby, causing an immense pressure on the natural resources which was unsustainable at any point of time. The roads in the geologically sensitive region should have been five metres wide, but the government widened the roads to 12 metres in a complete disregard to the Ravi Chopra committee recommendations. This led to not only cutting around 50,000 trees but also more and more cleaning of the hills. This made the already ecologically sensitive region highly vulnerable to landslides as the top layer was cleaned for the road construction. Another factor which was extremely important in destroying the local hill ecosystem was the establishment of Tapovan - Vishnugad hydel project which mandated NTPC to carve out a 12-kilometre tunnel puncturing some of the acquirers in the process. However, due to the unavailability of solid rocks underneath, the water released from the acquirers seeped into the soil and loosened it from within. With the top surface of the soil already gone due to intense construction, the region stood on the edge and sunk as the time passed on. That is not all. In the last decade, the ridge that houses Joshimath has been traversed by running streams with a high gradient from Vishnuprayag, a confluence of the Dhauliganga and the Alaknanda rivers. The confluence has survived two big glacial and cloud outbursts that deposited heavy sediments causing major erosion in the region. The outbursts brought debris worth 10,000 houses in one day, which made things worse for Joshimath.

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UNSUSTAINABLE TOURISM:

Tourism can lead to various environmental problems, such as water pollution, solid waste generation, and depletion of natural resources (Buckley, 2012). Therefore, it is important to find a balance between tourism development and environmental conservation by adopting sustainable tourism practices. Many studies have raised concerns regarding the state's capacity to accommodate tourists sustainably, with estimates suggesting

that the maximum capacity of Uttarakhand lies between four and five crore tourists per year (Bhandari, 2017). According to the data released by the Uttarakhand government, the state has witnessed a surge in tourism, with 3.2 crore tourists visiting in 2019, as compared to 2.85 crore tourists in 2018 (Uttarakhand Tourism, 2021). However, increasing visitors have posed several challenges to the state's infrastructure, transportation, and environment. The sinking of Joshimath has highlighted the issue of infrastructure development and its impact on the environment, in Uttarakhand. A study by (Pandey et al, 2015) found that the tourism industry in the Himalayan region has a negative impact on the Himalayan ecosystem in terms of affecting its biodiversity, resulting in habitat fragmentation, pollution, glacier melting, soil erosion, etc

DISCUSSION:

Due to earth subsidence that caused 561 homes in Joshimath to develop cracks, the Uttarakhand government prohibited development work in the area on January 5, 2023 in response to protests from the terrified inhabitants. The geological developments underway in Joshimath should be a case study for every town planner working in the hills. The factors at play in Joshimath are also found to be similar in other cities such as Nainital, Champawat, and Uttarkashi. All these cities are witnessing rampant construction, deforestation, tourist boom, and poor civic management. The only silver lining is that they are not on top of ancient glacial debris. The National Institute of Hydrology (NIH) has published a report called "Sinking Joshimath" which reveals that Restriction in the flow of water in Joshimath, Uttarakhand may have led to the major land subsidence in the region early in January, 2023. The report further says that the recharge area held an estimated 10.66 million litres of water, which was emptied in approximately one month. To gather this much water, it might take approximately 12 to 15 months. While the reason for the water flow is not known, there is a possibility that it may have collected due to the blockage of a sub-surface channel and burst from a weak spot. Although not specifically stated in the NIH document, it has been observed that Joshimath had experienced heavy rainfall, which was measured at 190 mm in 24 hours in October 2021, about 15 months before the torrential flow of water started in JP Colony. There was also flooding in the area on this day. It is feared that rainwater may have collected underground and came out the most weaker points due to the hydraulic pressure. The report explained through maps that the water channels flowing from the upper areas have disappeared in the middle. Therefore, permanent surface channels will have to be built to dispose of water coming from the upper areas. The water requirements of local people and flora and fauna should be kept in mind before the channelization of water. Water coming from upper areas and city waste should be disposed of safely. The NIH made note of the necessity to pinpoint both cities with geological settings and specific geographic locations, such as Joshimath. These towns ought to have the tools required so that pre-emptive actions can be done well in advance in order to stop repetitive catastrophe of this magnitude. In the

last 46 years from 1976 to 2023, there have been many studies on Joshimath and its surrounding areas. Among them, the 2006 report of Swapnamita Chaudhary, the 2012 Disaster Management Report of the Government of Uttarakhand, the report of the High-Power Committee formed under the chairmanship of Ravi Chopra after the 2013 tragedy, the 2022 report of Piyush Rautela, and the report of SP Sati, Shubham Sharma and Navin Juyal filed in the same year, are some of the important ones. Apart from this slew of government studies, studies by independent researchers and institutes were also done from time to time. The oldest of all these reports, the 1976 Mishra Committee report which was submitted way back in 1976 has a set of very valid and relevant recommendations which are not at all addressed in true spirit. The Mishra Committee attributed the land subsidence in Joshimath to felling of trees. He recommends that trees are important as they act as mechanical barriers to rain, increase the water conservation capacity and hold the loose debris mass. An increase in grazing and browsing incidents is akin to felling. Natural forest cover in the Joshimath area has been mercilessly destroyed by a number of agencies. The rocky slope is bare and treeless. The absence of trees results in soil erosion and landslides. There is nothing to hold the detaching boulders. Landslides and slips are the natural outcomes. However, the amount of attention paid to this recommendation can be gauged from the fact that 58,684 hectares of forest land, a little less than the size of Mumbai city, in Uttarakhand was diverted for non-forest uses, mainly road construction, power generation and its transmission between 1991 and 2021. Of these, Chamoli district, in which Joshimath is located, is the district that has diverted the maximum forest land after Tehri Garhwal (ISFR 2021). It is not just about one study; many studies were conducted but they didn't help the people of Joshimath. Instead of implementing their recommendations, they were ignored. As a result, the people of Joshimath and Uttarakhand are suffering. Ignoring the recommendations of the Mishra report, there were blasts in tunnels, the government was building huge guest houses and private players were also given permission for such buildings. Even after all those suggestions, the Rishi Ganga and Tapovan projects were continuing and 12 more hydroelectric projects were approved.

INDIFFERENT COURTS:

With regards to the situation worsening in Joshimath, local organisations and people approached the Supreme Court on January 10. The Supreme Court dismissed the petition saying that the Uttarakhand High Court is already hearing the matter related to the incident in question and the petitioner should approach the High Court. Earlier, following the Chamoli floods in 2021, which claimed nearly 200 lives and caused extensive damage to the Tapovan power project, five residents of Chamoli petitioned the Uttarakhand High Court to cancel the environmental clearance granted to the Tapovan-Vishnugad and Rishi Ganga projects and compensate the local people for the damage they suffered. The court not only dismissed this public interest litigation (PIL) but also imposed a fine

of 10,000 rupees each on the five petitioners.

CONCLUSION:

The most recent census survey for Joshimath town was conducted in 2011, revealing that the town is divided into nine wards. According to the survey, the total population of Joshimath Nagar Palika Parishad was 16,709, with 9988 males and 6721 females, as reported by Census India in 2011. However, recent census data is not available but the population has gone up multiple times. Population and unplanned growth have led to irreparable damage to the ecosystem. In 2006, the number of buildings in Joshimath town was 2456, covering a corresponding area of 4,66,438 sq. meters, and in 2023, the number of buildings in Joshimath town increased to 5113, covering a corresponding area of 8,98,843 sq. meters. Construction in a mountainous region can be challenging due to the rugged terrain and hazard risk, which emphasizes the need to consider factors such as slope stability, erosion, and the impact of natural disasters such as earthquakes and landslides before planning permanent structures. Any country who does not learn a lesson from its own mistake gets obliterated. A study was carried out to understand the deformities occurring in the year 2016-17, 2018-19, 2020-21 and 2021-23. The results revealed that the Joshimath region experienced the highest land deformation during the year 2022–2023. During this period, the maximum land



subsidence was observed in the north-western part of the town. The maximum Line of sight (LOS) land deformation velocity $+60.45$ mm/year to $+94.46$ mm/year (2022–2023), occurred around Singhdwar, whereas the north and central region of the Joshimath town experienced moderate to high subsidence of the order of $+10.45$ mm/year to $+60.45$ mm/year (2022–2023), whereas the south-west part experienced an expansion of the order of 84.65 mm/year to -13.13 mm/year (2022–2023). Towards the south-east, the town experienced rapid land subsidence, -13.13 mm/year to -5 mm/year (2022–2023). In the 19th century, many terrible floods devastated the lives and livelihoods of thousands of people in Switzerland. Between 1850 and 1900, there were nine major floods in the European country, with the most damaging ones in 1850, 1860, 1971, and 1874. After the flood of 1868, professors Elias Landolt and Carl Culmann of the Swiss Forestry Society convinced the government and public that the devastating floods were the

direct consequences of unscientific deforestation and the over-exploitation of forest resources. The Swiss government enacted a special policy and development strategy for the Swiss mountain ranges. This culminated in the formation of the Swiss National Park in 1914. It was the first national park in Europe, with a total area of about 14,000 hectares (about 34,600 acres). Some scholars believe that the flood of 1868 changed Switzerland, resulting in the country that suffered from natural disasters in the 19th century being at the top of the global human development index list in 2024. The Indian situation is quite opposite to these countries, India stands at 176th position out of 180 countries in the environmental performance index, 2024 and 134th position out of 193 countries in human development index list in 2024. The forest bureaucracy has failed to understand a simple thing which even an ordinary person from the Alaknanda Valley could trace a direct relation between the massive flood and indiscriminate deforestation. The Indian hill states ecology is declining very fast on account of unsustainable growth. The hill states are geologically susceptible to landslides. The Himalayas are continuously growing due to the continuous movement of geological plates. Infrastructure development plans in this area are not free from risk. Hydropower projects are also sensitive to the geography of the region. A large amount of water is collected at one place, which increases both the humidity and the pressure in that area which may cause earthquakes. Due to increasing humidity, the risk of landslides also remains constant therefore, before starting any infrastructure development project in the future, environmental impact assessment needs to be properly and thoroughly conducted, else Himalayan states may witness the same fate as witnessed in Uttarakhand and Sikkim in recent past. Widening of roads, big power projects and other developmental activities have made the Himalayan region very unstable and as a result of this, even small accidents were resulting in huge human and property losses. The example of Himachal Pradesh is very revealing and despite of the fact that the truth is in public domain the successive governments are carrying out with the unsustainable developments. Himachal Pradesh has a total built-up area of 866.14 sq.km (Prashar, 2023). Geographic Information System and visuals showed that most of the built-up area comes under high risk area. Of the total $1,628$ km of national highway roads in the state, 993 km are in highly sensitive areas and 514 km of roads are in the low risk areas. Further, 10 sq. km of roads are in very sensitive areas. Apart from this, out of $2,178$ km of roads in the state highway, $1,111$ km are in high risk areas and 873 km are in low risk. The hydropower sector is also under threat. Out of 118 big power projects ranging from 101 to $1,500$ MW in Himachal, 67 come under hazard risk and 10 mega power projects fall in the medium and high category for landslides. It may be noted that the state's biggest power projects, $1,190$ MW Karchham Wangtu, $1,500$ MW NathpaJhakri and $1,325$ MW Bhakra are also in sensitive regions. Around 40 per cent of the area in Himachal falls in the highly sensitive category and 32 per cent in the highly sensitive category (Building Material and Technology Promotion Council). Similarly, Char Dham Highway project is one of the primary reasons

behind the increasing number of landslides in Uttarakhand, including the land subsidence reported in Joshimath. A strange rule in July 2022 was framed which says that Highway projects related to defence and of strategic importance in border states were sensitive. Guidelines for these projects should be implemented keeping in mind the strategic, defence and security considerations in each case. Institutions implementing such projects in border areas were, thus, exempted from the requirement of Environment Clearance (EC) subject to a specific SOP therefore, the path was cleared for the Char Dham highway project. The subsidence in Joshimath was so severe that it sank at a pace of 5.4 cm in just 12 days between 27th December 2022 and 8th January 2023 (ISRO report 2023). The study of rocks in the Char Dham Highway project where blasting was undertaken shows that the project is responsible for many of the landslides that have been occurring in the recent past. TotaGhati is a location in Joshimath, Uttarakhand, where there have been landslides and other issues with the road. TotaGhati, where there are seemingly stable rock slopes had a number of slope failures recently. The narrow stretch of TotaGhati is dominated by limestone and interbedded shale rocks, shattered light grey dolomite, with occasional pockets (as fracture filling) of gypsum and purple grey shale and limestone. This is called a 'Karol formation' in geological terms. The calcareous (calcium containing) rocks are highly jointed (two to three sets of intersecting joints), fractured and sheared due to three 'thrusts' passing proximally to Bayasi, Shaknidhar, and Teen Dhara. The TotaGhati's rocks are widely sheared, faulted and fractured. At places, cavities filled with secondary carbonate precipitate have developed in the rocks, as the rocks dissolved locally. The beds around TotaGhati are varied due to folding. However, a dominant dip is towards the road. Geologically, rocks with fractures and joints are highly susceptible to failures, which may be triggered even due to the vibration induced by traffic flow (Pradhan & Siddique, 2019). The Joshimath town lacks adequate sewage systems and drainage channels to sustain its rapid growth in recent years. It originally had nine natural drainages (nalas), but only five of them currently exist. This is because of the unplanned development that has changed the town's natural drainage pattern. Locals have also reported the subsurface seepage of water starting since 2014. In addition, the rapid construction of buildings has obstructed the city's natural drainage channels (Nalas). Inadequate drainage systems have caused excessive surface runoff and sewage water to infiltrate and seep into the ground, thereby accelerating land subsidence. Further, the flood events in June 2013 and February 2021 also negatively impacted this region. These events resulted in significant toe erosion along the streams of the Alaknanda River in the town's foothills and led to the formation of landslide zones that further increased toe erosion and slope instability. To prevent land subsidence in Joshimath, a comprehensive drainage system is required, comprising proper infrastructure, slope design, routine maintenance, and efficient waste management. The septic tanks and household wastewater should not be permitted to seep into the ground, and the soaking pits should be sealed.

Instead, sewage water should flow through a sewage line and be deposited in concrete safety tanks that are protected against seepage and located away from areas prone to landslides. To prevent water from infiltrating mountain rocks and causing landslides, drains should be constructed to transport water to safe areas, and cracks should be filled with a mixture of lime, local soil, and sand bitumen. Further, in order to mitigate toe erosion and slope instability along the Alaknanda River, retaining walls must be constructed in affected areas to provide lateral support and prevent toe cutting. Therefore, it is essential to acknowledge that the issues the town of Joshimath is facing are not unique to this region. Many other regions in the Himalayas and around the world face comparable environmental and geological challenges because of rapid human development. Therefore, a concerted effort is required to address these issues and promote sustainable development practices that place a premium on environmental preservation. Joshimath's future depends on the implementation of effective measures to mitigate environmental and geological hazards. Future imperatives include prioritizing sustainable development practices and implementing policies that account for the region's fragile geological and environmental conditions. The growth of the town should be regulated, and large infrastructure projects should be carefully planned and implemented. Large infrastructure and hydropower projects should be evaluated carefully to ensure that they do not exacerbate existing environmental issues. To prevent further land subsidence, the government should work towards developing an effective drainage system and waste management system while preserving the region's natural resources and considering the region's fragile geological and environmental conditions when planning and executing development projects. The vulnerability of the region to natural disasters such as earthquakes and landslides must be addressed, and precautions must be taken to protect the local population. In addition, the government should invest in the development of alternative industries, such as ecotourism and sustainable agriculture, to reduce the region's dependence on the hotel and tourism industries, which have contributed to land degradation. To ensure the long-term prosperity and well-being of the region, a cautious and sustainable approach is required overall.



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PYRACANTHA CRENULATA: UTTARAKHAND'S BOTANICAL MARVEL

By - Priyanshu Bishan¹, Anshu Kumari², S.C..Arya³

| Taxonomic rank | Classification |
|----------------|-----------------------------|
| Kingdom | Plantae |
| Phylum | Angiosperms |
| Class | Eudicots |
| Order | Rosales |
| Family | Rosaceae |
| Genus | Pyracantha |
| Species | <i>Pyracantha crenulata</i> |

Indian Himalayas is a house to more than 8000 species of vascular plants out of which more than 1700 are known for their medicinal properties. Indian hawthorn, scientifically known as *Pyracantha crenulata* (D. Don) M. Roem. Syn., formerly classified as *Crataegus crenulata* Roxb. is native to the Himalayan hills. Referred to locally as "Ghingharu" in the Kumaon region of Uttarakhand. The authority for this species is D. Don, which stands for David Don, a Scottish botanist who described many plant species during the 19th century. This species holds significant ecological importance in the Himalayan foothills, being prevalent in regions spanning Uttarakhand, Himachal Pradesh, and the northeastern states of India and Nepal.

Botanical description

Pyracantha crenulata or Indian hawthorn is classified as a deciduous to semi-evergreen shrub with heights ranging from 2 to 5 meters. (C. Mukhopadhyay, 1989). These flowers are hermaphrodites, bisexual, with 20 stamens and a single ovary positioned at the center. Each flower has five sepals and five petals (Singh et al., 2018). The fruit of *Pyracantha crenulata* is of the pome variety, comprising pulpy berries, and it typically ripens from July to September in



Uttarakhand. These orange-red pome fruits serve as a food source for numerous bird species. *Pyracantha crenulata* is indigenous to the temperate Himalayan region. The fruits are not only edible but also contain high levels of sugar, while the leaves are utilized in the preparation of herbal tea (Kunkel, 1984). Typically, each berry of *Pyracantha crenulata* contains five triangular seeds with a brown hue; occasionally, three or four seeds are noted. These seeds are encased in a tough seed coat.

Distribution and habitat.

Pyracantha is found all over Uttarakhand but is predominantly found in the districts highlighted in the map. Its habitat includes areas near streams, riverbanks, roadsides, as well as Pine and *Quercus* forests, and mixed forests. It is an important plant in the foothills of the Himalayas and is found in Uttarakhand, Himachal Pradesh, and the North Eastern states of India and Nepal at elevations of 1600 to 2500 m (Brandis 1921). *Pyracantha crenulata* is typically observed in hill regions during the rainy season, specifically from June to August, when it is in the flowering stage.

Phytochemical composition-

Pyracantha crenulata contains Glycosides, Carbohydrates, Tannins, Amino Acids, Sterols, and Terpenoids as shown below. The moisture level is at 75%, with flavonoids comprising 2–3% of the content. Additionally, the fruits contain vitamins A, B12, C, and E, along with protein, calcium, magnesium, and potassium. They also contain

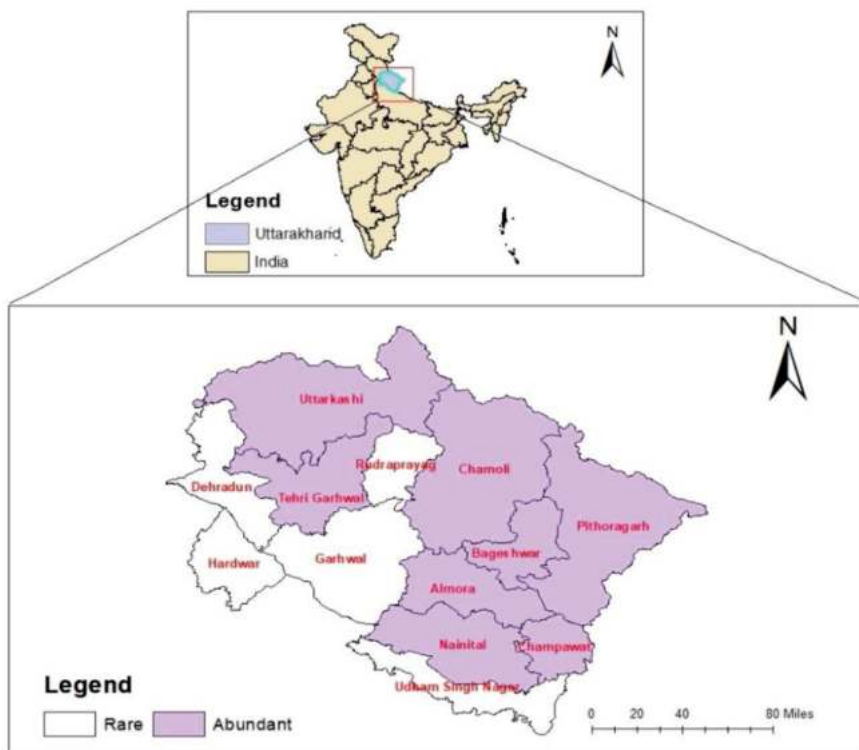
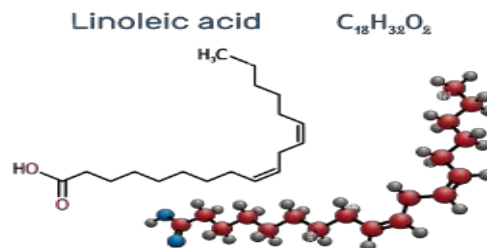
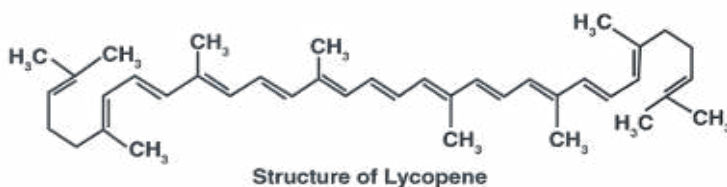


Flavonoids and oligomeric proanthocyanidins have been identified as the active components in standardized preparations derived from various *Pyracantha* species utilized in heart treatment. A novel compound known as pyracrenic acid, which has been extracted from the bark of *Pyracantha crenulata*, has demonstrated significant anti-inflammatory properties (Otsuka H et al.,1981). In an experiment conducted by Quiroga and Bou, it was found that the predominant fatty acids present in the seed extract of *Pyracantha crenulata* were linoleic acid (61.1%), oleic acid (17.3%), and palmitic acid (17.4%).

Successful propagation of *P. crenulata* requires a good understanding of its growth requirements, including soil type, moisture levels, and sunlight exposure. Accurate knowledge of the precise stage of seed collection is crucial to prevent the gathering of immature and non-viable seeds, as emphasized by R.L. Willian, 1985. Pre-harvested, immature, and non-viable seeds have the potential to lead to nursery and plantation failures. Propagation is carried out by cuttings and seeds as well. Cuttings measuring 30 centimeters in length and 0.5 to 0.8 centimeters in thickness, and possessing a minimum of two nodes are best suited. Before sowing, the seeds are immersed in lukewarm water for 24 hours. Subsequently, they are sown in nursery beds,

Uses-

Pyracantha is incorporated into Ayurvedic medicines and commercially gathered from forest regions for various medicinal formulations, including infusions of dried fruits, liquid extracts, and tinctures. Clinical trials investigating its impact on heart-related conditions have indicated that treatment with hawthorn bioflavonoids led to reductions in cholesterol levels among patients suffering from heart



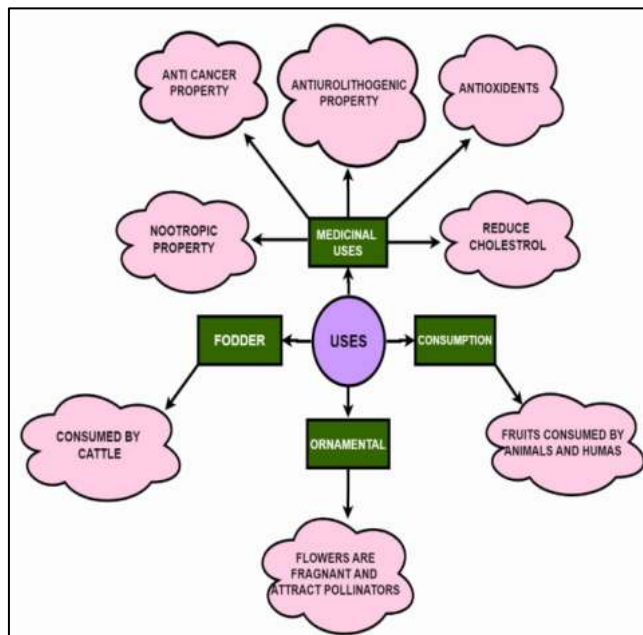
disease (Negi et al.,2009). The leaves can be utilized for herbal tea formulations. Because of its thorny nature *Pyracantha* can be planted as an excellent bio-fence for agricultural fields to protect the fields from stray and wild animals. A mixture of *Pyracantha* and Ginkgo (*Ginkgo biloba*) leaf was found to enhance brain cell activity and memory and work as a nootropic agent.

Conclusion-

Pyracantha crenulata, also known as the Himalayan firethorn, presents a valuable botanical asset with diverse advantages alongside notable challenges. Its attractiveness in landscaping, medicinal value, and ecological significance highlights its importance across various domains. Serving as an ornamental feature, it elevates visual appeal while supporting local wildlife through habitat provision and food sources. Moreover, its medicinal properties, including antioxidant and anti-inflammatory characteristics, suggest potential applications in pharmaceuticals. However, this species confronts significant threats such as habitat degradation, climate change pressures, and competition from invasive species. To ensure its preservation and maximize its benefits for ecosystems and human health, concerted conservation measures are imperative.

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CRITICAL ANALYSIS OF “ENERGY INDEPENDENCE OF INDIA” INTERNATIONAL & ECONOMIC IMPLICATIONS: METICULOUS PLANNING FOR COAL BLOCK DIVERSION

By - Ravindra Nath Saxena

India is one of the 12 mega biodiversity rich country, harbouring a wide variety of flora and fauna. The country is home to 5198 species of vascular plants and about 6802 species of wildlife; but the country has witnessed extinction of 21 species and have large list of fauna and flora in “red data book”, which signify species vulnerable to extinction. The forest area of the country is 7,57,740 sq.kms., which is 23.41% of the geographical area. The country is having 3,99,919 sq.kms of “reserve forests” (not burdened with privileges) and 2,38,434 sq.kms. of “protected forest” (communities are having traditional privileges for Nistar). There are 602 national parks, wildlife sanctuaries, conservation reserves and community reserves covering area of 1,55,678

sq.kms [notified under Sections-18, 35 and 36A; Wildlife (Protection) Act, 1972]. Among these protected areas an intricate web of wildlife corridors are situated along with Important Bird Areas (IBAs), wildlife activity areas, CITES sites, sites covered under international conventions etc. The forest land is having heterogeneous origin and

sometimes covered under blanket notifications. These blanket notifications were the need of hour in 1940s to 1960s; but with the passage of time reforms have not taken place due to lack of vision. In nutshell the situation is extremely complicated. The Hon'ble Supreme Court of India has passed about 1300 judgements in the Civil Writ Petition No. 202/1995, T.N. Godavarman Thirumulkpad versus Union of India. Some of these orders have been reported in law journals, but some have not been reported. The order dated 12th December passed in this PIL define “forests” and “forest land”, thus very important for any coal or mineral block planning.

The important coal and Coal Bed Methane (CBM)

are situated in the states of Madhya Pradesh, Chhattisgarh, Jharkhand, Odisha, West Bengal, Andhra Pradesh, Maharashtra and Meghalaya. These States are having 31 to 45% forest cover. The States are having 37% to 80% tribal population in different districts. There are 584 coal blocks in India. About 23 coal blocks are situated in Teak forests (*Tectona grandis*) and rest 561 are located in Sal forests (*Shorea robusta*). These “coal range” States are having large number of protected areas and also having large populations of Tiger (*Panthera tigris*, Fam. Felidae) and Asiatic Elephants (*Elephas maxima*, order Proboscidea). There are certain “specified” and “un-specified” corridors of these wildlife species, which have got serious ramifications for the

linear infrastructure like haulage roads, railway lines and sidings, power transmission lines, water pipelines, conveyor belts, coal washries, etc. for coal transportations.

I. “Energy Independence of India” : Economic and International Implications :

India is having dire shortage of fuel minerals. Particularly

petroleum crude, compressed natural gas (CNG), liquefied petroleum gas (LPG). India is importing about 85% of the domestic demand of petroleum products, with the import bill of INR Rs. 12,00,000/- Crores per annum. Though India is having vast coal reserves, but India produces about 870 MT coal only. And in financial year 2019-20, imported 274 MT coal with the foreign exchange outgo of about INR Rs. 1,58,000/- Crores.

India signed 1-2-3 Agreement with United States for supply of Uranium and similar protocols were signed with Canada & Australia. But these countries have not supplied Uranium to India and consequently “nuclear power generation” is suffering to a great extent. The well developed



technology for “Thorium based nuclear power generation” is not developed, though India is having ample reserves of Monazite and Ilmenite. Due to these reasons, India is forced to have reliance of coal resources for energy needs.

India mostly import petroleum crude from Saudi Arabia, Iran, Iraq, United Arab Emirates, Kuwait, Katar, Nigeria, United States of America, Venezuela, Britain, Russia, Ukraine, Belarus, etc. But most of this petroleum crude supply pass through middle-east Asia. The Red Sea, Suez Canal, Gulf of Eilath and Strait of Hormuz, there are 4 critical supply passages, where these crude supplies can be blocked with little efforts.

The world is polarising after COVID-19 pandemic into 2 alliances – the Northern Alliance comprising of China, Korea, Pakistan, Iran and Turkey and the Southern Alliance – comprising of USA, Saudi Arabia, Israel, India, Japan and Australia. The Indian Ocean and the “Strait of Malacca” is developing into a big “flash point” in international trade.

With the setting-up of Chinese Naval Bases in Coco Islands, Myanmar; Cox Bazar, Bangladesh; Trincomalee, Sri Lanka and Seychelles in recent times, there is alarm bells ringing for India to secure “energy supply routes” or be ready to face huge energy crisis during war. Though our Northern border is tense due to expansionism of Chinese People's

Liberation Army (PLA), but the real war will take place in the Indian Ocean, threatening our petroleum crude and coal supplies. India gets coal supply from Madagascar, Indonesia and Australia; in case of war our coal supply will be under serious threat from these countries. Our past experiences with Indonesia and Iran is not amicable, these countries are not trustworthy. The other Moreover, India is deficient in “metallurgical coal” and there is hardly any availability of this high grade coal in the international market. Consequently, India is forced to open new “coal or other mineral mines” immediately or face serious “energy crisis” in case of tension or war.

II. Integrated Energy Policy, 2020 & National Steel Policy, 2017 :

The Integrated Energy Policy, 2020 provides that the country is required to produce / import 2600 million tonnes of coal to generate 8,00,000 M.W. of thermal power.

Even in “best case scenario” (BCS), India is required to depend on domestic coal to the tune of 55-58%. The alternative resources of energy can account for 11% only by 2032. Thus the country has to develop coal sector to achieve and maintain GDP growth rate of 8-10% per annum.

The availability of coal in international market is going down heavily, particularly metallurgical coal. No country can sustain GDP growth rate of 8-10%, based on “imported energy”. India has suffered badly in “import of petroleum crude” and the country cannot repeat this disastrous experience in coal resources, now.

The National Steel Policy, 2017 envisage steel production and consumption of 300 MT, by the year 2030. While India's current steel production is only 60 MT. To enhance steel production to 300 MT tonnes, India requires about 274 MT of additional iron-ore. This quantum of iron-ore has to be indigenously produced in Chhattisgarh, Jharkhand and Odisha and may be Karnataka. The country

cannot import every mineral, or the consequences would be disastrous for the economy of India. Moreover, minerals are very heavy and transportation is a huge cost in logistical management.

III. Statutory clearances required for the operation of greenfield and brownfield operations :

After the promulgation of the Constitution of India on 26th January, 1950. The “Forests” were placed in the “State List” (Seventh Schedule, List-II), but in the 27th year of the Republic of India under the recommendations of the National Agriculture Commission a need was felt to upgrade the status of “forests” from the “State List” to “Concurrent List”. Accordingly the Constitution 42nd (Amendment) Act, 1976 was passed and as per Section-57 “Entry-17A. Forests” was inserted in the “Concurrent List” (Seventh Schedule, List-III). The Part-XI of the Constitution of India, Chapter-I, Legislative Relations, Distribution of Legislative Powers defines the relations between the Parliament and State Legislative Assemblies. The Articles-245, 246, 249, 250 and 251 provide very insight about the Centre-State Legislatures relations. The Article-251 and 254 throws light on the inconsistency of the legislation made by the Parliament under Article-249 and 250 and laws made by the Legislatures of States.

Provided that nothing in this clause shall prevent





Parliament from enacting at any time any law with respect to the same matter including a law adding to, amending, varying or repealing the law so made by the Legislature of the State.

The 42nd Constitutional Amendment, 1976 has empowered the Parliament to effectively legislate on forest related issues.

In 1978, the Govt. of India issued directive to all State Governments to check indiscriminate diversion of forest areas for non-forest purposes. The Indian Forest Act, 1927 is silent about diversion, assignment and treatment of forest crop under the statutory authority of the Union of India. It was the need of hour, before enactment of Forest (Conservation) Act, 1980 the rate of diversion was about 1,75,000 to 1,80,000ha. / annum; which has been reduced to about 15,000ha./annum after the enactment of FCA. But the responses of most of the State Governments were lukewarm in this matter and this situation forced the Central Government to proclaim Presidential Ordinance for “Forest Conservation Act” on 25th October, 1980 to regulate diversion of forest land for non-forest purposes.

Under the provisions of the Forest (Conservation) Act, 1980, prior approval of the Central Government is mandatory for diversion of forest lands for non-forest purposes. Since the enactment of the Act, the rate of diversion of forest land has come down to, around 15,000 hectares per annum from 1.75 to 1.80 lakh hectares per annum, before 1980. During 2019, more than 4000 proposals from various State and UT Governments were processed under the FCA.

The Section-2(i) of Forest Conservation Act, 1980 abridges powers of State Governments to denotify forest areas. When we read provisions of FCA and IFA together, Forest Settlement Officers (FSO) cannot excise / delete forests areas burdened with rights from forest blocks without obtaining prior approval of the Central Government. Even lands of proposed forest blocks, notified under Section-4 of Indian Forest Act, 1927 cannot be denotified by the State Government, without prior approval of the Government of India.

The following “statutory clearances” are required for the

operation of Greenfield / brownfield mines in India:

- A. “Forest Clearance” under Section-2(ii) of Forest (Conservation) Act, 1980. The “forest clearance” is accorded by the GoI, Ministry of Environment, Forests & Climate Change (MOEF&CC) after the case has been assessed by the State Advisory Group (SAG) under 40 hectares and above 40 hectares by the Forest Appraisal Committee (FAC).
- B. “Environment Clearance” under Environment Impact Assessment Notification, 2006 (the said Notification is under revision), under the Environment (Protection) Act, 1986. Since Environment Impact Assessment Notification, 2006 is under revision, hence it is beyond the scope of this article. Still, most of the baseline data required for environment clearance rely heavily on the status of forests, wildlife, biodiversity and impact on human population.
- C. “Wildlife Clearance” under the Section-38O(g) of Wildlife (Protection) Act, 1972 – since most of the coal / mineral blocks affect wildlife and linear infrastructure cause interferences in “wildlife corridors. The “wildlife clearance” is accorded by the Standing Committee, National Wildlife Board, MOEF&CC, GOI. For this purpose, the proposal can be submitted to Divisional Forest Officer / Field Director / Chief Conservator of Forests; after due scrutiny it will be forwarded to the Chief Wildlife Warden of the State and placed before the State Wildlife Board for approval. Then the proposal shall be placed before the Standing Committee, National Wildlife Board, MOEF&CC, GOI for final approval. That all projects (including coal and other mineral mines) adversely affect wildlife of the landscape. The project proponent is required to commission a study on the “Wildlife Impact Assessment” (WIA). And based on WIA, a “Wildlife Habitat Management Plan” (WHMP) is prepared to reduce the adverse impact of the mining project. Accordingly mitigation prescriptions are evolved to reduce the adverse impact. If hydro-structures are being constructed for water supply or ash dykes of Thermal Power Plants (TPP), a detailed study is required of water resources.



The habitat of National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves are under “prohibitory regimes” of Section-20 and 29 of Wildlife (Protection) Act, 1972; hence mining is not allowed. The “buffer zones” have been notified as “Eco-Sensitive Zones” (ESZs) under the Environment (Protection) Act, 1986 and accordingly mining is ordinarily not permitted, however certain infrastructure may be permitted, looking to no adverse impact to habitat or wildlife.

The Ministry of Coal, GOI can acquire any area under the provisions of Coal Bearing Areas (Acquisition & Development) Act, 1957 or Coal Mines (Special Provisions) Act, 2015 and the Mineral Laws (Amendment) Act, 2020 (an Act further to amend the Mines and Minerals (Development and Regulation) Act, 1957 and to amend the Coal Mines (Special Provisions) Act, 2015) assign said land to the project proponent. But for the operation of the mines, all above mentioned statutory clearances are mandatory.

IV. The Perspective Planning for Coal Sector :

To achieve the target production of 2600 million tonnes by 2032 (based on Integrated Energy Policy, 2020), the country is required to open about 300sq.kms of Sal (*Shorea robusta*, family Dipterocarpaceae) forests, may be the country have to realign some of the “wildlife corridors” to develop coal and iron-ore infra-structure; with meticulous “Mitigation Planning” to reduce adverse “ecological damages” and to protect our amazing wildlife and biodiversity. To achieve these ambitious targets, the country is required to get prepared the two perspective plans to have perspective, visionary planning and guidelines for Forest Appraisal Committee (FAC) and Expert Appraisal Committee (EAC), Standing Committee of the National Wildlife Board, National Tiger Conservation Authority (NTCA), GoI and the Judiciary as well. The GOI is planning to invest INR Rs. 50,000/- Crores for development of coal and mineral infrastructure. Without these perspective coal development plans, the development of this gigantic infrastructure is not possible.

A. “Perspective Coal Development Plan, 2025” :

The plan may include issues of inviolate forest and wildlife areas (may include other minerals also like iron-ore, Bauxite, Copper, CBM etc.) with vision for “Mitigation Planning”. The Plan may address the issues / requirement for inviolate areas, to be developed for “coal mining” by 2030, if need arise. Develop “cluster coal mines”. Simultaneous identification of linkages / infrastructure – transmission lines for development / operation, forest land required for placing overburden dumps (OBD), conveyor belt, safety zone, ash dykes, landscape plan, buffer zones, coal handling plants (CHP), road and infrastructure for transport, construction of hydro-structure for water supply, water supply pipelines, coal beneficiation plants, etc.

For this exercise, the Government is required to get prepared composite maps of forests, geological formations, wildlife protected area and corridors and surface water available in these catchments. This exercise can determine quantum of

coal available in “inviolate forest areas”. The coal potential of “inviolate forest areas” may be determined and suitable mitigation may be planned in advance. The adverse impact of Climate Change and scanty / no regeneration in Sal crop should be analysed and the age of “Senescence” may be determined assessing crop conditions.

The wildlife habitat will be subjected to “Wildlife Impact Assessment” and “Wildlife Habitat Management Plan”, “Wildlife Rehabilitation & Resettlement Plan” (in case of the destruction of the habitat)s shall be prepared to reduce the adverse impact on wildlife. The wildlife corridors may be mapped by radio-collaring of adequate Asiatic Elephants and Tigers and the ramification may be assessed for transportation corridors and transmission lines. The wildlife corridors and transportation corridors shall be subjected to “camera traps” and CCTV monitoring to assess the traffic and impact of development of mining in these areas.

The tools shall be developed for “ecological risk analysis”, “landscape planning” etc.

Capacity building for “tree transplantation” techniques and identification of suitable plant machineries. Biodiversity Indexing of “high crown density” forest areas. The “population pyramid studies of wildlife population” shall be carried-out in coal range States to determine the status of wildlife population and adequacy of the available habitat areas.

The coal mining and thermal power sectors are drawing huge surface water from natural ecosystems. It has been observed that this is causing stress between the industries and local communities. Additional hydro-structures are required to store water and such areas also require soil moisture conservation (SMC) in catchment areas, since rainfall is dwindling and has become uncertain. Satellite imageries may be obtained / drone technology may be used to determine the status of “coal mined-out areas” and reclamation of mined-out areas.

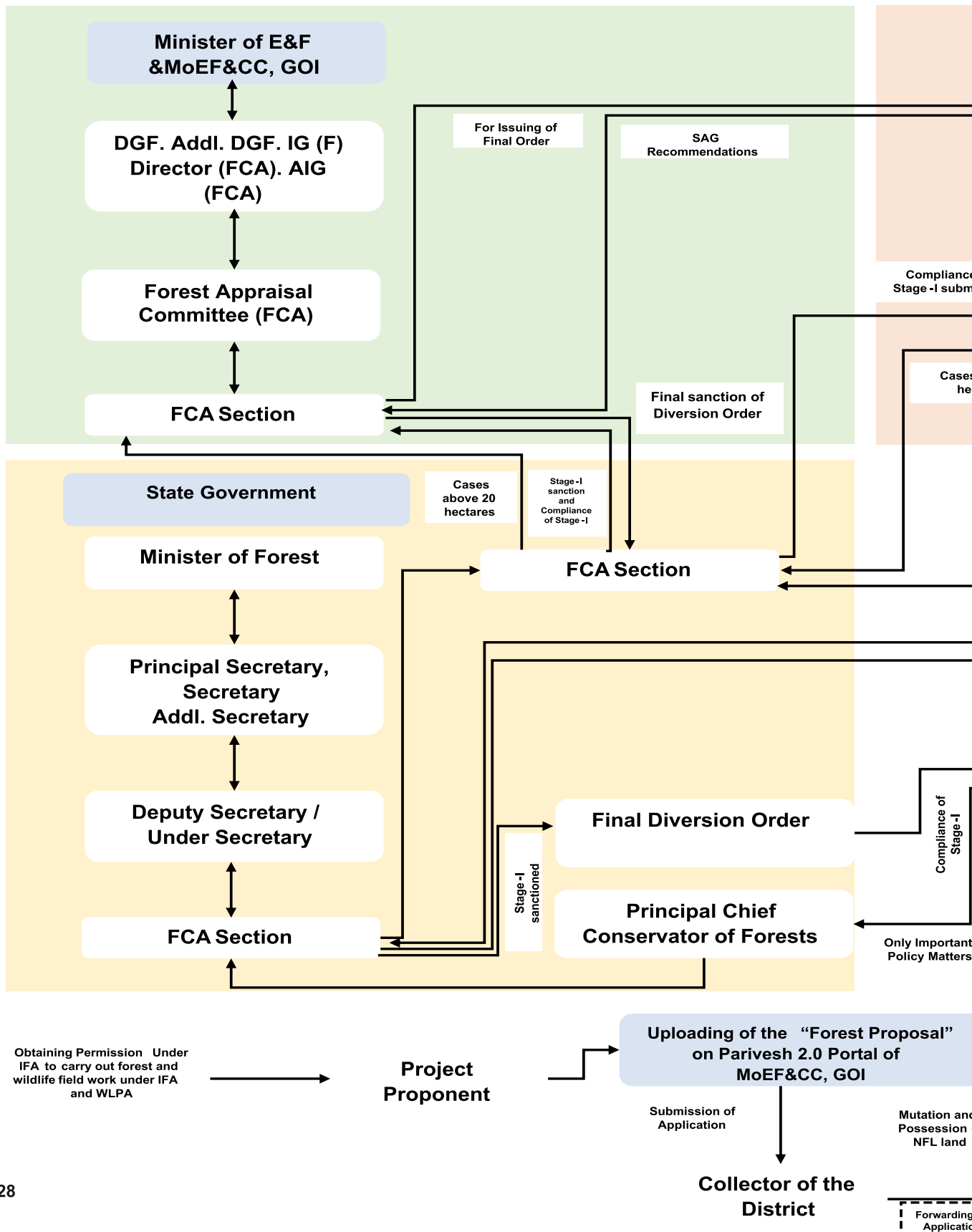
B. “Perspective Coal Development Plan, 2032”:

The plan may include issues of “inviolate forest and wildlife areas” and Buffer Zones of Tiger Reserve / National Parks / Wildlife Sanctuaries. The plan may include other minerals also like iron ore, Bauxite, Copper, CBM etc. with potential target requirement of India; found in these 7 State of Central India. The visionary planning for “Mitigation Measures” shall be further refined to reduce “ecological foot prints”.

The Plan may address the issues / requirement for inviolate areas, to be developed for “coal mining” by 2030, if need arise. Developing “cluster coal mines”. Simultaneous identification of linkages / infrastructure – transmission lines for development / operation, forest land required for placing overburden dumps (OBD), conveyor belt, safety zone, ash dykes, landscape plan, buffer zones, coal handling plants (CHP), road and infrastructure for transport, construction of hydro-structure for water supply, water supply pipelines, coal beneficiation plants, etc.

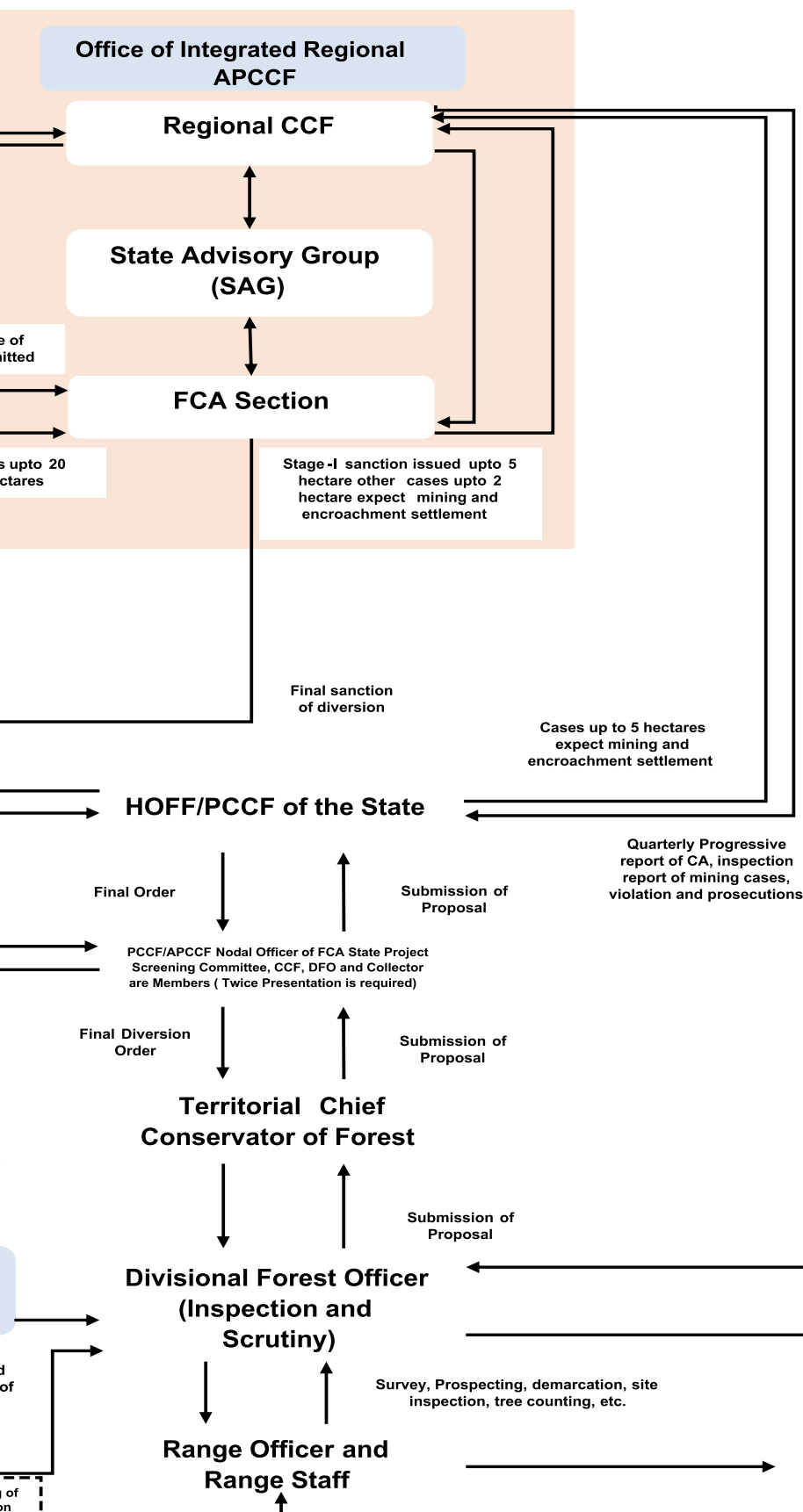
The coal potential of “inviolate forest areas” may be determined and suitable mitigation measures may be planned

FLOW CHART FOR THE PROCESSING OF Section -2(ii) and



CASES OF FOREST CLEARANCE UNDER

Section 2 -(iii)



- KIND ATTENTION INVITED :**
- THERE ARE 35 LAYERS OF ASSESSMENT – A VERY TEDIOUS & COMPLICATED ISSUE.
 - LARGE NUMBER OF MITIGATION PLANNING IS REQUIRED.
 - TWO STAGE CLEARANCE – THE CASE WILL GO TO THE GOI, MOEF&CC TWICE. (Rule -9 of F.C.R)
 - AFTER STAGE-I FOREST CLEARANCE – TRANSFER OF NON-FOREST LAND IS A BIG PROBLEM, NOTIFICATION OF THIS LAND AS PROTECTED FORESTS AND RESERVE FORESTS.
 - Payment of CAS, NPV, Wildlife Conservation Plan, Landscape Management Plan payable to CAMPA.
 - AFTER STAGE-II FOREST CLEARANCE, THE STATE GOVERNMENT SHALL ISSUE “FINAL DIVERSION ORDER”.

in advance. The adverse impact of Climate Change and no regeneration in Sal crop should be analysed and the age of “Senescence” may be determined looking to crop conditions.

If required, measures will be suggested for shifting of “wildlife corridors” to facilitate development and transportation of coal in Central India.

Capacity building for “tree transplantation” techniques and identification of suitable plant machineries.

V. Meticulous Planning for obtaining “forest clearance” under Forest (Conservation) Act, 1980 and “wildlife clearance” under Wildlife (Protection) Act, 1972 :

The pre-operational planning for obtaining “forest clearance” under Forest (Conservation) Act, 1980 and “wildlife clearance” under Wildlife (Protection) Act, 1972 require very careful planning. The baseline data collected about forest and wildlife shall be useful obtaining “environment clearance” under the Environment (Protection) Act, 1986. The “forest proposal” is scrutinised at about 35 levels in the State Government and the MOEF&CC, GOI; hence utmost care is required. The forest proposal is submitted to the MORF&CC, GOI twice – first for obtaining Stage-I sanction and then after compliance of stipulated conditions, for getting Stage-II or final sanction.

That the amount for compensatory afforestation (CA), safety zone management plan, net present value (NPV), Wildlife Habitat Management Plan (WHMP) shall be deposited in Compensatory Afforestation & Management Planning Authority (CAMPA). The CAMPA authority had been constituted under the order dated 30th March, 2003. And subsequently CAMPA was brought under the Compensatory Afforestation & Management Planning Authority Act, 2017 and Compensatory Afforestation Rules, 2018 for operation.

The following action is required for obtaining “forest clearance” under Forest (Conservation) Act, 1980 and “wildlife clearance” under Wildlife (Protection) Act, 1972 :

- 1. Forest area and non-forest area involved :** The “forest proposal” require explicit details of diversion area including - Reserve Forests (RF), Protected Forests (PF), unclassified forests, revenue forests, dictionary meaning of forests and DLC (forests according to the District Level Committee) and non-forest area alongwith private holdings. Enclose Cadastral Map of the diversion area, forest stock map and Patwari Revenue Map.
- 2. Compensatory Afforestation land & Plan :** The Forest (Conservation) Act, 1980 provides that the project proponent is required to provide equal area of “diversion area” for compensatory afforestation (CA). But a concession has been provided to the agencies of Central Government to carry-out CA on double degraded forest lands. However the MOEF&CC, GOI may accept the parameter of “double degraded forest lands”; if the certificate of Chief Secretary of the State is submitted, in case of non-availability of non-forest land. The CA scheme should be submitted with the maintenance of 7 years. The suitability of CA land should be certified by the Divisional Forest Officer (DFO). If possibility the non-forest land for CA should be situated in close

proximity to forest blocks and should be not less than 20 hectare in are.

- 3. Mine linkages with the infrastructure :** It is advisable to obtain diversion under one proposal only – the “forest proposal” may be submitted with coal / mineral block, transmission line for operation, roads, railway linkage, coal washry, conveyor belts, water supply pipelines, canals, Meri-go-Round, hydro-structures for water storage etc.
- 4. Maps required for the forest proposal :** The following maps should be submitted with the “forest proposal” : Administrative map exhibiting location in the State and district, exhibiting location of project on forest cover map, also show the location of other mines in the vicinity, sites of non-forest lands identified for CA, map showing national parks, wildlife sanctuaries, conservation reserves, community reserves, Important Bird Areas and Biosphere Reserves etc; Buffer Zones (enclose notifications), wildlife corridors; Patwari map of non-forest areas, forest stock map, Forest Management Map, Cadastral Map of entire diversion area etc.
- 5. Tree Enumeration :** The “tree enumeration” is carried-out to ascertain the ecological impact of the forest diversion. If the area is upto 10 hectare 100% actual tree enumeration is required. But if forest area is more than 10 hectares, then data of 5% stratified sampling is acceptable. The sample plots should be selected at the spacing of 1”X1”, with area of 1.00 hectare (100 meters X 100 meters) and geo-coordinates, the sample plots should be demarcated with RCC pillars for identification. After tree counting, inventory should be formed, record site quality of the sample plots and crown density. The Biodiversity Indexing should be performed in these sample plots during Monsoon season for determination of Biodiversity Indexes. Carry-out photography and videography from the centre of sample plots to assess the forest crop. The data of “forest inventory” shall be used for calculation of growing stock, basal area, etc.
- 6. Crown Density :** The “forest crown density” can be obtained from the forest stock maps. Alternatively a new software “Gap Light Analyser” is available to determine the crown density. The satellite imageries of LANDSAT-III are having serious limitations in determination of crown density.
- 7. Photographs and video graph of the diversion area and sample plots :** The photographs and videographs of the sample plots and other important formations should be enclosed for analysis at various levels.
- 8. Biodiversity Indexing :** The species and their ratios in the sample plots should be determined at the time of tree enumeration. The Biodiversity Indexing should be carried-out in Monsoon or just after this season. The baseline data may be used in calculation of Shanon Weiner Index, Margalef Index, Simpsons Species Richness Index etc.
- 9. Crop assessment :** The “forest crop” of the diversion area should be assessed in different “Silviculture parameters” including growing stock, status of regeneration, crop composition, proportion of xerophytic / mesophytic

species, presence / absence of RET species, signs of senescence observed, any susceptibility to diseases seen, mortality, high forest or coppice crop etc. A sample photo and signs of senescence is enclosed. Prepare a check list of all the species found in the diversion area.

10. Growing Stock determination : Based on the data collected in tree enumeration and sample survey, the growing stock can be determined and presented in the “forest proposal”.

11. Forest Crop and Climate Change : The Climate Change (CC) is having very deep impact on forest crop, particularly Sal. Two maps depicting impact of Climate Change (CC) are enclosed. Another map depicting reduction in Net Primary Productivity is enclosed to show the degradation setting in the forest crop.

12. RET Species found in the diversion area : The proposed diversion area may be habitat of any Rare, Endangered or Threatened species found in the “Red Data Book” of International Union for Conservation of Nature, Zoological Survey of India or Botanical Survey of India.

13. Forest Crop Assessment under Forest Working Plans : The forest crop should be assessed in the context of forest Working Plan prescriptions. To which working circle the diversion area compartments are allotted, regeneration status, observations of the Forest Working Plan Officer, the details of compartment history etc.

14. Net Present Value (NPV) : Net Present Value is described in simple terms as “forest productivity likely to achieve in next 50 years. The value is calculated according to Faustmann's Formula. Based on Site Quality and Crown Density, the GOI, MOEF&CC has decided the NPV for different type of forests in 2009. The NPV rates are due for renewal at anytime. That if the diversion area is located in wildlife sanctuary, then 5 times NPV is payable, if the area is part of the national park, 10 times NPV is payable.

15. GO & NO-GO Areas : The GOI, MOEF&CC constituted a committee to determine the areas which cannot be diverted or which can be considered for diversion. The mechanism is based on certain parameters, but the details are not known in public domain. Based on the report of this committee, the Forest Survey of India has developed “Design Support System” (DSS) with 6 layers of the forest satellite imageries. The accuracy of DSS depends upon the “confidence level” of the baseline data of satellite imageries. The States or GOI, MOEF&CC have not allotted these compartment to GO-NOGO areas, and not issued any notification for this purpose. Hence this system has got very little “reliability value”.

16. Cost : Benefit Analysis : The Cost : Benefit Analysis is an important tool for the Forest Appraisal Committee for assessment of the diversion case. If the project is not likely to generate adequate profits, even after deforestation, it is not likely to be accepted.

17. Report of Geological Reserves: The applicant is required to legally procure the “Report of Geological Reserve” and submit with the “forest proposal”.

18. Opencast versus underground Mining : Normally opencast mining is discouraged in forest areas, because it involves large scale deforestations, but underground mine can be acceptable due to lesser “ecological foot prints”. The NPV is payable in the case of underground mines also. Depending on the texture of soil strata, considerable drying of forest crop has been noticed in certain underground mines.

19. Land Subsidence in Underground Mines : A certificate from competent authority is required that the area is not susceptible to land subsidence due to underground mining. If land subsidence takes place, then NPV for opencast mine is payable.

20. Wildlife Assessment : The project proponent is required to commission a study to determine the status of wildlife in diversion area and buffer zone. Also the effect on “wildlife corridors” should be studied. Prepare checklist and determine the population size of various species. Provide details of RET species.

21. Location in Wildlife Corridors : Though there are no notifications for the “wildlife corridors”, but it should be studied on the basis of areas frequented by wildlife species with special reference to Asiatic Elephants and Tigers. If snapping / fragmentation of corridors are anticipated, then suitable meticulous planning should be performed.

22. Wildlife Impact Assessment (WIA) and “Wildlife Habitat Management Plan” : The impact of the project, should be assessed on wildlife in diversion area and buffer zone. Even nocturnal, migratory wildlife species should be studied.

23. Comments of the Chief Wildlife Warden : The comments of CWLW should be obtained on Wildlife Corridors, Wildlife Impact Assessment (WIA) and “Wildlife Habitat Management Plan” of the project. These comments are very vital for the proceedings in State Advisory Group / Forest Appraisal Committee and National Wildlife Board.

24. Objections of certain States related to Elephant Reserves : Certain States are opposing diversion of coal blocks on the ground of “Elephant Reserves”. The Asiatic Elephant population got disturbed in 1986 with the construction of Betla dam in Bihar. After that Elephants are moving South and Eastwards and exploring new habitats for the settlement. The concerned States have not notified any national park, wildlife sanctuary, community reserve or conservation reserve under the Section-18, 35 and 38 of the Wildlife (Protection) Act, 1972. The Section-18 provides that the proposed area should be mapped with ecological, zoological and geomorphological parameters to assess the suitability of the habitat for protected area. No such report or notification is available. The movement of Asiatic Elephants cannot be studied without “radio collaring” of certain male and female Elephants. In the absence of these data / documents, the bonafides of such intentions are doubtful.

25. Human Population being affected : Submit Rehabilitation & Resettlement Plan duly approved by the

competent authority under National Rehabilitation & Resettlement Policy, 2007. The GOI, MOEF&CC doesn't provide forest land for resettlement of ousted population. This facility is available for oustees of protected areas only.

- 26. Distance from National Parks, Wildlife Sanctuaries, Conservation Reserve, Community Reserve, Biosphere Reserve, Important Bird Areas (IBAs) :** A map should be prepared on forest cover map of the district or State to display National Parks, Wildlife Sanctuaries, Conservation Reserve, Community Reserve, Biosphere Reserve, Important Bird Areas (IBAs). The distance from these protected areas is a crucial parameter for sanction.
- 27. Eco-restoration Ratio :** The afforestation activities and Wildlife Habitat Management Plan, CA, Safety Zone Management Plan, Greenbelt Plan etc. considerable reduce the foot print of "diversion project". It should be calculated and presented in the "forest proposal".
- 28. Mining Plan sanctioned by the Ministry of Coal, GOI :** Enclose a copy of Mining Plan and sanction of the competent authority. The MOEF&CC doesn't accept proposal in the absence of Mining Plan.
- 29. Reclamation & Mine Closure Plan :** The Reclamation Plan and Mine Closure Plan should be prepared and submitted with the "forest proposal". The proponent should ensure that the diversion area is simultaneously reclaimed along with the progress of mining.
- 30. Safety Zone Management Plan :** The "Safety Zone Management Plan" should be prepared and submitted. The ecologically vulnerable areas should be adequately strengthened to avoid leakage of mine spills.
- 31. Landscape Management Plan :** Prepare "Landscape Management Plan" for the Buffer Zone of the project and submit with the "forest proposal".
- 32. Certificates :** All the undertakings, certificates, undertakings etc. should be prepared, signed by the authorised signatory and submitted with the "forest proposal".
- 33. Limitations of Satellite Imageries :** The satellite imageries of FSI, NRSA obtained with LANDSAT-III scanner is having serious limitations, when analysing "False Colour Composite" (FCC), LIDAR, determination of species composition etc. when operating at a small area. Moreover the angle of the scanner camera is very important factor when determining "forest crown density".
- 34. Presentations before the Chief Wildlife Warden, Principal Chief Conservator of Forests, State Wildlife Board :** The project proponent should ensure to have a proper presentation before these authorities to submit his arguments before the authorities. The presenter should be prepared to answer the queries of the authorities.
- 35. Presentations before the National Tiger Conservation Authority (NTCA, if required), Forest Appraisal Committee (FAC), Standing Committee of National Wildlife Board :** The project proponent should ensure to have a proper presentation before these authorities to submit his arguments before the authorities. The

presenter should be prepared to answer the queries of the authorities.

- 36. Obtaining "wildlife clearance" :** Most of the projects will require "wildlife clearance" under the Section-38O(g) of Wildlife (protection) Act, 1972.
- 37. Obtaining Stage-I clearance :** The "forest proposal" is considered and recommended by the Forest Appraisal Committee (FAC), MOEF&CC, GOI. After getting "administrative approval" of the Hon'ble Minister, MOEF&CC, the Stage-I forest clearance is issued. Mostly Stage-I sanction is not revoked and valid for 5 years, after that renewal is required.
- 38. Compliance of the conditions stipulated in the Stage-I :** The compliance of stipulated conditions by the project proponent, which includes transfer of non-forest land for compensatory afforestation, depositing amount for CA, Wildlife Habitat Management Plan, Safety Zone Management Plan, Landscape Management Plan etc. to CAMPA Authority. The compliance report is submitted to the State Government and forwarded to the MOEF&CC for acceptance.
- 39. Submission of the compliance report to the MOEF&CC, GOI and obtaining Stage-II sanction:** That on the basis of compliance report of Stage-I, the MOEF&CC issue Stage-II forest clearance.
- 40. Diversion order of the State Government :** The copy of Stage-II forest clearance is submitted to the State Government. And the State Government issue, the "forest diversion order".
- 41. Forest harvesting and handing-over of the area :** That after issue of "forest diversion order", the forest crop is harvested in the diversion area. Project proponent is not having ownership on the felled forest crop and required to pay "harvesting expenditure" as assessed by the DFO and sanctioned by the Conservator of Forests.
- 42. Correlation between statutory clearances and financial closure :** That normally Stage-I forest clearance is required for consideration of the proposal of "environment clearance". After these two statutory clearances are obtained, the financial institutions may consider "financial closure" of the project.

The author believes that this article shall prove a mile stone in understanding the energy needs of the country. The project proponents shall be able to understand the various mechanism of obtaining "forest clearance" under Forest (Conservation) Act, 1980 and "wildlife clearance" under Wildlife (Protection) Act, 1972.



Author is : Ravindra Nath Saxena, Former Principal Chief Conservator of Forests, Madhya Pradesh

EMPOWERING LOCAL COMMUNITIES THROUGH MINOR FOREST PRODUCE IN MADHYA PRADESH: A PATH TO SUSTAINABLE LIVELIHOODS AND CONSERVATION

Acharya Balkrishna, Swami Narsingh C. Dev, Bhasker Joshi, Anupam Srivastava, Rajesh Kumar Mishra

Madhya Pradesh, often referred to as the "heart of India," boasts an extensive forest cover that accounts for over 25% of its geographical area. The state houses a significant portion of India's biodiversity and is particularly known for its Minor Forest Products (MFPs), which include a variety of medicinal plants used traditionally and commercially. MFPs refer to forest-derived resources other than timber, such as fruits, seeds, bark, leaves, roots, gums, resins, and flowers. Many of these products have been integral part of traditional medicine systems, including Ayurveda, Siddha, and Unani. Minor Forest Produce (MFP) plays a pivotal role in the socio-economic upliftment of these communities by providing livelihood opportunities, fostering sustainable development, and preserving traditional knowledge systems. This article explores some of the significant medicinal plants found in Madhya Pradesh and their role in the state's forest economy. Moreover, while popular species like Amla, Tendu, Mahua and Neem have dominated the market, lesser-known species such as Kalmegh, Gokhru, Safed Musli, and Shatavarican also be explored for similar purposes.

MINOR FOREST PRODUCE: A VITAL RESOURCE

Minor Forest Produce includes non-timber forest products (NTFP) such as fruits, seeds, leaves, roots, bark, flowers, and honey, as well as medicinal plants. In Madhya Pradesh, MFP forms a crucial component of the forest economy, particularly for the tribal population, which constitutes over 20% of the state's population. Key MFPs collected in the region include mahua flowers (*Madhuca longifolia*), tendu leaves (*Diospyros melanoxylon*), sal seeds (*Shorea robusta*), and lac (produced by lac insects). Madhya Pradesh's state policies, under the aegis of the Madhya Pradesh State Minor Forest Produce Federation (MPSMFPPF), have focused on empowering local communities by providing them with fair prices, facilitating market access, and promoting value addition to MFPs. The Minimum Support Price (MSP) scheme ensures economic stability for forest dwellers, reducing their dependence on exploitative middlemen.

EMPOWERING LOCAL COMMUNITIES

The collection and processing of Minor Forest Produce (MFP) in Madhya Pradesh provide livelihood for thousands, with training in sustainable techniques maximizing yields. Value addition, like tamarind pulp and honey packaging, boosts income and creates jobs, especially for women and tribal peoples. Additionally, preserving and integrating traditional knowledge on medicinal plants ensures sustainable resource use while blending traditional practices with modern science.

ROLE OF MEDICINAL PLANTS IN LIVELIHOOD GENERATION

Apart from widely known MFPs, Madhya Pradesh's forests are rich in medicinal plants that have significant therapeutic value and economic potential. Some of the less-publicized medicinal plants in the region include:

1. *Phyllanthus emblica* L. (Amla)

- **Parts used:** fruits, leaves, stem, and roots
- **Medicinal Uses:** used in Herbal medicine for its antioxidant and immune-boosting properties
- **Economic importance:** processed foods (juices, murabba, pickles, candies, jams), nutraceuticals (powder, capsules, Triphala, Chyawanprash), cosmetics (hair oils, skincare products), agro-industrial applications (seed oil, dyes, tannins)
- **Potential:** frequent uses in herbal medicine as in formulations such as Triphala and Chyawanprash, may promote rural entrepreneurship and expanding domestic and export market. Commercial value of Amla in both domestic and international markets.

2. *Azadirachta indica* A. Juss. (Neem)

- **Parts used:** leaves, bark, and seeds
- **Medicinal Uses:** Neem has numerous medicinal and pesticidal properties and is widely used in traditional medicine.
- **Economic importance:** used for making various products such as neem oil, neem soap, and biopesticides.
- **Potential:** various products of this plant are in demand, both in the health and agriculture sector

3. *Diospyros melanoxylon* Roxb. (Tendu)

- **Parts used:** leaves
- **Medicinal Uses:** used to make medicines
- **Economic importance:** Leaves are traditionally used for rolling tobacco known as beedi (local cigarettes)
- **Potential:** Valorization of leaves for eco-friendly packaging and fruits for health food products.

4. *Tinospora cordifolia* (Willd.) Hook.f. & Thomson (Guduchi)

- **Parts used:** Stem
- **Medicinal Uses:** known for its immune-boosting properties used in traditional medicine to treat various ailments.
- **Economic importance:** used in making health tonic and supplement.
- **Potential:** increasingly being recognized for its commercial potential.

5. *Andrographis paniculata* (Burm.f.) Wall. ex Nees (Kalmegh)

- **Parts used:** aerial parts, roots and whole plant
- **Medicinal Uses:** used in the production of herbal medicines, teas, and supplements.
- **Economic importance:** used by the industries for herbal health product market
- **Potential:** it is potential in making herbal medicines.

6. *Withania somnifera* (L.) Dunal (Ashwagandha)

- **Parts used:** leaves, flowers, bark, stem and specially the roots
- **Medicinal Uses:** used in Herbal medicines and supplements.
- **Economic importance:** used by the industries for herbal health product in the form of food supplements and immunity booster products
- **Potential:** It has significant commercial potential due to its stress-reducing and health benefits.

7. *Aegle marmelos* (L.) Corrêa (Bael)

- **Parts used:** fruits and bark
- **Medicinal Uses:** used in treatment of asthma, diarrhea, and other conditions
- **Economic importance:** used in the preparation of summer drinks also used in the preparation of salads in houses.
- **Potential:** can be used in herbal medicine to treat swelling, and to overcome sunstrokes.

8. *Annona squamosa* L. (Sitaphal)

- **Parts used:** fruits and seeds
- **Medicinal Uses:** used to treat cardiac disease, controls blood pressure and helps to fight skin and hair related problems.
- **Economic importance:** used in preparing custard apple

ice cream, sitafal shake, cosmetic products and as an organic pesticide

- **Potential:** high nutraceutical potential for medical food.

9. *Mucuna pruriens* (L.) DC. (Kenwachh)

- **Parts used:** whole plant
- **Medicinal Uses:** Parkinson's disease, seeds in male infertility, nervous disorders, dysentery, diarrhea, snakebite, cancer, diabetes, dysmenorrhea, delirium, gout, sterility, gonorrhea, muscular pain, rheumatic disorder, impotence, tuberculosis, cough, blood purifier, diuretic, uterine stimulant.
- **Economic importance:** The high demand for L-DOPA in pharmaceuticals ensures a lucrative market for seed collectors.
- **Potential:** Used in preparation of various herbal drugs in Ayurveda, Unani, and Siddha systems of medicine, to treat various ailments.

10. *Gymnema sylvestre* (Retz.) R.Br. ex Sm. (Gudmar)

- **Parts used:** leaves
- **Medicinal Uses:** the dried leaves and extracts have been used to treat eye diseases, allergies, constipation, cough, dental caries, obesity, stomach ailments, and viral infections
- **Economic importance:** used as lozenges, mouthwash, or tea diminishes the sugar level. Also used by modern and herbal drug industries.
- **Potential:** powder used as a destroyer of glycosuria, and is believed to neutralize the excess sugar present in the body.

11. *Chlorophytum borivilianum* Santapau & R.R. Fern. (Safed Musli)

- Parts used:** tuberous roots
- Medicinal Uses:** being promoted as an aphrodisiac, adaptogenic, and immunomodulatory herb, since over the centuries in traditional medicine.
- Economic importance:** Its tuberous roots have high market demand, offering significant economic potential for pharmaceutical industries and export markets.
- Potential:** cultivation of Safed Musli provides a lucrative income source for farmers, promoting sustainable agriculture and rural development.

12. *Gloriosa superba* L. (Karihari, Visalya)

- **Parts used:** root, tuber and leaves while, the major constituents were rhizomes and seeds
- **Medicinal Uses:** used as a tonic, anti-periodic, anti-helminthic and also against gout, snake bites, and scorpion stings.
- **Economic importance:** is of high economic value in the pharmaceutical industry for colchicine extraction
- **Potential:** it serves as a source of income for rural and

tribal collectors.

13. *Abrus precatorius* L. (Gungchi)

Parts used: seeds

Medicinal Uses: used for the treatment of various ailments

such as, bronchitis, jaundice, hepatitis, contraception, tumor, abortion, malaria, skin disease, etc.

Economical: Moreover, cultivated as an ornamental plant and is used to make jewelry (rosaries) and toys for children.

Potential: seeds contain a toxic protein known as abrin



Phyllanthus emblica



Azadirachta indica



Diospyros melanoxylon



Tinospora cordifolia



Andrographis paniculata



Withania somnifera



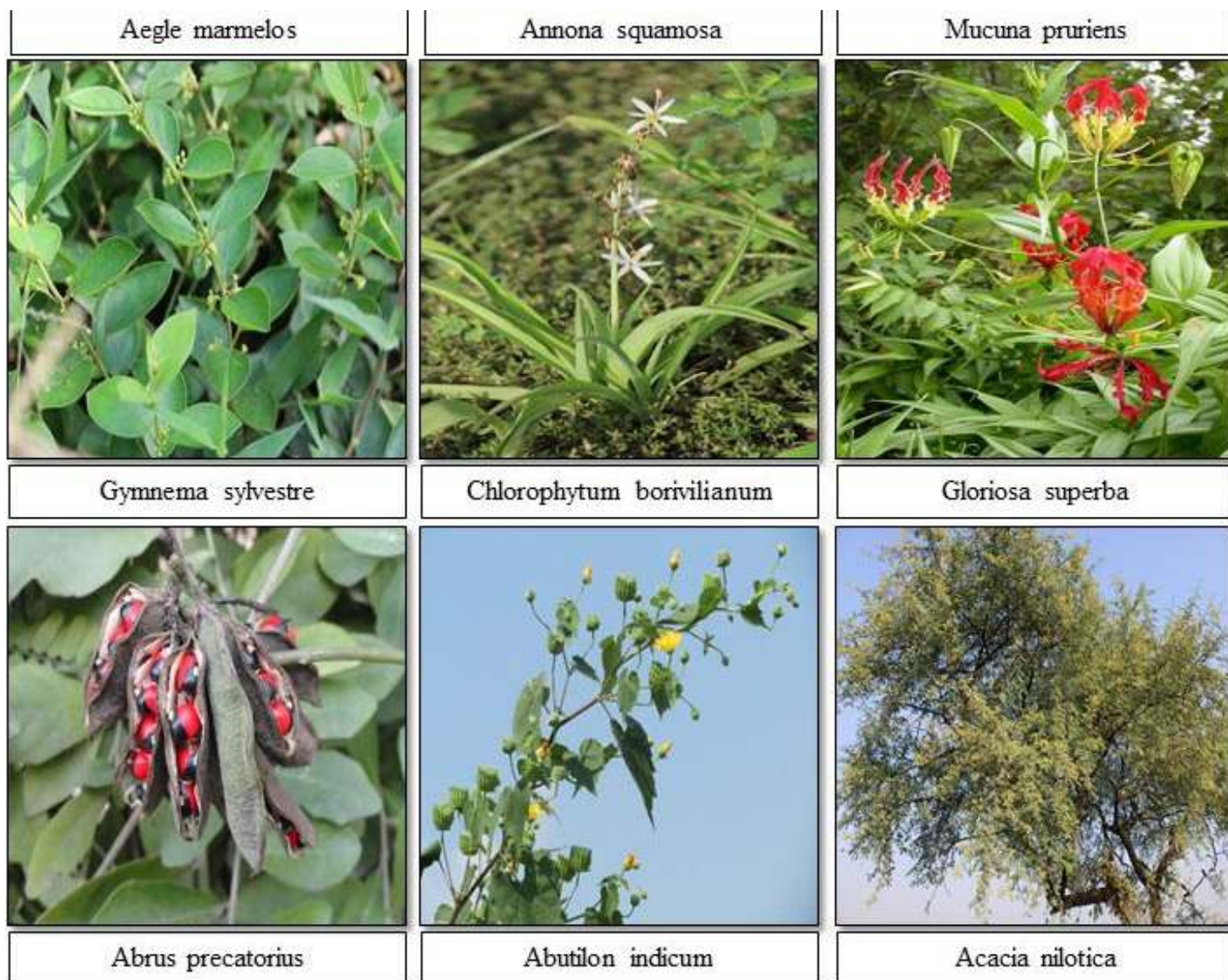
Aegle marmelos



Annona squamosa



Mucuna pruriens



herbal formulations.

14. *Abutilon indicum* (L.) Sweet (Kanghi)

- **Parts used:** whole plant
- **Medicinal Uses:** used in facial paralysis and joint disorders, used in toothache and tender gums. Demulcents of leaves are locally applied to boils and ulcers. Also indicated as a uterine tonic as well as an aphrodisiac mentioned in Ayurveda.
- **Economical:** used by pharmaceutical companies to make medicines and found utility in agriculture as well, serving as a green manure and aiding in soil improvement.
- **Potential:** as a source of natural fibers for textiles

15. *Vachellianilotica subsp. indica* (Benth.) Kyal. & Boatwr. (Babool, Bamur)

- **Parts used:** bark, root, gum, leaves, pods and seeds
- **Medicinal Uses:** It is useful for treatment of venereal

diseases, nausea, burns and wounds, stomachache and diarrhea.

- **Economical:** used by the textile industry as a dyeing and finishing agent. Also in manufacturing of many goods and as sweeteners by the bakeries.
- **Potential:** extensively used as a browse, timber and firewood species. Also have various pharmacological properties and therapeutic uses.

Government Initiatives and Support in Madhya Pradesh

Despite its potential, the MFP sector in Madhya Pradesh faces challenges such as inadequate infrastructure, limited market access, and the impacts of climate change. To address these, the M.P. Government has launched key initiatives to empower local communities and promote sustainable use of Minor Forest Produce (MFP):

1. **State Medicinal Plant Board (SMPB):** Supports sustainable harvesting and cultivation of medicinal plants

while conserving biodiversity with community involvement.

2. Van DhanVikas Kendra (VDVK): Focuses on MFP collection, processing, and marketing by tribal communities, offering training and creating employment.

3. MFP Federation & Livelihood Support: Links tribal collectors to local and national markets, ensuring fair prices and providing financial support for sustainable practices.

4. Medicinal Plant Conservation Areas (MPCA): Conserves medicinal plant biodiversity with local participation to preserve traditional knowledge.

Conclusion

The forests of Madhya Pradesh, rich in biodiversity, hold immense potential to empower local communities through the sustainable management and utilization of Minor Forest Produce. By focusing on medicinal plants alongside other MFPs, the state can ensure the socio-economic upliftment of its tribal and forest-dependent populations while conserving its

ecological heritage. Through a synergistic approach involving policy frameworks, community participation, and technological advancements, the potential of MFPs as a tool for rural empowerment can be fully realized. Additionally, promoting research on lesser-known medicinal plants can unlock their commercial potential, while fostering public-private partnerships can help establish processing units and improve market access.

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BLUE TEA: A NATURAL ELIXIR FOR HEALTH

Ashish Kumar Yadav, Darshita Rawat, Kumud Dubey, S.D.Shukla & Dharmendra Kumar

Introduction

Clitoriateratea, commonly known as the butterfly pea, blue pea, or blue tea, is an herbaceous plant belonging to the Fabaceae family. It is renowned for its vibrant blue flowers and has been traditionally used in various cultures for its medicinal properties, culinary uses, and as an ornamental plant. This comprehensive overview delves into the botanical characteristics, phytochemistry, pharmacological properties, and diverse uses of Clitoriateratea.



Botanical Classification Habitat and Distribution

Clitoriateratea is native to tropical Asia but has spread to various tropical and subtropical regions worldwide. It thrives in a wide range of soil types, from sandy loams to heavy clays, and is commonly found in disturbed areas, open

fields, and as a garden plant.

| | |
|----------|-------------|
| Kingdom: | Plantae |
| Clade: | Angiosperms |
| Clade: | Eudicots |
| Clade: | Rosids |
| Order: | Fabales |
| Family: | Fabaceae |
| Genus: | Clitoria |
| Species: | C. ternatea |

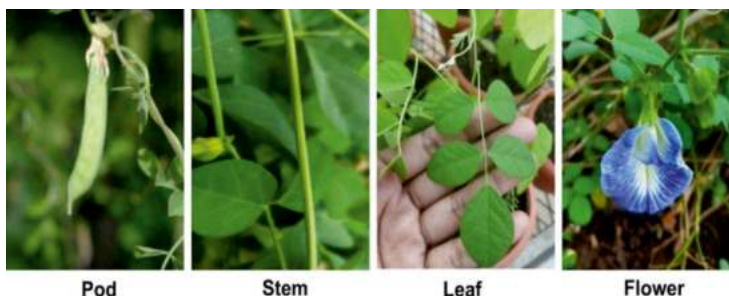


Morphology

Roots: The plant has a robust root system with a taproot that penetrates deep into the soil, aiding in drought resistance.

Stems: The stems are slender, twining, and can climb or trail, often requiring support from surrounding vegetation or structures.

Leaves: The leaves are pinnate, typically comprising 5 to 7 leaflets. The leaflets are ovate to elliptical, smooth, and arranged alternately.



Flowers: The most distinctive feature is the bright blue flowers, although white and purple varieties also exist. Each flower has five petals with a prominent keel petal. The flowers are solitary or in axillary racemes.

Fruit: The fruit is a flat, linear pod containing several seeds. The pods dehisce upon maturation, releasing the seeds.

Phytochemistry

Clitoriateratea is rich in bioactive compounds that contribute to its medicinal properties. The primary phytochemicals include:

1. Flavonoids:

Kaempferol: Exhibits antioxidant and anti-inflammatory activities.

Quercetin: Known for its antioxidant, anti-inflammatory, and anticancer properties.

Myricetin: Possesses antioxidant and anti-inflammatory effects.

2. Tannins: Tannins are known for their astringent properties and contribute to the plant's anti-diarrheal effects.

3. Alkaloids:



Clitoriacetal: Exhibits antimicrobial and anti-inflammatory activities.
Ternatins: Responsible for the blue pigment in the flowers, with antioxidant properties.
4. Saponins: Saponins are known for their

immune-boosting and cholesterol-lowering effects.

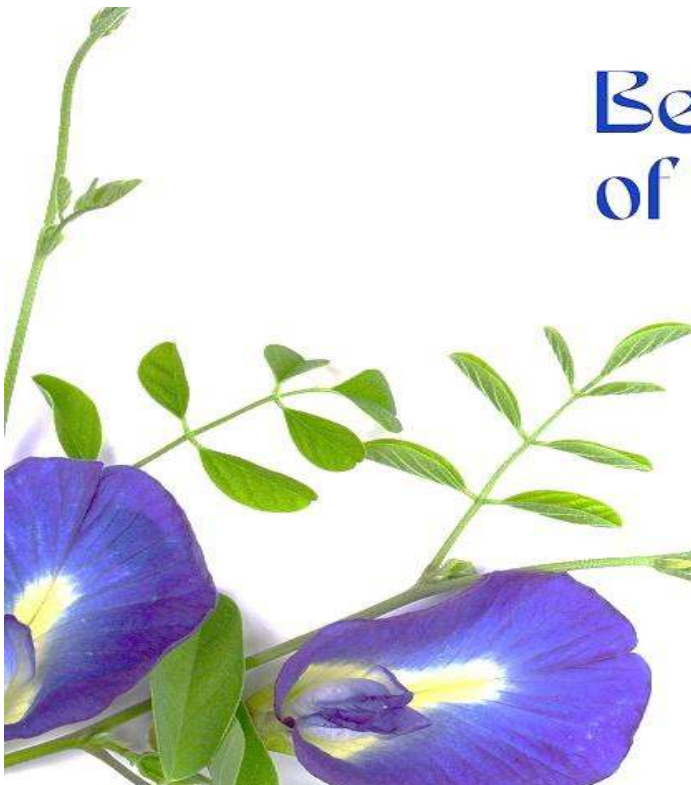
5. Phenolic Compounds: These compounds contribute to the plant's antioxidant capacity.

Pharmacological Properties

- **Antioxidant Activity:** Clitoriaternatea exhibits potent antioxidant activity due to its high flavonoid and phenolic content. This activity helps neutralize free radicals, protecting cells from oxidative stress and reducing the risk of chronic diseases.
- **Anti-inflammatory Effects:** The plant's flavonoids and alkaloids have shown significant anti-inflammatory effects, making it useful in treating inflammatory conditions such as arthritis and asthma.
- **Antimicrobial Properties:** Clitoriaternatea possesses broad-spectrum antimicrobial activity against bacteria, fungi, and viruses. This makes it valuable in treating infections and as a natural preservative.
- **Cognitive Enhancement:** Traditional medicine has used Clitoriaternatea for its nootropic effects, enhancing memory and cognitive function. Studies have shown that the plant extracts can improve learning and memory by increasing acetylcholine levels in the brain.
- **Anti-diabetic Effects:** Research indicates that Clitoriaternatea can help regulate blood sugar levels by enhancing insulin secretion and improving glucose uptake.
- **Anxiolytic and Antidepressant Effects:** The plant has been used traditionally to alleviate anxiety and depression. Scientific studies support these claims, showing that Clitoriaternatea extracts have anxiolytic and antidepressant properties.
- **Anti-cancer Potential:** Preliminary studies suggest that Clitoriaternatea exhibits cytotoxic activity against various cancer cell lines, indicating its potential as an anti-cancer agent.



Benefits of Butterfly Pea



- Antioxidants
- Anti-Inflammatory
- Weight Loss
- Regulating Diabetes
- Brain Health
- Lowers the Risk of Cancer
- Reduce Blood Pressure
- Aid Digestion
- Good for Eyes
- Anti Aging
- Boosts Hair Growth
- Natural Food Colorant

Uses of Clitoriaternatea

Traditional Medicine: *Clitoriaternatea* has been used in Ayurvedic and traditional Chinese medicine for centuries. It is used to treat various ailments, including:

- **Respiratory Disorders:** The plant is used to treat asthma, bronchitis, and other respiratory conditions.
- **Digestive Issues:** It is used as a remedy for diarrhea, dysentery, and constipation.
- **Nervous System Disorders:** The plant is used to enhance memory, reduce anxiety, and treat neurological disorders.
- **Skin Conditions:** It is applied topically to treat skin infections, wounds, and ulcers.
- **Modern Medicine:** Research has led to the development of various pharmaceutical formulations using *Clitoriaternatea* extracts. These include:

Memory Enhancers: Supplements and medications aimed at improving cognitive function.

- **Anti-diabetic Drugs:** Formulations to help manage blood sugar levels.
- **Anti-inflammatory Medications:** Products for treating inflammatory conditions.

Culinary Uses: *Clitoriaternatea* is used in culinary applications, particularly in Southeast Asia. The flowers are used to color food and beverages naturally. Popular uses include:

- **Blue Tea:** The flowers are steeped in hot water to produce a vibrant blue tea, which can be consumed hot or cold. Adding lemon juice turns the tea purple due to a pH change.
- **Rice Dishes:** The flowers are used to color rice, such as in the Malaysian dish nasikerabu.
- **Desserts:** The flowers are used to color and flavor desserts, including cakes and jellies.



Ornamental Plant: Due to its striking blue flowers, *Clitoriaternatea* is widely cultivated as an ornamental plant. It is used in gardens, landscaping, and as a climber for trellises and fences.

Agriculture: *Clitoriaternatea* is used in agriculture for soil improvement and as a cover crop. Its robust root system helps prevent soil erosion, and it fixes nitrogen in the soil, enhancing soil fertility.

Dye Production: The blue pigment from the flowers is used as a natural dye for textiles, offering an eco-friendly alternative to synthetic dyes.

Conclusion

Clitoriaternatea, with its striking blue flowers and wide range of uses, is a plant of significant importance in various fields. Its rich phytochemical profile and diverse pharmacological properties make it a valuable resource in traditional and modern medicine. Additionally, its culinary, ornamental, agricultural, and dye-producing uses highlight its versatility. Continued research and development could further unlock the potential of this remarkable plant, contributing to health, agriculture, and sustainable practices.



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Ref.:

Date :

CONSTRUCTION OF AAKADIA PANCHAYAT BHAWAN WITH THE HELP OF DONKEYS

Rana Sajjan Singh

In the year 2004, at the Aakadia panchayat Sachiv Shri Rajesh Kanesh had hired donkeys from Maharashtra brought them to Aakadia village (Alirajpur Tahasil), of then Jhabua district by motor boat and had constructed a Panchayat Bhawan. Since there no road available for transportation the rural and backward area of Mathwad region.

He also supplied vegetable & oil drums bringing them by boat to Aakadia, Chilagada, Jal sindhi and sakarja panchayat by motor boat.



Hence, the then Sachiv of village Aakadia Mr. Rajesh Kanesh hired these donkeys from Maharashtra and built a Panchayat Bhawan.



Panchyat Bhawan Construction work in progress



MEETING THE VILLAGERS villagers
of Hafeshwar and Aaksdia.



vegetable & oil drums



Rana Sajjan Singh,
Mathwad, Alirajpur



LEGAL INTERVENTION SOUGHT FROM THE NGT TO PREVENT HABITAT FRAGMENTATION WITHIN THE ECO-SENSITIVE ZONE (ESZ) OF PENCH TIGER RESERVE MP, IN PRIVATELY OWNED LAND.

By Captain Brajesh Bharadwaj

INTRODUCTION:

This article examines the circumstances that prompted the author to seek legal intervention from the Hon'ble National Green Tribunal (NGT) following the exhaustion of official channels and the subsequent issuance of a favourable order dated 21.09.2023 in Original Application No. 92/2023 (CZ) by the Hon'ble NGT (CZ) Bhopal, the case argued by the author. The concern articulated pertains to the cessation of extensive habitat fragmentation of terrestrial and aquatic habitat on a large private land situated within 200 meters from the core area boundary (PA) of the Pench Tiger Reserve in Seoni, MP specifically within the eco-sensitive zone (ESZ) and the Khawasa buffer zone in the village of Awarghani, near the Touria gate. The Awarghani village is listed in the fringe area.

FOLLOWING ARE SHORT FACTS OF THE PROJECT:

Land measuring 7.19 hectares adjacent to the core area boundary was purchased by a scheduled tribe (ST) person with an existing pond (Nandu Talab area 1.5 hectare) to build an upscale luxury resort project. The land owner was backed by politically influential person and both individuals were not locals. Other adjacent lands were also purchased to enlarge the area. Nandu Talab is frequented by tigers and wild animals due to its proximity to the forest and a natural stream. Farmhouses and lavish resorts are located nearby. After purchasing the land, the existing Nandu talab (pond) area 1.5 hectares was illegally excavated without any government permissions, using heavy earth moving machinery causing disturbance to wildlife and the violation of the provisions of ESZ notification of Pench Tiger Reserve MP. High mudmound barriers (12ft. high) were landscaped from the extracted mud into a new border wall running across several acres facing the core area. The entire



land along the core area boundary was fenced with prohibited high RCC and chain link fencing (over 7 ft. high). Deep open trench was also dug along the jungle side facing the natural stream which is at high risk of clogging due to siltation from the site. Few rooms with amenities were also built within 100 meters from the pond. Thus, the local area dynamics were artificially altered, preventing tigers and other wild animals, drinking from the already existing pond (Nandu talab) and permanently obstructing the existing tiger dispersal route, which affected tiger breeding habitat. Fragmentation of tiger habitat occurred in private land due to the

conflicting land/water uses. The project attracted wide news print coverage.

COMPLAINTS THAT WERE PREVIOUSLY FILED WITH AUTHORITIES:

Citing wrongs and the necessity to minimize the negative impact of such activities on the fragile eco-system, there were several complaints made by the author to the concerned officials of the State and Centre Government for imposing ban on illegal aforementioned activities. Despite the Collector Seoni temporary stay order, illegal work at the site continued. Due to territorial jurisdictional issues related to forest administration in revenue areas of tiger reserve, despite the repeated objections from the tiger reserve authorities the stay order was lifted, and work resumed. Thereafter Hon'ble NGT intervention was sought. NGT constituted an expert committee and issued instructions for submitting reports following site inspections. SFRI Jabalpur was directed to submit a seasonal wildlife report. On expert committee's request author was present during the site inspection.



ISSUES RAISED BEFORE THE HON'BLE NGT FOR RESOLUTION:

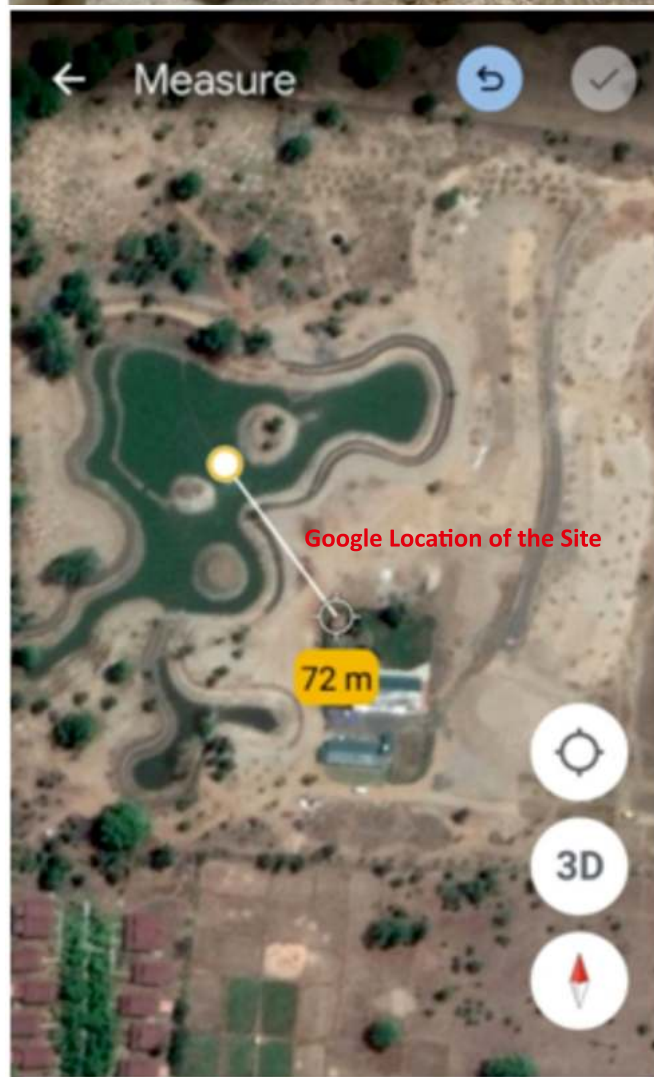
- Removal of entire high boundary wall/fencing of the property causing hindrance to wild animals.
- Removal of stone pitching at the pond that prevented the herbivores from drinking and risk of skidding.
- Filling up the trench along the jungle side to prevent wild animals falling inside and to prevent flow of silage to natural stream.
- Removal of high mud mounds causing obstruction to the spillover tiger movement.
- Removal of rooms being located within 100 meters of natural pond. (LAC decision prohibited any construction within 100 meters of pond).

“The *fringe areas* around tiger reserve have corridor value, and their ecological sustainability is important to prevent the area from becoming ecological sinks on account of overuse of resources and “*unwise land use*”. Fringe area revenue village-Awarghani is listed in “zone of influence” (ZI), being within 1Km from the boundary of PA, TCP Zone of influence.” (National Tiger Conservation Authority NTCA Gazette Notification No. 15-31/2012-NTCA dated 15.10.2012 (NGT e-filed document). The applicable relevant section is as follows: Section 16.5. para 2). The aforementioned section was emphasized during the case arguments.

HON'BLE NGT(CZ) FINAL ORDER:

37. In view of the above discussion and in light of the order dated 26.04.2023 passed by the Hon'ble Supreme Court of India quoted above in T.N. Godavarman's case, ***we direct the respondent is as follows:***

1. The respondents are directed to strictly follow the guidelines and also the provisions contained in the ESZ notifications pertaining to the respective areas with regard to prohibited activities, regulated activities and permissible activities.
2. While granting environmental clearance or forest clearance the respondents are directed to strictly follow the provisions contained in the Office Memorandum dated 17.05.2022 issued by MoEF&CC with regard to project activities in ESZ and other areas outside the protected areas.
3. With regard to the trenches along the boundary it shall be ensured that this trenches are not deep and shall be provided with soil bunds along the boundaries of the trenches, so that the animals do not get trapped and fall into the trenches.



Madhya Pradesh: NTCA takes up complaint against upcoming luxurious resort near Pench

TNN | May 4, 2022, 08:30 PM IST



BHOPAL: National Tiger Conservation Authority (NTCA) has sent a letter to the Chief Wildlife Warden (CWW) of Madhya Pradesh seeking action taken report on a complaint against an upcoming luxurious resort of a size of football ground close to Pench Tiger Reserve in Seoni district. It is alleged that the site is being diverted very close to the park's core boundary for ecologically unsustainable use which would directly affect the dispersal of spillover populations of tigers and other wild animals.

Printed from

THE TIMES OF INDIA

NGT seeks report on resort, water park near Pench

Sep 5, 2022, 08:18 AM IST



Nagpur: The principal bench of National Green Tribunal (NGT) has sought action taken report from joint committee on the controversial construction of a high-profile resort hardly 200 metres from the boundary of core area of Pench Tiger Reserve (PTR) in Madhya Pradesh.

TOI in April this year reported how concrete construction of a huge reservoir, allegedly for an adventure and aqua park, came up close to the boundary of the core area near Turiya gate in Khawasa buffer and also eco-sensitive zone (ESZ) right under the nose of forest officials.

Green crusader from Chhindwara Capt Brajesh Bharadwaj turned out to be a whistleblower and on April 8 lodged a formal complaint about the mega construction with deputy director-general of forests, MoEFCC,

Bhopal, National Tiger Conservation Authority (NTCA) and MP wildlife department. A copy was also sent to the NGT, Delhi, by post.

Judicial member Justice Arun Kumar Tyagi and expert member Dr Afroz Ahmad treated the complaint as original application and sought a factual position and action taken report from the authorities concerned.

A five-member joint committee was set up to investigate and submit report to the NGT. It will include representatives of MoEFCC's regional office, Bhopal, MP PCCF (HoFF), Pench field director, MP Pollution Control Board, and Chhindwara collector.

The NGT has asked the committee to conduct joint visits and look into the grievances of the complainant and take requisite remedial action by following due process of law. The action taken report has to be submitted in two months. The next hearing is slated for October 17, 2022.

Abstract of the NGT orders published in times of India

the officers from district administration of the district. A team of following nominated officers from various departments was thus formed:

| S.No. | Name of the Nominated Officer & designation | Representing |
|-------|--|------------------------------------|
| 1. | Pradeep Vasudeva, APCCF, Working Plan, Forest Department Jabalpur. | PCCF (HOFF), Forest Department, MP |
| 2. | Dr. HVC Chary, Guntapalli, Scientist E, Integrated Regional Office, MoEF&CC, | Regional Office, MoEF&CC, Bhopal |

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4. Instead of the metallic wired fencing, these fences should be replaced with bio-fence with the involvement of local Forest Officers. The bio-fence of appropriate height and plant species shall be identified by the Forest Department. The bio-fence would also act as a habitat for birds, animal and provide necessary protection and feed to the herbivorous animals as well.

5. The stone pitching along the ponds that prevents the animals to walk over to the ponds for drinking water shall be rectified. The Authorities may ensure that the stone pitching shall be covered with soil and grass bed to be created on the soil along the bank of the pond. The slope of the banks of the pond shall be such that there is free movement of animals to the pond.

For Further Readings Of NGT Order Visit The Link...

https://greentribunal.gov.in/casestatus/caseNumberData?zone_type=3&case_type=1&case_number=92&case_year=2023



Author is: Ex-International Airline Pilot (AirMacau). Widely travelled.

| | | |
|----|--|--|
| | Bhopal. | |
| 3. | B.P. Tiwari, Deputy Director, Pench Tiger Reserve, Seoni | Field Director, Pench Tiger Reserve, Seoni |
| 4. | O.P. Sanodiya, ADM, Chhindwara | Collector Chhindwara |
| 5. | H.K. Ghormare, SDM, Kurai, Seoni | Collector Seoni |
| 6. | H.K. Sharma, Zonal Officer, MPPCB, Jabalpur | MPPCB, Bhopal |

1.6 The inspection of the disputed site was carried out by the committee so formed on 12-09-2022. The petitioner, Capt.

Officers Designated By The Government to Inspect The Site In Question

The Natural World is so beautiful.....
We need to worship it, admire it, praise it and protect it from all the evils.

ME & MY EARTH



PILGRIMAGE PLACES & TIGER RESERVES NOT PICNIC SPOTS, MAINTAIN THEIR SACTITY: SC JUDGE

Nagpur: Pilgrimage centres and tiger reserves are not mere picnic spots, and it is imperative to maintain their sanctity, emphasised Supreme Court judge justice BV Nagarathna. She advocated the need for measures to regulate the number of vehicles and tourists entering eco-sensitive zones, such as the Char Dham sites or forests, to prevent overcrowding while preserving the serenity of the sacred destinations.

Delivering the 4th GL Sanghi memorial lecture at the Maharashtra National Law University (MNLU) in Nagpur on Saturday, Justice Nagarathna delved into the pressing issues of forest fires, landslides, floods, extreme weather events, urban heat islands, and air and water pollution that plague various regions of the country.

Justice BV Nagarathna structured her discourse into four segments, encompassing the constitutional rights and duties pertaining to the environment, the existing environmental jurisprudence in India, novel challenges posed by climate change to the legal order, and the necessity for

judges and advocates to be well-versed in these matters.

The SC judge said that climate change poses multifaceted threats not only to a stable environment but also to human life, impacting the right to health, which is an integral component of the right to life. She highlighted the potential consequences of climate change, such as shifts in vector-borne diseases, rising temperatures, droughts, food supply shortages, storms and flooding, particularly for those living in coastal areas.

Discussing environmental justice, Justice Nagarathna asserted that it should be viewed within the broader framework of justice rather than in isolation. She

underscored the paramount importance of addressing climate change compared to other risks while acknowledging the equally perilous nature of social polarization, misinformation, and the adverse outcomes of artificial intelligence and cyber technologies.

She cautioned that even well-intentioned policies aimed at promoting environmental justice must be scrutinised for their broader implications. She cited the example of road-widening projects, which are often intended at ensuring smooth traffic movement and reducing fuel consumption. However, she pointed out that such projects may lead to a greater number of cars on the roads, resulting in ecological implications such as loss of forest cover and soil erosion, as well

as increased vulnerability to disasters due to increased tourist access and pressure on available resources. She advocated for imposing limits on the number of tourists visiting particular destinations, such as Badrinath, Kedarnath, Yamunotri, or

Gangotri, and maintaining data at relevant stations to prevent excessive pressure on the environment and infrastructure while preserving the sanctity of these sacred sites. Justice Nagarathna also called for declaring certain areas as inviolable, recognizing their biological significance, heritage value, and role in harboring biodiversity and mitigating the acceleration of climate change.

On the promotion of tiger safaris in the name of eco-tourism by some govts, Justice Nagarathna cautioned against the risks of putting stress on ecosystem and disrupting wildlife. She emphasised the need for govts to prioritise the ecosystem of the area and impose restrictions on the number of vehicles and human presence in tiger reserves to ensure effective



conservation efforts.

Justice Nagarathna on GL Sanghi
GL Sanghi was a leading member of the Nagpur bar association. He was designated as senior counsel of the Supreme Court. "There was no branch of law which was untouched by Shri Sanghi. His sheer power of logical reasoning, careful analysis and clarity of thought contributed immensely in the development of law. Modest, simple and unassuming, he also helped those who sought legal help from him, irrespective of their stature or economic position. He possessed a rare combination of unquestionable integrity, sterling character and high moral values," Justice BV Nagarathna said.

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News courtesy: Times of India
New Dehli

वन विभाग के कामकाज पर सवाल, 24 जिलों में अधिकारी की जवाबदेही तय होगी?

गणेश पाण्डेय, भोपाल। भारतीय वन संरक्षण संस्थान देहरादून की रिपोर्ट आने के बाद एपीसीसीएफ प्रोटेक्शन मनोज अग्रवाल एक्शन मोड में आ गए हैं। अग्रवाल ने 25 डीएफओ को नोटिस जारी वन आवरण क्षेत्र कम होने के कारण पूछे हैं। उनके इस नोटिस को लेकर एक सवाल वन भवन की वीथिकाओं में तैर रहा है—कहीं यह नोटिस रस्म अदाएंगी की शुरुआत तो नहीं है..? क्या यह है अपर मुख्य सचिव वन अशोक वर्णवाल के साप्ताहिक कार्यक्रम टीएल (टाइम लिमिट) की बैठक के एजेंडे में शामिल होगा?

सूत्रों के अनुसार अपर प्रधान मुख्य वन संरक्षक (संरक्षण) मनोज अग्रवाल ने बड़वानी, भोपाल, बुरहानपुर, छतरपुर, दमोह, धार, डिंडोरी, पूर्व मंडला, गुना, हरदा, होशंगाबाद, इंदौर, जबलपुर, कटनी, खरगोन, कूनो पालपुर, नरसिंहपुर, नीमच, नार्थ बालाघाट, नॉर्थ बैतूल, नॉर्थ पन्ना, नॉर्थ सिवनी और नॉर्थ शहडोल को नोटिस जारी उन वास्तविक कारणों को जानना चाहा है, जिसकी वजह से वन आवरण घनत्व घटा है। दरअसल, अग्रवाल के नोटिस को ही रस्म अदाएंगी की क्या वजह माना जा रहा है। जबकि एक सीनियर अधिकारी के अनुसार वन घनत्व एरिया कम होने के असल कारणों तक पहुंचाने के लिए कैपा शाखा, विकास शाखा और अनुसंधान विस्तार शाखा से रिलीज किए गए फंड और फील्ड में हुए कार्यों की सूक्ष्मता से जांच कराई जानी चाहिए। खासकर वर्किंग प्लान के अनुसार वन मंडलों में कार्य किए गए अथवा नहीं। विभागीय सूत्रों के अनुसार वन मंडलों को कार्य योजना के अनुसार मद नहीं दिए गए बल्कि कैपा और विकास शाखा से 'अंधा बाते रेवड़ी चीन्ह-चीन्ह कर देत' की तर्ज पर बांटे गए। वर्ष 19 से 2023 तक दिए गए बजट और उसे पर हुए कार्यों की जांच होनी चाहिए। जांच प्रतिवेदन आने पर उन पर कार्रवाई भी होनी चाहिए ताकि भविष्य में उसे दोहराया न जा सके।

अतिक्रमण और उत्खनन को रोकने में नाकाम

राजनीतिक दबाव के चलते फॉरेस्ट के अधिकारी अतिक्रमण को रोक नहीं पा रहे हैं। जब किसी भी डीएफओ ने अतिक्रमण को लेकर सख्ती दिखाई उसे हटा दिया गया। फील्ड के अफसर पर लगातार हमले हो रहे हैं किंतु मंत्रालय में बैठे अपर प्रमुख सचिव अशोक वर्णवाल उनकी सुरक्षा को लेकर चुप्पी साधे हुए हैं। विभाग द्वारा खंडवा, बुरहानपुर, विदिशा, खरगोन, दमोह, पूर्व मंडला, उत्तर सिवनी, गुना और उत्तर बैतूल वन मंडलों में अवैध कटाई अतिक्रमण और उत्खनन को रोकने के लिए कोई एक्शन प्लान तैयार नहीं किया गया। प्रदेश में सर्वाधिक अतिक्रमण बुरहानपुर में हैं। यहां राज्य सरकार भी अतिक्रमण रोकने में नाकाम रही है। बुरहानपुर में 1,90,102 हेक्टेयर अधिसूचित वन क्षेत्र हैं। इनमें से 52,751 हेक्टेयर क्षेत्र में अतिक्रमण पाया गया है। वर्तमान में नॉर्थ सिवनी, विदिशा और बुरहानपुर में कोई भी डीएफओ पदस्थ नहीं है।

पूर्व वन मंत्रियों के क्षेत्र में अतिक्रमण की स्थिति

पिछले पांच साल में पांच वन मंत्री बनें, लेकिन वे मध्य प्रदेश के जंगल तो क्या अपने गृह जिले के जंगल में ही अतिक्रमण को पैर पसारने से नहीं रोक पाए। राज्य मंत्री दिलीप अहिरवार के गृह जिले छतरपुर में 12 हजार 957 हेक्टेयर अधिसूचित वन क्षेत्र में अतिक्रमण पाया गया है।

गौरीशंकर शेजवार- रायसेन में 46 हजार हेक्टेयर
उमंग सिंघार- धार में 4360 हेक्टेयर
विजय शाह- खंडवा में 4034 हेक्टेयर
नागर सिंह चौहान- अलीराजपुर में 25601 हेक्टे.
दिलीप अहिरवार- छतरपुर — 12,957 हेक्टेयर

News courtesy: INDIAN BRAKING NEWS



गिद्धों के विलुप्त होने से 5 लाख लोगों की मौत कैसे हुई?



सौतिक बिस्वास
बीबीसी संवाददाता

एक वक़्त ऐसा था जब भारत में बड़ी संख्या में गिद्ध पाए जाते थे।

मवेशियों के शवों की तलाश में गिद्ध विशाल लैंडफिल पर मंडराते। कभी-कभी वे हवाईअड्डे से उड़ान भरने के दौरान जेट इंजन में फंसकर पायलटों के लिए ख़तरा पैदा करते थे।

लेकिन दो दशक से कुछ अधिक वक़्त ही गुज़रा है, जब बीमार गायों के इलाज के लिए इस्तेमाल की जाने वाली कुछ दवाओं के कारण भारत में बड़ी संख्या में पाए जाने वाले ये गिद्ध मरने लगे।

1990 के दशक के मध्य आते-आते 5 करोड़ की आबादी वाले गिद्धों की संख्या डाइक्लोफेनाक नाम की दवा की वजह से तकरीबन शून्य पर आ गई। 'डाइक्लोफेनाक' मवेशियों के लिए एक सस्ती गैर-स्टेरॉयडल दर्द निवारक दवा है, जो गिद्धों के लिए घातक है।

स्टेट ऑफ़ इंडियाज़ बर्ड्स की नई रिपोर्ट के मुताबिक, साल 2006 में पशुओं के इलाज में डाइक्लोफेनाक दवा के इस्तेमाल पर प्रतिबंध लगाने से कुछ इलाकों में गिद्धों की मौतों में गिरावट आई। लेकिन कम से कम तीन प्रजातियां ऐसी थीं, जिनपर इसका लंबा असर हुआ और उन्हें 91 से 98 फ़ीसदी तक नुक़सान झेलना पड़ा।

अमेरिकन इकोनॉमिक एसोसिएशन जर्नल में प्रकाशित अध्ययन में कहा गया है, "अनजाने में इन पक्षियों की मौत की वजह से घातक बैक्टीरिया और संक्रमण फैला। इससे पांच वर्षों में करीब पांच लाख लोगों की मौत हो गई।"

पांच लाख लोगों की मौत कैसे हुई?

अमेरिकन इकोनॉमिक एसोसिएशन जर्नल में प्रकाशित अध्ययन में कहा गया है, "अनजाने में इन पक्षियों की मौत की वजह से घातक बैक्टीरिया और संक्रमण फैला। इससे पांच वर्षों में करीब पांच लाख लोगों की मौत हो गई।"

अध्ययन के एक लेखक और शिकागो विश्वविद्यालय के हैरिस स्कूल ऑफ़ पब्लिक पॉलिसी में सहायक प्रोफ़ेसर इयाल फ्रैंक कहते हैं, "ऐसा माना जाता है कि गिद्ध प्रकृति को स्वच्छ रखते हैं, वे हमारे पर्यावरण से बैक्टीरिया और बीमारी से मारे गए जानवरों को हटाने में महत्वपूर्ण भूमिका निभाते हैं। उनके बिना बीमारी फैल सकती है।"

इंसानों के स्वास्थ्य में गिद्धों की भूमिका, वन जीवों की रक्षा के महत्व को रेखांकित करता है।

सभी जीवों का हमारे इकोसिस्टम में अलग-अलग काम है जो हमारे जीवन को प्रभावित करता है।

फ्रैंक और उनके दूसरे लेखक अनंत सुदर्शन ने गिद्धों की संख्या में गिरावट से पहले और बाद में, ऐतिहासिक रूप से कम गिद्धों की आबादी वाले भारतीय ज़िलों और गिद्धों से समृद्ध ज़िलों में मानव मृत्यु दर की तुलना की।

उन्होंने रेबीज़ टीके की बिक्री, जंगली कुत्तों की संख्या और जल आपूर्ति में बीमारी फैलाने वाले कारकों के स्तर की जांच की।

उन्होंने पाया कि सूजन कम करने वाली दवाओं की बिक्री बढ़ने



गिद्धों के बिना आवारा कुत्तों की आबादी बढ़ गई और मनुष्यों को रेबीज़ जैसी बीमारी का सामना करना पड़ा

और गिद्धों की आबादी घटने के बाद, उन ज़िलों में मानव मृत्यु दर में 4 फ़ीसदी से अधिक की वृद्धि हुई, जहां कभी ये पक्षी बड़ी संख्या में थे।

शोधकर्ताओं ने यह भी पाया कि इसका प्रभाव पशुओं की बड़ी आबादी वाले शहरी क्षेत्रों में सबसे अधिक था, जहां मवेशियों के शवों को फेंकना आम था।

शोधकर्ताओं का अनुमान है कि साल 2000 और 2005 के बीच, गिद्धों की आबादी घटने की वजह से हर साल करीब एक लाख से ज़्यादा लोगों की मौत हुई है। नतीजतन प्रति वर्ष देश को समय से पहले होने वाली इतनी मौतों से 69 अरब डॉलर का नुकसान झेलना पड़ा।

मवेशियों के शवों को हटाने के लिए गिद्ध पर निर्भर होते थे किसान

भारत में गिद्ध की जिन प्रजातियों को सबसे अधिक नुकसान झेलना पड़ा उनमें सफ़ेद पंख वाला गिद्ध, भारतीय गिद्ध, लालसर गिद्ध शामिल हैं। इन प्रजातियों ने 2000 के दशक की शुरुआत से सबसे महत्वपूर्ण दीर्घकालिक गिरावट देखी। इनकी आबादी में सबसे अब तक क्रमशः 98 फ़ीसदी, 95 फ़ीसदी और 91 फ़ीसदी की गिरावट आई।

मिस्र के गिद्ध और प्रवासी ग्रीफ़ॉन गिद्ध में भी उल्लेखनीय रूप से गिरावट आई है, लेकिन ये ज़्यादा विनाशकारी नहीं हैं।

शोधकर्ताओं के अनुसार, "भारत में साल 2019 की पशु जनगणना में 50 करोड़ से अधिक पशु दर्ज किए गए, जो दुनिया में सबसे अधिक है। पुराने समय में किसान पशुओं के शवों को तेज़ी से हटाने के लिए गिद्धों पर निर्भर रहते थे।"

"भारत में गिद्धों की गिरावट किसी भी पक्षी की प्रजाति के मामले में अब तक की सबसे तेज़ गिरावट है और अमेरिका में कबूतर के विलुप्त होने के बाद सबसे बड़ी गिरावट है।"

स्टेट ऑफ़ इंडियन बर्ड्स रिपोर्ट के अनुसार, भारत की शेष गिद्ध आबादी अब संरक्षित क्षेत्रों के आसपास केंद्रित है जहां उनके आहार में संभावित रूप से दूषित पशुओं की तुलना में मृत वन्यजीव अधिक हैं।

ये निरंतर गिरावट "गिद्धों पर मंडराते खतरों की ओर इशारा करती है, जो गंभीर चिंता का विषय है क्योंकि गिद्धों की संख्या में गिरावट ने मानव कल्याण पर नकारात्मक प्रभाव डाला है।"

जानकारों ने चेतावनी दी है कि पशुओं के लिए इस्तेमाल की जाने वाली दवाएं भी गिद्धों के लिए बड़ा खतरा बनी हुई हैं। मौजूदा वक्त में मृत पशुओं को अधिक दफन करने के कारण पशुओं के शवों की कमी और जंगली कुत्तों के कारण ये समस्या और गंभीर हो गई है।

इसके अलावा खनन और उत्खनन भी बड़ी समस्या है जो गिद्धों की कुछ प्रजातियों के घोंसले बनाने के तरीकों पर असर करता है।

तो क्या क्या गिद्ध वापस आएंगे? यह कह पाना मुश्किल है, हालांकि कुछ संकेत हैं जो उम्मीद जगाते हैं।

बीते साल 20 गिद्धों को पाला गया, उनके पैरों पर सैटेलाइट टैग्स लगाए गए और फिर उन्हें पश्चिम बंगाल के एक टाइगर रिज़र्व में छोड़ दिया गया।

हाल में हुए एक सर्वे में दक्षिण भारत में 300 से अधिक



दिल्ली के राष्ट्रपति भवन के ऊपर एक फव्वारे पर गिद्धों के झुंड की एक अदिनांकित तस्वीर

गिद्ध दर्ज किए गए।

हालांकि अभी भी ये नाकाफ़ी है। गिद्धों की आबादी को बढ़ाने के लिए अभी बहुत काम करने की ज़रूरत है



समाचार बी.बी.सी.
न्यूज के सौजन्य से

सतपुड़ा के पर्णपाती वन

नमिता सेनगुप्ता

ओ, सतपुड़ा के पर्णपाती वन,
वृक्ष तुम्हारे क्यों हैं उन्मन।
परस्पर करते प्रतिस्पर्धा,
चाह उनकी छू ले गगन ।

मैंने देखा -----

सतपुड़ा के बीहड़ जंगल,
वृक्ष वहाँ के कुछ उच्छ्वल।
सूर्य दीप्ति की अभिलाषा में,
आड़े तिरछे हो करते दंगल।

पथिक दें आहार्य एक मुष्टि,
क्षुधार्त वयस्क पाते सन्तुष्टि।
करे सभी आमोद संग उनके,
पथ में कपि दल करे प्रविष्टि।

रेवा का प्रवाह अति निर्मल,
पेंच नदी की हुई लहरे चंचल।
सूर्य रश्मियाँ करती अठखेली,
सरई पुहुप लुटाए वन में परिमल।

दिवसावसान भयावह हुई रात,
भय से काँप रहे थरथर गात।
श्रृगालों का शुरु समवेत गान,
मर्मर संगीत सुनाये शुष्क पात।

अंधकार संग वृक्ष हुए अस्पष्ट,
खुसुर-पुसुर बातें उनकी स्पष्ट।
जगजमगाते जुगनू झुरमुट में,
झींगुरों के स्वर अतिविशिष्ट।

सागौन महुआ करंजी बकायन,
सेमल शीशम पलाश अर्जुन।
वृक्ष सम्पदा से हो परितृप्त,
जनजाती को तुमसे संभरण।

उष्णकटिबंधीय पर्णपाती वन,
सतपुड़ा के रहो जंगल सघन।
तुमसे अस्तित्व निरभ्र मेघों का
वन्य जीवों को देते तुम शरण।



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कैसा हो समाज का प्रकृति एजेन्डा? - धरती और वन.....

—स्व. कृष्ण गोपाल व्यास

समाज को वनों और उनकी जैवविविधता की चिन्ता करनी चाहिए। उसके बिना समाज का प्रकृति एजेन्डा अधूरा है। भारतीय संस्कृति में मानव, पशु-पक्षी, कीट-पतंग, जल जीव, पेड़-पौधे लताएँ, नदी तालाब झरने, मिट्टी-पहाड़ इन सबका परस्पर निर्भर संबंध खोजा गया था। उसपर शोध किया गया और प्रामाणिकता के साथ अच्छी-अच्छी बातों को आचरण में ढाला गया है जिसे निम्न उदाहरण से समझा जा सकता है-

दश कूप समावापी, दशवापी समोहदः।

दश हृद समः पुत्रो, दश पुत्र समो द्रुमः।

मत्स्यपुराण में ऋषि मनीषा कहती है- एक बावड़ी दस कुओं के बराबर होती है। एक तालाब दस बावड़ियों के बराबर होता है। एक पुत्र दस तालाबों के बराबर होता है। एक वृक्ष दस पुत्रों के बराबर होता है। यह उल्लेख वृक्षों की उपयोगिता को सिद्ध करता है।

अथर्ववेद के पृथ्वी सूक्त में कहा गया है- हे धरती माँ! जो कुछ मैं तुझसे लूँगा वह उतना ही होगा जिसे तू पुत्रः पैदा कर सके। तेरी जीवनी शक्ति पर कभी आघात नहीं करूँगा। हे माता! एक पार्थिव गंध हम सबको एक सूत्र में बाँधे हुए है। यह सूत्र, यह नाता मनुष्य के साथ ही नहीं है, वरन पशु-पक्षी नदी-पर्वत, जड़-वेतन, संपूर्ण जगत के साथ है। यह स्नेह बंधन इसी प्रकार बना रहे।

एक बात और, जब कभी हम लोग पानी और प्रकृति की चिन्ता तथा चर्चा करेंगे तो उसके साथ-साथ अनिवार्य रूप से पेड़, पहाड़, जीव-जन्तुओं, हवा, जैवविविधता की चिन्ता और चर्चा भी करनी पड़ेगी। प्राकृतिक घटकों को खंड-खंड में नहीं अपितु एक दूसरे के पूरक के रूप मान्यता देकर समाज के एजेन्डे पर लाना होगा। वही समाज का एजेन्डा है। वही समाज की अपेक्षाओं का आईना है। वही हमारा भविष्य है। वही असली सरोकार है। यह चिन्ता, पर्यावरण चेतना है। उसी चेतना के कारण, अनेक बार, समाज मुख्य धारा में आया है।

पर्यावरण चेतना इतिहास के पन्नों में:

भारतवर्ष में पर्यावरण चेतना और तवानुकूल विकास के प्रमाण वैदिककाल से मिलने लगते हैं। इसी कारण, हमारे प्राचीन ग्रन्थों में प्रकृति एवं उसके घटकों (वन, जल, वृक्ष, पर्वत, जीव-जन्तुओं इत्यादि) के प्रति विशेष सम्मान भाव तथा पूजा का उल्लेख मिलता है। कृष्ण द्वारा



अंतराष्ट्रीय पर्यावरण दिवस के आयोजन (दिनांक 22/05/2017), पर विदेशी वनमंडल द्वारा आयोजित चित्रकला प्रतियोगिता में प्रथम पुरस्कार विजेता नन्दनी पंथी (कक्षा-12) का यह चित्रकारी.....

गोवर्धन पर्वत की पूजा को प्रकृति की पूजा माना जाता है। इस पूजा के बारे में कृष्ण ने कहा था कि उनके ग्राम के समाज की आजीविका का आधार, गोवर्धन पर्वत की जैव-विविधता है।

भारतीय समाज ने स्थानीय पर्यावरण और मौसम तंत्र के सम्बन्ध को अच्छी तरह समझकर नगर बसाए थे। खेती तथा पशुपालन को आजीविका का निरापद आधार बनाया था। उनके परस्पर सम्बन्धों के विश्लेषण से पता चलता है कि अलग अलग कृषि जलवायु क्षेत्रों में बसे भारतीय ग्रामों ने खेत, खलिहान, चारागाह, जंगल और बाग-बगीचों की एक-दूसरे पर निर्भर तथा मददगार प्रणाली विकसित की थी। यह प्रणाली स्थानीय जलवायु के अनुकूल थी। यह प्रणाली बाढ़ा नदद से पूरी तरह मुक्त थी। निरापद थी। साईड-इफेक्ट से मुक्त थी।

भारत के अलावा, अरब देशों के चिकित्सा शास्त्रों में वायु, जल, मृदा प्रदूषण तथा ठोस अपशिष्टों की व्यवस्था करने का उल्लेख है। इसी प्रकार, जब लन्दन में कोयले के धुँए के कारण प्रदूषण बढ़ गया तो सन 1272 में, ब्रिटेन के शासक किंग एडवर्ड प्रथम ने कोयला जलाना प्रतिबंधित किया। औद्योगिक इकाईयों द्वारा छोड़े धुँए के कारण जब वायु प्रदूषण का खतरा बढ़ा तो ब्रिटेन ने सन 1863 में ब्रिटिश एल्कली एक्ट (पर्यावरण कानून) पारित किया। महारानी विक्टोरिया के शासन काल में चलो प्रकृति की ओर लौटें (Back to Nature) आंदोलन हुआ, जनचेतना बढ़ी तथा प्राकृतिक संरक्षण के लिए अनेक सोसायटियों का गठन हुआ। सन 1739 में बैजामिन फेंकलिन तथा अन्य बुद्धिजीवियों ने चमड़ा उद्योग को हटाने तथा कचरे के विरुद्ध, अमेरिका की पेन्सिलवानिया एसेम्बली में, पिटीशन दायर की। 20 वीं शताब्दी में, पर्यावरण आंदोलन का विस्तार हुआ तथा वन्य जीवों के संरक्षण की दिशा में प्रयास हुये।

सन 1962 में, अमरीकी जीवशास्त्री रथेल कार्सन की पुस्तक (साइलेंट स्प्रिंग) प्रकाशित हुई। इस पुस्तक में डी.डी.टी. तथा अनेक जहरीले रसायनों के कुप्रभावों के बारे में जानकारी दी गई थी। जिससे पता चला कि डी.डी.टी. तथा अन्य कीटना नाशकों के उपयोग से लोगों में कैन्सर पनप रहा है। पक्षियों की संख्या में कमी आ रही है। इस पुस्तक के प्रकाशन के बाद, अमेरिका में पर्यावरण के प्रति जनचेतना बढ़ी। सन् 1970 में एन्वायरनमेंटल प्रोटेक्शन एजेन्सी का गठन हुआ। सन् 1972 में डी.डी.टी. के उपयोग

पर रोक लगी। इसी दौरान, अनेक नये पर्यावरण समूह जैसे ग्रीनपीस तथा पृथ्वी मित्र (Friends of the Earth) अस्तित्व में आये।

भारत के प्रमुख वृक्ष बचाओ आंदोलन:

पर्यावरणीय हास का सबसे अधिक प्रभाव गरीब लोगों पर पड़ता है इसलिये जब असहायता की स्थिति निर्मित होती है तो प्राकृतिक संसाधनों पर नियंत्रण खोता समाज मुखर होने लगता है। उम्मीद की टूटती डोर की कोख से पर्यावरणीय आंदोलन प्रारम्भ होते हैं। भारत के प्रमुख वृक्ष बचाओ आंदोलन निम्नानुसार है-

विश्वीय समाज का वृक्ष बचाओ आन्दोलन:

सन 1737 में जोधपुर रियासत में वृक्षों की रक्षा के लिये आन्दोलन हुआ था। जोधपुर के महाराजा अभय सिंह ने अपने सैनिकों को चूना बनाने के लिए बड़ी मात्रा में खेजड़ी (प्रोसोपिस) के वृक्षों को काटने के आदेश दिये। विश्वीय समाज की अमृतादेवी तथा उनकी तीन पुत्रियों ने राजाज्ञा का विरोध किया और वृक्षों को बचाने के प्रयास में अपने प्राणों की आहुति दी। उनके बलिदान की सूचना पाकर 83 गांवों के विश्वीयों ने आंदोलन किया। इस आन्दोलन में 363 व्यक्तियों की जान गई। इसके बाद, जोधपुर नरेश ने विश्वीयों के समीप के वनों तथा वन्य जीवों के संरक्षण के लिए आदेश जारी किया। इस आन्दोलन का मुख्य उद्देश्य वृक्षों की रक्षा था। उल्लेखनीय है कि विश्वीय समाज में शवदाह की प्रथा नहीं है।

चमोली का चिपको आन्दोलन:

यह आन्दोलन उत्तरांचल के हिमालय क्षेत्र में सन 1973 में प्रारंभ हुआ था। चमोली जिले की स्वयं सेवी संस्था (दशौली ग्राम स्वराज मंडल) ने ग्रामीण समाज के सहयोग से वन सम्बंधन का

CHIPKO MOVEMENT



उल्लेखनीय कार्य किया है। चंडीप्रसाद भट्ट ने इसे जन आन्दोलन बनाया तथा ख्याति दिलाई।

चमोली जिले के रेनी, गोपेश्वर तथा हूंगरी पायटोली गांवों की ग्रामीण महिलायें अपनी आजीविका तथा चारा, ईंधन इत्यादि की आवश्यकता के लिये स्थानीय वनों पर आश्रित थीं। जंगल कटने से उनकी आजीविका पर संकट संभव था इसलिए जंगल काटने आये ठेकेदारों के लोगों को रोकने के लिये वे अपने बाल-बच्चों सहित आगे आईं। उन्होंने वृक्षों से चिपक कर वृक्षों को बचाने का प्रयास किया था। धीरे धीरे यह जन आन्दोलन आसपास के क्षेत्रों में फैला, सर्वत्र उसकी चर्चा हुई, सबने आन्दोलन की आवश्यकता से सहमति जताई। पूरे देश तथा विदेशों में उसका सन्देश गया। चिपको आन्दोलन, वन संरक्षण का पर्याय बना। कुछ लोग, इसे वन संरक्षण और पुनर्जीवन का सत्याग्रह मानते हैं। आंदोलन बताता है कि वन तथा सार्वजनिक भूमि भले ही सरकार की हों पर नैतिक रूप से वे उस समाज की हैं जो अपनी आजीविका के लिये उससे

जुड़ा है।

केरल राज्य की शान्त घाटी का आन्दोलन:

केरल राज्य के पालघाट जिले में शान्त घाटी (Silent Valley) स्थित है। इस घाटी में शोर मचाने वाले कीड़ों (साइक्रेड) के नहीं मिलते इसकारण उसे शान्त घाटी के नाम से जाना जाता है। इस घाटी में उष्णकटिबन्धीय वर्षा-वन पाये जाते हैं। ये जंगल विलुप्ति की कगार पर हैं। इस घाटी के जंगलों में मनुष्यों का बहुत कम हस्तक्षेप हुआ है। इस घाटी को पाँच लाख साल पुराने जैविक पालने (Biological Cradle) की भी संज्ञा दी जाती है। इन वनों में दुर्लभ जीवजन्तु तथा पशुमयी घाट में मिलने वाली कुछ दुर्लभ वनस्पतियाँ पाई जाती हैं।

कुछ साल पहले केरल सरकार ने इस क्षेत्र में जलविद्युत परियोजना के निर्माण का निर्णय लिया था। इस योजना से 60 मेगावाट बिजली और मलावार क्षेत्र की 10,000 हेक्टर जमीन पर सिंचाई प्रस्तावित थी। इस योजना से शान्त घाटी के पर्यावरण तथा जैव विविधता को गंभीर खतरा संभावित था इसलिये कुछ पर्यावरणविदों तथा अनेक स्वयं सेवी संस्थानों ने उससे असहमति जाहिर की। इसके बाद 30 अगस्त, 1979 को फ्रेन्ड्स आफ दी ट्रीज सोसाइटी द्वारा दायर की याचिका पर केरल उच्च न्यायालय ने स्थगन आदेश दिया। भारत सरकार ने बढ़ते आन्दोलनों तथा बौद्धिक दबाव के कारण शान्त घाटी में जलविद्युत योजना को रोक दिया। इस आन्दोलन का उद्देश्य जैवविविधता

कर्नाटक चिपको आंदोलन:

उत्तरी कर्नाटक के समुद्र तट के समीप पश्चिमी घाट पर्वत श्रृंखला है। यहाँ की जैवविविधता बहुत सम्पन्न है। इस क्षेत्र से बहुमूल्य

Landmark of Chipko Movement

The landmark event of Chipko movement happened on march 26, 1974 in chamoli district, Uttarakhand, India, where a group of peasant woman hugged trees to prevent them from felling down. Their actions inspired hundreds of such actions at the grassroots level throughout the region. by the 1980's the movement had spread throughout India and led formulation of people sensitive forest policies, which put a stop to open felling of trees in regions as far reaching as vindhyaas and the western Ghats of India. This movement was already famous worldwide and this is true lessons in our modern era.

औषधियों, चारा, फल तथा ईंधन प्राप्त होता है। इस क्षेत्र में सदाबहार वन पाए जाते हैं। चिपको आंदोलन से प्रेरणा लेते हुए यहाँ के स्थानीय निवासियों ने वृक्षों की कटाई का विरोध किया था। सन 1983 में कालासेकुडरगोड के जंगलों में 150 महिलाओं तथा 30 पुरुषों ने वृक्षों से चिपक कर 38 दिन तक वृक्षों की रक्षा की थी। इसके बाद, वृक्षों की कटाई पर रोक लगी। बेनगांव, हर्स तथा निडिगोड के जंगल बचे। इस आंदोलन से सारे दक्षिण भारत में जंगलों तथा पर्यावरण के प्रति जागरूकता बढ़ी।

इस आन्दोलन का उद्देश्य सदाबहार वनों के वृक्षों के साथ साथ जैवविविधता की रक्षा था।

वनों की आवश्यकता:

वनों की आवश्यकता निर्विवादित है क्योंकि वे अपनी प्राकृतिक शुद्धिकरण व्यवस्था को सक्रिय रख आक्सीजन का सन्तुलन बनाने में योगदान देते हैं। वनों के कम होने का मतलब है आक्सीजन की कमी। आक्सीजन की कमी का

जब कटनी के वनवासियों ने जंगल बचाने की मुहिम वर्ष 2012



मतलब है जीवन पर संकट। इस कारण वे अपरिहार्य हैं। इसके अलावा, नदियों को पानी उपलब्ध कराने में उनकी महत्वपूर्ण भूमिका है। मनुष्यों के लिये औषधियाँ, भोजन, उद्योगों के लिये कच्चा माल प्रदान करते हैं। तापमान नियंत्रण में योगदान देते हैं, साथ ही खतरनाक मांसाहारी वन्य प्राणियों से समाज को सुरक्षित रखते हैं। पर्यावरण सन्तुलन एवं संरक्षण में उनका योगदान बहुआयामी और विविध है। वन पृथ्वी के पारिस्थितिक तंत्र को सन्तुलन कायम रखने वाले प्रमुख एवं अनिवार्य घटक हैं इसलिए उनकी आवश्यकता निर्विवादित है।

जैवविविधता की आवश्यकता:

इकोसिस्टम सेवाओं के लिए जैवविविधता अनिवार्य है। उसके घटने से गरीबी बढ़ती है। यह आश्चर्यजनक है कि आदिवासियों ने अपनी परम्परागत व्यवस्थाओं और रीति-रिवाजों द्वारा जंगलों के पर्यावरण को काफी हद तक ठीक स्थिति में रखा है। इसके उलट, जैव विविधता का विकृत रूप, सामान्यतः उन इलाकों में देखा गया है जहाँ वन और जीवन के रिश्तों की अनदेखी करने वाला समाज निवास करता है।

संरक्षण वन विभाग की भूमिका:

वन कई लोग मानते हैं कि वन संरक्षण की जिम्मेदारी केवल वन विभाग की है। यह सही नहीं है। यह सामाजिक जिम्मेदारी और नागरिक दायित्व भी है। वन संरक्षण में उद्योगों और कानून बनाने वालों की भी भूमिका है।

भविष्य में जलवायु परिवर्तन के कारण मौसम में बदलाव आवेगा। तापमान में वृद्धि होगी तथा वाष्पीकरण बढ़ेगा। वनों और वन्य प्राणियों पर पानी का संकट बढ़ेगा। उन्हें जलाभाव से बचाने के लिए पानी की माकूल व्यवस्था करना आवश्यक होगा। उस व्यवस्था का लक्ष्य जल-स्वावलम्बन होना चाहिए। जल स्वावलम्बन से जीव-जन्तुओं के लिये जंगल में भोजन और पानी का इन्तजाम सुनिश्चित होगा फूड-चैन पर पड़ने वाले असर की कमियों को दूर करने के लिए प्रयास करना होगा।

वन संरक्षण आम आदमी की भूमिका:

नागरिक जिम्मेदारी के अन्तर्गत समाज द्वारा वन विभाग को कुछ सुझाव दिए जा सकते हैं। पहला सुझाव मौजूदा प्रयासों की समीक्षा हो सकता है। दूसरा सुझाव हो सकता है जलवायु परिवर्तन के प्रतिकूल प्रभाव को कम कर वनों की सेहत तथा दायित्वों को बरकरार रखना। अर्थात् वन और जैवविविधता को सुरक्षित रखने के लिए प्रत्येक वन समूह (Forest Grid) को जलवायु की प्रतिकूलता से निपटने योग्य बनाना। इसके लिए वन विभाग को अपनी कार्ययोजना में दो प्रमुख सुधार करने की आवश्यकता होगी। पहले सुधार के अन्तर्गत वनों में पानी के भंडार, नदियों में अविरल प्रवाह के लिए योगदान, नमी की उपलब्धता, जैवविविधता और फूड-चैन जैसे अनेक बिन्दुओं को यथेष्ट रूप से समाहित करना होगा। दूसरे सुधार के अन्तर्गत भूमि कटाव और



जल संरक्षण के कामों की तकनीकी दक्षता को और बेहतर बनाना होगा। समाज द्वारा कार्य योजना में दोहन और उत्पादन के सन्तुलन एवं जैवविविधता को आदर्श बनाने तथा मिश्रित यनों को विकसित करने हेतु अनुरोध किया जा सकता है। अपेक्षा होगी कि सामुदायिक वनों के विकास में ग्रामीण समाज की जिम्मेदारी बढ़े। विभाग इस हेतु पहल करें। समाज चाहेगा कि वन सम्पदा का दोहन प्रकृति से तालमेल और वनों की कुदरती भूमिका को ध्यान में रखकर हो। आक्सीजन की कमी के कारण जीवन पर संकट नहीं पने। समाज की यह भी अपेक्षा है कि सरकार की सहयोगी और उत्प्रेरक की हो। इंडियन फॉरेस्ट एक्ट 1927 में उल्लेखित ग्राम वन (Village Forest) की अवधारणा को लागू करना चाहिए। मौजूदा कायदे-कानूनों के बन्धनों के कारण आम आदमी जंगल में जाकर वृक्षारोपण नहीं कर सकता पर अपने घर के आसपास तो वृक्ष लगाने का काम कर ही सकता है। उनकी रक्षा कर सकता है। अपने मित्रों, सगे सम्बन्धियों तथा परिचितों को पेड़ लगाने के लिए प्रेरित कर सकता है। अनेक नगरीय निकाय तथा पंचायतें स्मृति-वनों को प्रोत्साहित करते हैं। हम अपने आसपास प्राणवायु बढ़ाने वाले कार्यक्रमों को सफल बनाने में अपना योगदान दे सकते हैं। सूखते पेड़ों को पानी देकर उन्हें बचा सकते हैं। हरियाली से जुड़ा हर प्रयास हकीकत में योगदान होता है। उस नागरिक दायित्व को पूरा करने के लिए अपने घर में किचिन गार्डन, फूल वाले वृक्ष तथा सब्जियाँ लगावें। संभव हो तो टैरेस गार्डन विकसित करें। बड़े नगरों में कई मंजिला बिल्डिंग बनने लगी है। इनमें बहुत से लोग निवास करते हैं। उनकी आक्सीजन आवश्यकता को पूरा करने के लिए कई मंजिला बिल्डिंगों के आसपास सघन वृक्षारोपण होना चाहिए। हर बसाहट के आसपास ढेर सारे पार्क होना चाहिए। ढेर सारी हरियाली होना चाहिए।

लकड़ी के फर्नीचर का कम से कम उपयोग करें। कागज के इस्तेमाल में संयम बरतें।

कागज के दोनों ओर लिखें। इससे कागज तो बचेगा ही वन भी बचेंगे। रीसाईकल्ड कागज का उपयोग बढ़ावें। कम्प्यूटर संदेश का उपयोग करें। रेल टिकट की हार्ड कॉपी के स्थान पर मोबाइल पर दर्ज टिकट संदेश को बढ़ावा दें। अधिक से अधिक केशलेस ट्रांजेक्शन करें। और भी अनेक तरीके हैं या हो सकते हैं जिन्हें अपनाने से जंगल बचाये जा सकते हैं। सामाजिक दायित्व पूरा किया जा सकता है।



लेखक: म.प्र. शाहन वाट्टर शेड मिशन के अध्यक्ष रह चुके हैं

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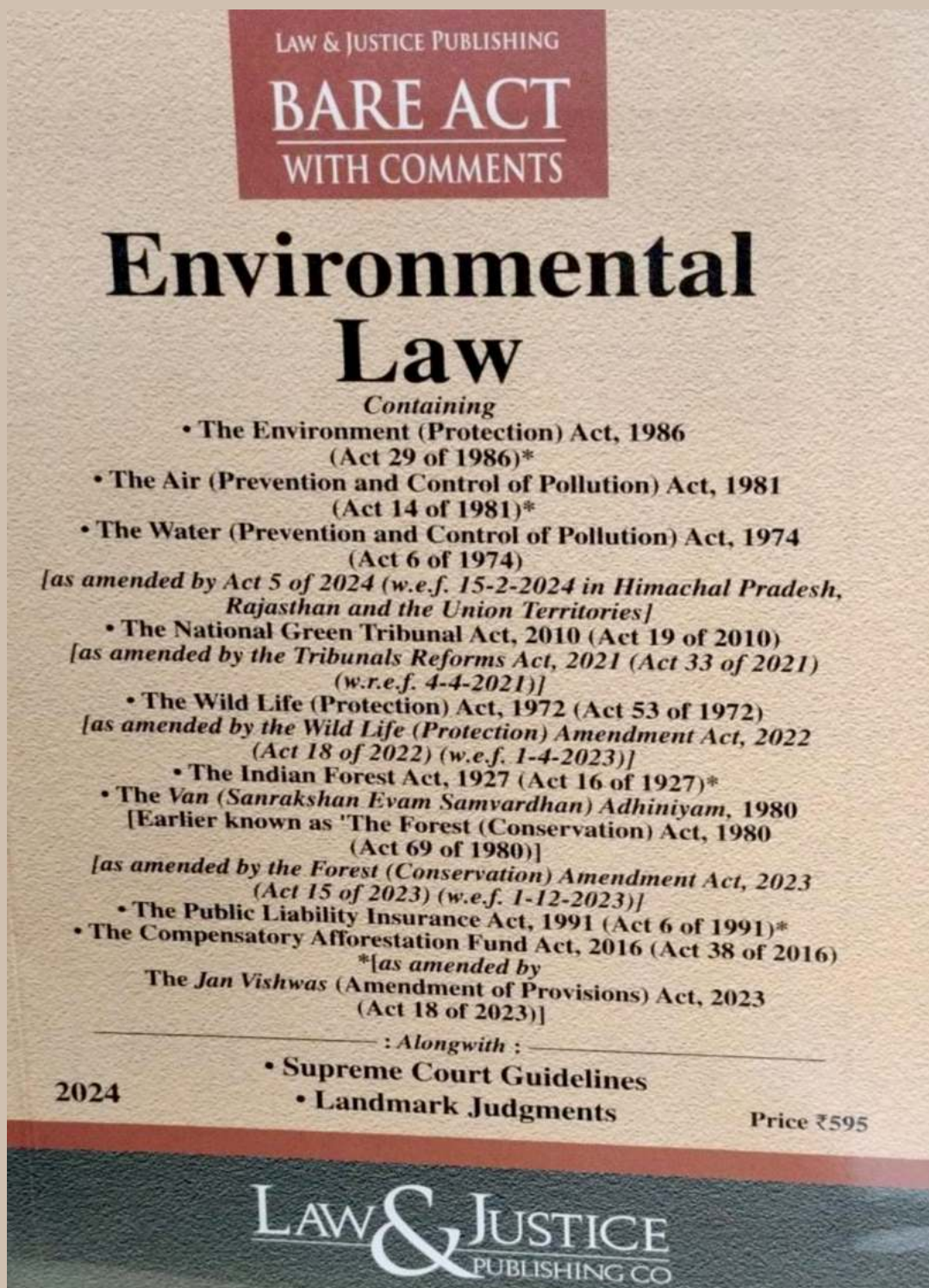
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