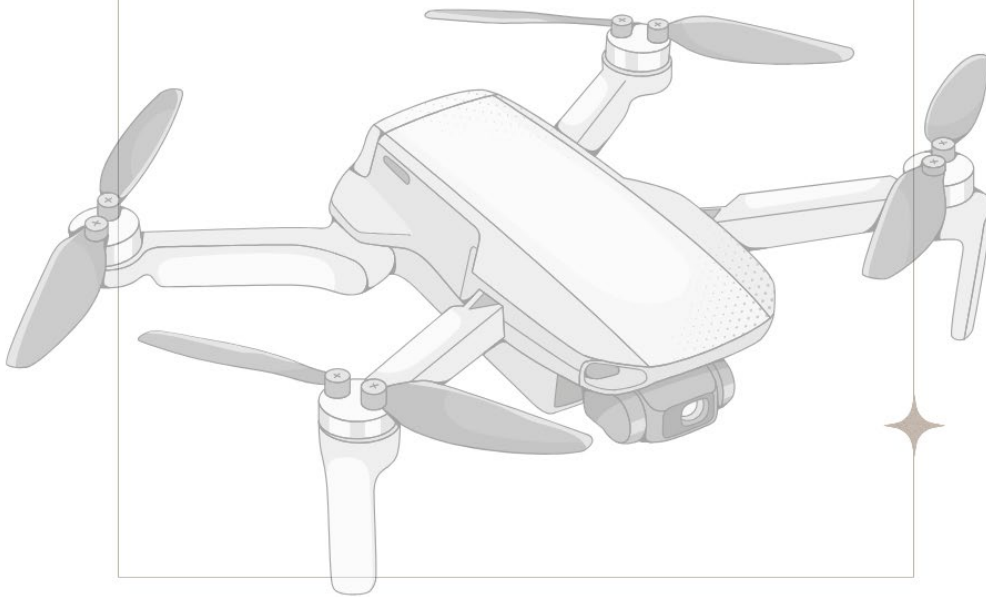




TN SHORE Drone Operation and Governance Policy



**Tamil Nadu Sustainably Harnessing Ocean Resources and Blue Economy
Environment, Climate Change and Forest Department**

TN SHORE DRONE OPERATION AND GOVERNANCE POLICY

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DRONE OPERATION AND GOVERNANCE POLICY

Drone operations in India are currently regulated by guidelines set forth by Government of India, Ministry of Civil Aviation (MoCA). MoCA notified the 'Drone Rules, 2021' in Aug 2021 (amended in February 2022) which is applicable to all Drones up to weights of 500 kg that are registered or operated in India. Further, the February 2022 amendment abolished the requirement of a Drone pilot license, thereby allowing a remote pilot certificate issued by a DGCA-authorized Drone school, for operating Drones. Director General of Civil Aviation (DGCA) has also established "Digital Sky" – an online single-window platform for all activities related to the management of Drones, which enables online registration of pilots, devices and service providers. This Document "Draft Drone Policy for Tamil Nadu Coastal Restoration Mission" provides Application of Drone As A Service -DAAS for the Establishment of state-level coastal zone management databases and information management systems ("MISs"). This document is prepared in line with the World Bank's Environmental and Social Commitment Plan (ESCP) requirements under ESS 1.5, which call for the preparation, adoption, and implementation of a Risk Mitigation Plan governing the use of drones in the project. The plan is designed to conform to the Government of India's guidelines and procedures, together with the World Bank's guidance note.

A step towards making India a global drone hub by 2030

Policy Objectives

- Technical assistance to Project Executing Agencies ("PEAs") to develop baseline assessments (using drones, wherever appropriate) of coastal ecosystems, measure carbon stocks, monitor the condition of mangroves, coastal wetlands, seagrasses, other coastal habitats, and plastic pollution
- Establishment of state-level coastal zone management databases and information management systems ("MISs")
- Enhance surveillance of canopy and social monitoring along the 1,069 km coastline
- Ensure safe, legal, and sustainable drone operations in Coastal Regulation Zones (CRZ) in accordance with the Directorate General of Civil Aviation's Drone Rules, 2021 and Drone (Amendment) Rules, 2023
- Promote innovation and public-private partnerships in Drone as a Service - DAAS.
- TN SHORE Department aims to position the Drone Ecosystem R&D. This Policy would also improve Drone usage in alignment with SDG Goals 13-15 (Climate Action, Life Below Water, LIFE On Land) for global alignment.

TN SHORE Relevance

- Ensures controlled drone activity and regulatory oversight near sensitive coastal infrastructure including nature-based infrastructure and airport corridors
- Supports Environment and Social Framework compliances
- The document shall comply with the World Bank's Environmental and Social Commitment Plan (ESCP) requirements, specifically ESS 1.5, by preparing, adopting, and implementing a Risk Mitigation Plan for the use of drones in the project (Annexure 1)
- Enables strategic environmental monitoring with Air Traffic Control coordination in semi-restricted areas
- Enhances coastal zone management and climate resilience planning.
- Supports real-time environmental data collection in green zones.
- Aligns with climate governance and stakeholder transparency goals.
- Strengthens local ecosystems and technology self-reliance in climate governance tools.
- Enhances precision navigation for coastal monitoring, CRZ compliance, and environmental data collection.
- Aligns with TN SHORE's goals of resilience, innovation, and institutional accountability.
- Supporting stakeholder engagement through transparent airspace governance.
- Facilitates real-time coordination for UAS operations in coastal and ecologically sensitive zones.
- Technical assistance to the Forest Departments in establishing regulatory frameworks to access carbon finance and for nature-based investments

Existing GoI Regulations

“GREEN ZONE” – UAS AIRSPACE CLASSIFICATION:

- **Geographic Scope:** Applies to land areas and territorial waters of India.
- **Vertical Limit:** Up to 400 feet (120 meters) above ground or water level.
- **Exclusion Criteria:** Must not be designated as a Red Zone or Yellow Zone in the official airspace map.
- **Airport Proximity Clause:**
 - Includes airspace between 8 km and 12 km from the perimeter of an operational airport.
 - Within this band, the vertical limit is reduced to 200 feet (60 meters).

“YELLOW ZONE” – UAS AIRSPACE CLASSIFICATION:

- **Geographic Scope:** Applies to land areas and territorial waters of India.
- **Operational Restriction:** UAS operations in this zone are restricted and require prior permission from the relevant Air Traffic Control (ATC) authority.

- **Vertical Boundaries:**

- Airspace above 400 feet (120 meters) in designated Green Zones is classified as Yellow Zone.
- Airspace above 200 feet (60 meters) in the band 8 km to 12 km from the perimeter of an operational airport is also designated as Yellow Zone.

“RED ZONE” – UAS AIRSPACE CLASSIFICATION:

- **Geographic Scope:**

- Airspace above land areas and territorial waters of India.
- Airspace above installations or notified port limits beyond territorial waters, as specified by the Central Government.

- **Operational Restriction:**

- UAS operations in Red Zones are strictly prohibited, unless "remotely piloted aircraft" meaning an unmanned aircraft that is piloted from a remote pilot station.

Classification for UAS Operations – TN SHORE Alignment

- Platform: Publication to be made on the Digital Sky Platform, ensuring transparency and accessibility.
- Scope: Segregation of Indian airspace for manned and unmanned aircraft systems (UAS) operations.
- Resolution Standard: Airspace mapping to maintain a horizontal resolution of 10 meters or finer, enabling precise geofencing and compliance tracking.

Category of drones:

Category	Weight Range
Nano UAS	≤ 250 grams
Micro UAS	> 250 grams and ≤ 2 kilograms
Small UAS	> 2 kilograms and ≤ 25 kilograms
Medium UAS	> 25 kilograms and ≤ 150 kilograms
Large UAS	> 150 kilograms

Licensing System for Category of Drones:

Category	Licensing system
Nano	No remote pilot license
Micro	For non-commercial purposes, there is no need for a remote pilot license
Small	Remote pilot license mandatory
Medium	
Large	

Regulatory Alignment:

Aspect	Govt of India Guidelines	TN Coastal Adaptation
Drone Classification	Nano to Large UAVs based on weight	All categories of drones approved by Govt of India regulatory bodies would be permitted in CRZ I to IV
Air Space Zones	Green. Yellow and Red Zones	The mandatory permissions from the yellow zone and red zone owners has to be obtained.

Operational Guidelines – Under TN SHORE

Objective:

To ensure responsible, risk-informed, and compliant use of unmanned aircraft systems (UAS) under the TN SHORE.

Provision:

Prior to initiating drone operations under any component of the Project, the Project Executing Agency (PEA), through the Tamil Nadu Special Project Monitoring Unit (SPMU) and the Tamil Nadu Project Executing Authorities (TNPEAs), shall undertake the following actions:

Certification Standards under TN SHORE Framework:

- **Issuing Authority:**

- The Central Government, based on recommendations from the Quality Council of India, may notify standards via the Official Gazette.

- **Purpose of Standards:**

- To define eligibility and technical criteria for obtaining Certification for unmanned aircraft systems (UAS).

Promotion of Indigenous Capabilities:

- Encourage use of Made-in-India technologies, designs, components, and UAS platforms.
- Support integration of the Indian Regional Navigation Satellite System (IRNSS), specifically Navigation with Indian Constellation (NavIC).

Certification Exemptions – TN SHORE :**Manufacturing & Import Exemption:**

- No Type of Certificate Required for:
 - Manufacturing of unmanned aircraft systems (UAS).
 - Importing UAS for approved use cases (e.g., environmental monitoring, coastal mapping).

Operational Exemption for Specific UAS Types :

- Model Remotely Piloted Aircraft Systems – Typically used for training, simulation, or educational purposes.
- Nano Unmanned Aircraft Systems – Lightweight drones ($\leq 250\text{g}$), ideal for low-risk operations such as:
 - Community-level climate awareness campaigns.
 - Environmental documentation.
 - Micro-level coastal vulnerability mapping.

Permitted Uses under TN SHORE :

- Environmental Monitoring:
 - Coastal erosion, mangrove health, land accretion, Geographic Delineation etc.,
- Marine Biodiversity Surveillance:
 - Mangroves, other coastal resources etc.,
- Restoration Site Mapping:
 - Mangrove replanting and tracking etc.,
- Aerial Surveys:
 - Sensitive marine habitats and shoreline dynamics

- Real-Time Monitoring:
 - Coastal restoration efforts and project interventions
- Habitat Mapping:
 - Endangered or sensitive species (e.g., seagrass beds, coral reefs, etc.,)
- Documentation:
 - Documentation and chronicling of activities carried out under TNSHORE

Restricted Activities:

- Recreational Flying prohibited in CRZ – I Zone & Ecologically Sensitive Areas for non-commercial drone operations such as nano and micro drone category
- TN SHORE would identify areas where restrictions on drone flying need to be imposed – either on a permanent nature and on a temporary nature. These restrictions would be promulgated through the Digital Sky Platform of DGCA
- Drone operations during critical nesting or spawning seasons in ecologically sensitive areas shall be in consultation with the Management authorities like DFOs/Wildlife Warden, District Collector or the District Official of the Project Executing Agencies
- Drones operations in Bird Migratory season and Nesting season should be done in a manner not to disturb natural ecological processes and to be carried out under the instruction of the DFOs/Wildlife Warden, District Collector or the District Official of the Project Executing Agencies
- Drone operations in coastal human dominated areas should have community concerns and to be sensitive to the societal frame works and status.

Pre-Deployment Requirements:

- Purpose of operation should align with Permitted Uses under TN SHORE policy
- Drone should be equipped with GPS, return-to-home, and geo-fencing features (as per DGCA norms)
- Digital Sky Registration:
 - All drone operators and remote pilots must be registered on the Digital Sky Platform.
- Pilot Certification Requirement: A valid Remote Pilot Certificate is mandatory for operating drones above Nano category.

Area-Specific Compliance:

Verification must be specific to the intended area of operation, including:

- Coastal zones under TN SHORE, should ensure airspace integrity and World Bank Environmental and Social Framework

- Supporting real-time coordination with regulatory authorities for no operation zone in airport proximity corridors for safe and lawful drone operations

Access to Digital Sky platform:

Institutional Access to Digital Sky Platform – Governance Integration

- Authorized Entities:
 - Nodal officers of State Governments and Union Territory Administrations
 - Law Enforcement Agencies
- Access Provision:
 - These entities shall be granted direct access to the Digital Sky Platform.

Operation and Monitoring of drones:

Operational Protocols:

- Drone should be marked with unique identification number (UIN)
- Visual line-of-sight should be maintained throughout operation
- Emergency protocols should be briefed to the team (such as loss of signal, battery failure, etc.)
- Weather conditions should be assessed and logged, prior to flight
- Data capture should be aligned with approved objectives (e.g., erosion mapping, biodiversity monitoring etc.,)
- No payloads or hazardous materials should be attached unless pre-approved by concerned Project Executing Authorities
- All drones operating under the TN-SHORE be preferably covered for drone insurance coverage to address risk due to accidents, damages or privacy breaches

Monitoring and Evaluation:

- Flight log should be submitted within 48 hours
- Data should be archived securely and shared with relevant TN SHORE Executing Departments
- Any deviations or incidents should be reported immediately within 24 Hrs.
- Visuals should be tagged with location, timestamp, and purpose for audit trail.
- Compliance record should be updated for future reference and audits
- Quarterly reports will be submitted by the Project Executing Agencies to the SPMU – TNSHORE on the usage of UAV with the following particulars,
 - Purpose of use
 - Duration of usage

- Output of the assignment
- Details of any untoward incidences.

Mandatory safety features

Safety, Airspace Ethics & Incident Reporting:

- Safety Mandate:
 - No person shall operate an Unmanned Aircraft System (UAS) in any manner directly or indirectly, that endangers the safety or security of individuals or property.

Right of Way:

- Airspace Ethics:
 - UAS operators must yield right of way to all manned aircraft.
 - Drone operations must remain clear of manned flight paths at all times.

Mandatory Reporting of Accidents:

- Reporting Timeline:
 - Any accident involving a UAS must be reported within 48 hours of occurrence.
- Reporting Channel:
 - The remote pilot must submit the report via the Digital Sky Platform to the Director General.

Future Safety Mandates for UAS – TN SHORE:

Central Government Notification – Safety Feature Specification :

- Authority: Central Government may notify mandatory safety features via Official Gazette.
- Applicability: All unmanned aircraft systems (UAS) owned by individuals or entities.
- Indicative Safety Features:
 - No Permission–No Take-off (NPNT): Hardware/firmware ensuring regulatory clearance before flight.
 - Real-Time Tracking Beacon: Transmits UAS location, altitude, speed, and unique ID—critical for coastal surveillance and climate monitoring.
 - Geo-Fencing Capability: Prevents UAS from entering restricted zones (CRZ-I areas, ecologically sensitive wetlands etc.,).

Risk Assessment and Mitigation

- No drones shall be deployed under any component of the Project unless the Project Executing Agency (PEA), through the TNSPMU and TNPEAs, has fully implemented the prescribed risk mitigation measures
- Notify the Authority of the proposed drone deployment, including scope and intended operational zones.
- Conduct a comprehensive risk assessment, covering:
 - Operational risks
 - Legal and regulatory compliance
 - Institutional and technical feasibility
 - Social and Environmental implications
 - Fiduciary and governance risks
- Recommend appropriate mitigation measures to address identified risks.

Data Governance & Ethics

- Data governance:
 - All data collected through drone operations under the TN SHORE initiative shall be owned by TN SHORE, and its usage, storage, and dissemination shall be governed by the project's data security and access protocols
- Geo-Tagging Requirement:
 - All environmental and spatial data collected via drones must be geo-tagged for traceability and planning accuracy.
- Privacy Protocols:
 - Enforce strict privacy safeguards for civilian areas to prevent unauthorized surveillance or data misuse.
- Data Sharing Mandate:
 - Environmental datasets to be shared with:
 - SPMU - TNSHORE
 - Project Executing Agencies
 - Purpose: Coastal planning, restoration tracking, and climate resilience mapping etc.,
- Data Storage Standards:
 - Hybrid Storage Model: Combine cloud-based storage (Azure, AWS) with on-site servers for speed and resilience.
 - Automatic Backups: Schedule daily or weekly backups to prevent data loss.
 - Audit Trails: Maintain logs of data access and modifications for accountability.

- Data Format & Interoperability:
 - Standardized Formats: Use open formats like GeoTIFF, LAS (LiDAR), and CSV for metadata.
 - Metadata Tagging: Include timestamps, location, drone ID, and operator details for traceability.
- Operational Efficiency:
 - Compression & Archiving: Use lossless compression for large files (3D models, thermal imagery).
 - Version Control: Maintain version history for datasets used in analysis or reporting.

ANNEXURE 1

Assessment of Operational Risk, Legal & Regulatory Compliance, and Social & Environmental Implications for Drone Deployment under TN-SHORE

To be completed by the Drone Operator prior to each drone deployment under TN-SHORE, in accordance with the TN-SHORE Drone Policy. The assessment shall cover the operator's competency and capacity, safety and operational risk management, legal and regulatory compliance, ethical considerations, and community engagement requirements applicable to the proposed drone operation.

1. Basic Mission Details

TN SHORE- Sub-project name	
**Component / Activity	
Site / Location (District, Taluk, Village, Coordinates)	
Purpose of Drone deployment	
Implementing/Executing Agency (PEA/DFO/SPMU-TN SHORE unit)	
Drone Operator / Agency engaged	
Pilot-in-command (name, licence no.)	
Proposed date(s) and duration of flight(s)	
Area of Interest (AOI) size (ha/km ²)	
Drone type/model and sensor payload	
Prepared by / Designation	
Date of assessment	

**G.O.(Ms) No. 11, 70, 130, 160 references

2. Operational Risk Assessment

List all risk factors likely to affect the mission's safety, timeline, or data quality. Rate Likelihood and Severity as Low/Medium/High and record the mitigation measure and responsible person for each.

Risk factor	Likelihood	Severity	Mitigation measure	Owner
Adverse weather (rain, wind, low visibility)				
Equipment/battery failure in flight				
Loss of GPS signal / link loss				
Fly-away / loss of control				
Airspace conflict (proximity to airport, restricted zone, other aircraft)				
Take-off/landing site hazards (crowd, animals, obstacles)				
Battery fire / **LiPo mishandling				
Injury to crew, community members or third parties				
Damage to third-party property				
Data loss / corrupted imagery				
Delay in flight permission / clearance				
Site inaccessibility or travel-related delay				
Other (specify)				

**Lithium Polymer (LiPo) battery(Rechargeable)

2.1 Emergency Preparedness Checklist

Item	Status / Remarks (Yes/No/NA)
Standard Operating Procedures (SOP) manual available with operator	
Emergency Response Plan (ERP) prepared and briefed to team	
Concept of Operations (ConOps) document prepared	
First-aid kit and fire extinguisher (Class D, for LiPo fires) available on site	
High-visibility jackets and safety cones/markers for take-off/landing zone	
Emergency contact numbers listed (nearest control tower/hospital/police)	
Pre-flight safety briefing conducted with all field team members	
Flight log maintained for the mission	

3. Legal and Regulatory Compliance Checklist

Compliance requirement	Status (Yes/No/NA)	Evidence / Reference no.
Drone operator holds a valid licence/authorisation to operate commercially (e.g., DGCA-registered Remote Pilot Certificate / **UAOP, as applicable)		
Drone registered on the Digital Sky platform - Directorate General of Civil Aviation (DGCA)		
Operator has valid third-party liability insurance covering the mission		
Equipment insurance (Drone and sensor loss/damage) in place, if applicable		
Flight permission obtained from Civil Aviation Authority / local administration (where required)		
No-Fly Zone / restricted-area check completed (airports, defence installations, government buildings)		

Compliance requirement	Status (Yes/No/NA)	Evidence / Reference no.
Coordination with local police/district administration completed, where the AOI is near sensitive installations		
Compliance with State/local Drone rules (e.g., coastal regulation zone, forest, or wildlife sanctuary permissions, if applicable)		
Data storage, ownership, and sharing protocol consistent with project data policy		
Applicable clearances under Coastal Regulation Zone (CRZ) Notification obtained, if AOI falls within CRZ limits		

****Unique Authorization Number / Unmanned Aircraft Operator Permit**

4. Social and Environmental Implications Assessment

4.1 Community Engagement and Consent

Item	Status (Yes/No/NA)	Remarks / Reference
Community/stakeholders informed in advance of the planned Drone flight (date, purpose, area)		
Local self-government / VMC / community representative consulted and consent recorded		
Grievance Redress Mechanism (GRM) contact details shared with the community		
**Vulnerable groups or sensitive sites, in the AOI identified and additional safeguards applied, if any		

****Illustrative categories for the vulnerable groups/sensitive sites — To state which apply at this AOI and the corresponding safeguard, or record "None identified within or adjoining the AOI":** traditional/artisanal fisherfolk households; women's SHG members (fish-drying, net-mending, vending); children (schools/anganwadis); turtle nesting/rescue centres and other wildlife enclosures; religious/cultural sites; fish landing centres/drying yards/auction halls during active hours; health sub-centres and anganwadis.

4.2 Privacy and Data Protection

Item	Status (Yes/No/NA)	Remarks / Reference
Flight altitude and resolution assessed to avoid unnecessary privacy intrusion (e.g., avoid imaging private dwellings/open latrines at intrusive resolution)		
Personally identifiable information in imagery restricted or blurred where required		
Data access, storage and sharing limited to authorised project personnel		

4.3 Environmental and Ecological Considerations

Item	Status (Yes/No/NA)	Remarks / Reference
Flight does not coincide with breeding/nesting season of sensitive species (e.g., sea turtles, nesting birds) in or near the AOI		
Flight altitude/noise assessed for potential disturbance to wildlife and habitats (eg., mangroves, turtle nesting beaches, marine protected areas)		
Coastal/marine ecological sensitivities considered (tidal timing, protected habitat boundaries)		
No adverse impact anticipated on ongoing conservation or livelihood activities in the AOI		

5. Overall Risk Determination and Approval

Overall operational risk rating (Low/Medium/High)	
Overall legal/regulatory compliance status (Compliant / Pending / Non-compliant)	
Overall social & environmental risk rating (Low/Medium/High)	

Overall operational risk rating (Low/Medium/High)	
Conditions attached to approval, if any	
Recommendation (Approve / Approve with conditions / Reject / Defer)	

Prepared by Agency/Drone Operator	Reviewed by (E&S Team – TN SHORE)	Approved by CMD/MD – TN SHORE
Name:	Name:	Name:
Designation:	Designation:	Designation:
Date & Signature:	Date & Signature:	Date & Signature: