

## REVIEWER'S REPORT

Manuscript No.: IJAR-54213

**Title:** DETECTING ILLEGAL LOGGING USING DEEP LEARNING ON SENTINEL-1 SAR IMAGERY

### Recommendation:

Accept as it is .....

**Accept after minor revision.....yes.....**

Accept after major revision .....

Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		y		
Techn. Quality		y		
Clarity			y	
Significance		y		

Reviewer Name: Dr.Shaweta Sachdeva

**Date:** 8/10/25

## Detailed Reviewer's Report

### Strengths and Positive Feedback

#### 1. Relevance and Impact:

The study addresses a critical global issue — illegal logging — and presents a technically advanced solution using deep learning and SAR data. Its environmental relevance and potential for real-world application are commendable.

#### 2. Novel Approach:

The integration of UNet + DeepLabV3 architecture with an EfficientNet-B4 encoder and SCSE attention mechanisms shows innovative model design and a strong understanding of deep learning frameworks for environmental monitoring.

#### 3. Clear Methodological Explanation:

The paper systematically explains dataset preparation, preprocessing, augmentation, and model architecture, enabling reproducibility and clarity.

#### 4. Strong Theoretical Basis:

Adequate literature support is provided, referencing recent works (2024–2025), which strengthens the paper's scientific grounding.

#### 5. Balanced Evaluation Metrics:

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The use of multiple evaluation metrics (Accuracy, Precision, Recall, F1-Score, IoU, Dice) provides a comprehensive assessment of model performance.

**Suggestions for Enhancement****1. Abstract and Results Quantification:**

Include more quantitative performance comparisons in the abstract — e.g., “The proposed model outperformed baseline U-Net by X% IoU.” This would emphasize novelty and measurable contribution.

**2. Literature Review Expansion:**

Although relevant works are cited, the **related work section** could benefit from a short comparative discussion on other remote sensing or CNN-based logging detection studies to highlight the gap this work fills.

**3. Dataset Limitation Discussion:**

The dataset (23 SAR images from 2015–2016) is quite limited. Discuss more explicitly how this may affect generalization, and propose methods (e.g., transfer learning from other forest regions or temporal datasets) to mitigate this.

**4. Model Performance Interpretation:**

The model's **moderate F1-score (65.56%)** and **IoU (48.76%)** should be critically interpreted. Explain what environmental or data factors caused the gap between precision and recall, and how the model could be improved to detect more subtle illegal activities.

**5. Comparative Baseline Models:**

Include results of **baseline comparisons** (e.g., classical UNet, ResNet encoder) to better demonstrate the improvement provided by the combined DeepLabV3-EfficientNet model.

**6. Figures and Visualization:**

Add clearer, high-resolution examples of segmentation outputs (true vs. predicted masks) to visually demonstrate model effectiveness and highlight areas of error.

**7. Results Validation:**

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Mention whether any **independent validation or field verification** was performed to assess model reliability beyond the dataset source. This is crucial for practical application in conservation.

### 8. Discussion on Generalization and Deployment:

Include a short section on **scalability** — how the model can be deployed in real-time systems or integrated with cloud-based forest monitoring platforms (e.g., Global Forest Watch).

### 9. Language and Formatting:

Some parts of the text (especially in the methodology) are overly dense. Simplify long technical sentences and improve figure captions for clarity.

### 10. Future Scope:

Expand the future work section to mention the inclusion of **multimodal data (SAR + multispectral imagery)**, **temporal monitoring**, and **transfer learning across different forest types** for improved robustness.