A Quarterly Newsletter of **Odisha Forestry Sector Development Project,** Phase-II July-September, 2024, VOL-8, ISSUE-2

From Project Director's Desk

The Odisha Forestry Sector Development Project, Phase-II (OFSDP-II) is a comprehensive initiative led by the Government of Odisha, implemented through the Department of Forest, Environment, and Climate Change, with financial support from JICA. The project's primary objective is to mobilize resources and optimize the use of funds to enhance the capacity of community stakeholders, thereby boosting their income generation activities. This is achieved through targeted handholding support and inter-sectoral convergence initiatives.

The project has successfully mobilized livelihood support for thousands of Common Interest Groups (CIGs), Self Help Groups (SHGs), and the Poorest of the Poor (PoPs), assisting them through various sectoral convergences and project interventions. The Project Management Unit (PMU) has provided significant support to grassroots SHGs, CIGs, and PoPs by helping them showcase and sell their products at different district and state-level platforms of sale cum exhibitions.

This edition of Banayana highlights the bond of community and groups with the nature and the celebration across forest fringe areas on the occasion of Rakhya Bandhan. In many places, the day was celebrated as a family day with tree and forests. Some glimpses of these and allied activities across divisions of OFSDP, Phase -II has been highlighted here.

This issue carries a Special Case Study on Application of Geospatial Technology with Information Management System in Decentralised Planning by Forest Fringe Dwelling Communities in Forestry Sector is reflected here with comprehensive analysis and related output. It is worth mention here that Odisha Forestry Sector Development Project- II (OFSDP-II) exemplifies innovative forest conservation by integrating geospatial technology and information management systems with community-centered planning. This study highlights key findings viz. advanced tools like GIS and remote sensing enabled real-time forest monitoring and resource allocation; information systems promoted transparency and empowered local communities alongside project's inclusive governance improved livelihoods for forest fringe communities while advancing environmental stewardship. The study calls for continued investment in technology, capacity building, and exploring advanced tools for sustainable forest management and community engagement.

Dr Meeta Biswal, IFS
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OFSDS

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"What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another"

COVER STORY

RAKHYA BANDHAN WITH TREE

In a world grappling with environmental challenges, planting trees and saving forests has become imperative. Forests, as the source of water, oxygen, and biodiversity, are vital for human survival. In a unique effort to spread awareness about the need for environment preservation, community members of various Vana Surakhya Samitis of OFSDSP-II in different Forest Divisions participated in the celebration of Rakhya Bandhan with Tree and sensitised everyone on the need of preserving our nature and flora and fauna.

Rairangpur: Tying Rakhis to Trees: A Symbol of Love and Conservation in Tulasibani

The call of the hour is to love and protect our forests—not just by the Forest Department, but also by the dedicated forest dwellers of the Tulasibani Vana Surakhya Samiti (VSS) in the Manada Range under the Rairangpur Forest Division. Drawing inspiration from the Rakhi tradition, which symbolizes love, protection, and a deep moral bond between siblings, the community has extended this sentiment to the forest. As sisters tie Rakhi on their brothers' wrists, pledging affection and security, the villagers have embraced a similar ritual for the forest. They tied Rakhis to trees as a profound reminder of their responsibility to conserve and cherish nature.

A Heartfelt Initiative by SHG Members

Women from the Self-Help Groups (SHGs) Maa Mandara Malini and Maa Sarala demonstrated their love for nature through a Rakhi-tying ceremony at Tulasibani Reserved Forest (RF). Led by the 75-year-old VSS President, Sri Brajamohan Singh, this initiative highlighted the emotional and practical need to protect the forest. Under the guidance of local forest officials, who strongly advocates for forest preservation for future generations, the Rakhi Utsav brought the community together. The event was meticulously organized by the VSS for encouraging the villagers to strengthen their bond with the forest. In a deeply symbolic act, 35 SHG members worshipped and tied Rakhis to trees across Tulasibani Forest. The event also included extempore speeches, reflecting their commitment to saving forests and wildlife. This heartwarming celebration of Rakhi for trees showcases a growing

consciousness about environmental conservation and the hope for a greener future.

Subranapur: Raksha Bandhan: A Celebration of Bonds, Now Extended to Nature

A New Interpretation of Raksha Bandhan by Khajuriapali VSS Inspired by the essence of this festival, the women of Khajuriapali Village Self-Help Society (VSS) under FMU Ullunda (OFSDP-II) in the Subarnapur Forest Division have reimagined this tradition with a heartfelt purpose. For the past few years, these women have embraced the Raksha Bandhan spirit by tying Rakhis to the trees in their nearby forest. This act symbolizes their commitment to protecting the forest, fostering its growth, and ensuring its preservation for future generations. A Bond with Nature By tying Rakhis to trees, these forest-loving women highlight the harmonious relationship between humans and nature. Their symbolic gesture serves as a reminder of the forest's role as a protector and provider. This innovative approach has not only brought attention to forest conservation but also inspired the surrounding community to adopt sustainable practices. Creating a Positive Ripple Effect The dedicated efforts of Khajuriapali VSS have left a profound impact on the region. By merging tradition with environmental awareness, these women have set a shining example of how cultural

practices can be leveraged to promote ecological balance. Their initiative underscores the message that forests, much like siblings, deserve love, care, and unwavering protection. Through their actions, these women demonstrate that Raksha Bandhan is more than just a celebration of human bonds—it can also be a call to nurture and protect the natural world that sustains us all.

Raksha Bandhan: A Celebration of Love, Duty, and Nature

Raksha Bandhan, also known as Rakhi, is one of the most cherished traditional festivals celebrated by Hindus worldwide. It honors the bond of love and duty between brothers and sisters. However, this beautiful occasion transcends biological ties, bringing together people across religions and ethnicities to celebrate all forms of platonic love.

Extending the Bond to Nature

Unlike a brother, who reciprocates with a gift, trees—our silent benefactors—ask for nothing in return. They give humanity essential gifts like oxygen, shade, and sustenance. Yet, they are often neglected and harmed in the name of development. Millions of trees are felled annually, and countless others perish in wildfires, threatening the delicate balance of life on Earth. On this special day, it is imperative to recognize trees as our protectors and nurturers. On this Raksha Bandhan, treating trees as siblings, mothers, or friends is a very unique thought. By tying a Rakhi to a tree, community can pledge to protect and preserve them, ensuring a safe and sustainable future for generations to come.

Raksha Bandhan Beyond Human Bonds

Hindu mythology offers numerous instances where Raksha Bandhan signifies more than just sibling relationships. In the face of global environmental changes, tree species are in danger. Deforestation and climate change threaten the very ecosystems that sustain life. Trees don't differentiate between caste, religion, wealth, or poverty—they serve all equally. To protect our planet, we must cultivate a bond between humans and trees, treating them as essential members of our community.

An Innovative Celebration with Trees

The Odisha Forestry Sector Development Project (OFSDP-II) staff of Mujagada FMU has embraced this idea by organizing Raksha Bandhan celebrations at various Vana Surakhya Samitis (Forest Protection Committees). Since 2004, this innovative approach has encouraged people to tie Rakhis to trees, symbolizing their commitment to protect them. This year, men, women, and children participated in the event, learning about the vital role trees play in our lives. Discussions highlighted the importance of forest conservation and the need to protect trees for a sustainable future.

SPECIAL CASE STUDY

APPLICATION OF GEOSPATIAL TECHNOLOGY WITH INFORMATION MANAGEMENT SYSTEM IN DECENTRALISED PLANNING BY FOREST FRINGE DWELLING COMMUNITIES IN FORESTRY SECTOR

By Shri Swyam Mallick, IFS, Joint Project Director, (PI&LCD), OFSDS

INTRODUCTION

Forests, often referred to as the lungs of the Earth, are irreplaceable ecosystems that contribute to global biodiversity, climate regulation, and sustainable livelihoods for countless communities worldwide. In the Indian state of Odisha, the intricate tapestry of lush forests, spanning over 37% of the state's land area, has historically been a vital resource, supporting the lives and aspirations of millions of its residents. Yet, this resource has faced significant challenges in recent decades, including rampant deforestation, habitat degradation, and inadequate community involvement in forest management.

Odisha, endowed with a rich natural heritage, recognized the urgent need to address these challenges while harnessing the full potential of its forestry sector. The Odisha Forestry Sector Development Project (OFSDP) Phase II, conceived as a multifaceted initiative, has emerged as a visionary response to these pressing issues. It marks a transformative shift in the paradigm of forestry management, anchored in the principles of sustainable development, community participation, and the integration of cutting-edge geospatial technology and information management systems. The Project Goal is to enhance forest ecosystem along with sustainable livelihood of local people by improving sustainable forest management, sustainable biodiversity conservation and community development, thereby contributing to harmonization between environmental conservation and socio-economic development in the Project area in Odisha. Consistent with the aforesaid goal the project has framed the following objectives:

- Restore degraded forest and augment forest resources
- Secure sustainable forest management by improving forest administration, community organizations and other stakeholders
- Conservation and scientific management of the biodiversity
- Promoting inter-sectoral convergence
- Improve income of target forest dependents and their livelihood options

Thus OFSDP - II, a flagship endeavour in Odisha's developmental landscape, seeks to achieve a delicate equilibrium between forest conservation and the socio-economic upliftment of its forest fringe dwelling communities.

This paper focuses on a comprehensive exploration of the project, from the prism of application of geospatial technology and information management systems within the context of decentralized planning. It endeavours to unravel the nuances of the project's objectives, methodologies, and outcomes, shedding light on how these innovative tools and strategies have contributed to the advancement of sustainable forestry practices and the empowerment of Odisha's forest fringe communities. Accordingly the objectives of the study can detailed as given below:

1. To conduct an in-depth examination of the pivotal role played by geospatial technology and information management systems in bolstering decentralized planning within the framework of the Odisha Forestry Sector Development Project - II.
2. To assess the tangible impact of the project on forest conservation efforts, forest ecosystem restoration, and the sustainable management of vital natural resources.
3. To meticulously analyze the level of engagement and participation achieved by forest fringe dwelling communities in the OFSDP's decision-making processes and to elucidate the ensuing socio-economic transformations within these communities.
4. To extract valuable lessons and offer nuanced recommendations for the further integration of geospatial technology and information management systems within the ambit of similar forestry projects.

The Odisha Forestry Sector Development Project stands as a testament to the potential of projects that place local communities at the heart of their design and execution while harnessing the power of cutting-edge technology to inform and empower. This paper thus seeks to provide a comprehensive and insightful narrative of the project's experiences, achievements, and challenges, with the aim of illuminating a path forward, not just for Odisha but for regions worldwide that are committed to harmonizing

conservation goals with the aspirations of their forest fringe communities.

Review of Literature

The intersection of geospatial technology, information management systems, decentralized planning and their role in the forestry sector has garnered significant scholarly attention in recent years. This literature review provides a comprehensive examination of the key concepts and relevant studies in this interdisciplinary field, contextualizing the Odisha Forestry Sector Development Project (OFSDP) - II within the broader landscape of forestry and community development.

Geospatial Technology in Forestry:

Geospatial technology, encompassing Geographic Information Systems (GIS), Global Positioning System (GPS), remote sensing, and satellite imagery, has

revolutionized the forestry sector by enhancing data collection, analysis, and decision-making. Researchers have delved into diverse applications:

- In a review, Kacic et al. (2022) underscored the significance of remote sensing and GIS in forest biodiversity monitoring. This review provides a first time focus on the three spectral diversity concepts "vegetation indices", "spectral information content", and "spectral species" for forest biodiversity monitoring based on airborne and spaceborne remote sensing
- Ko et al. (2022) showcased the utility of Light Detection and Ranging (LiDAR) technology for precise forest resource inventories for timber yield and carbon sink estimation. Their research proves that the utilization of LiDAR devices increases the efficiency of data collection and overcomes the limitations of existing methods.
- Novkovic et al. (2019) have delved extensively on GIS based forest fire zonation. Their work can be applied for adequate forest fire risk management, improvement of the monitoring, and early warning systems at national, regional, and local level, which will be able to coordinate and intervene in a case of emergency events.
- The study by Dandois et al. (2010) emphasized that high spatial resolution 3D measurements of vegetation structure and spectral characteristics can be produced by applying open-source computer vision algorithms to ordinary digital photographs acquired using inexpensive hobbyist aerial platforms.

Information Management Systems in Forestry:

Information management systems have emerged as vital tools for organizing, storing, and disseminating data critical to effective forestry management and community engagement:

- Sahay et al. (1996) have explored the efforts of the Ministry of Environment and Forests in India to apply geographical information systems (GIS) for the management of wastelands in the country Decentralized Planning in Forestry.

Decentralized planning has gained prominence as a means to empower local communities in forestry management and decision-making processes:

- Larson et al. (2008) have reviewed the literature on natural resource decentralization with an emphasis on forests in developing countries. Their study can be located at the intersection between discussions of good governance and democracy, development, and poverty alleviation, on the one hand, and common property resources, community-based resource management, and local resource rights, on the other.
- The World Bank's Forest Action Plan (2016 - 20) advanced the cause of decentralized forest management as a critical component of sustainable

development. It advocated for the meaningful engagement of local

communities in decision-making processes to ensure equitable benefits from forest resources.

Application in Community Development:
Within the context of community development

- Mishra et al. (2020) have focussed on new generation community management needs to be devised to sustain our forest resources for the need of the forest dwellers in one hand and global need of carbon sink in the other
- Elwood et al. (2002) have developed a multidimensional conceptual framework for assessing empowerment (and disempowerment) and employed it in examining the impacts of GIS use by community-based organizations engaged in urban planning and neighbourhood revitalization.

OFSDP and its Context:

The Odisha Forestry Sector Development Project - II represents a dynamic and innovative response to the complex challenges of deforestation, habitat degradation, and the marginalization of forest fringe communities in the state of

Odisha. By strategically integrating geospatial technology and information management systems into decentralized planning, the project aspires to simultaneously address environmental conservation imperatives and elevate the socio-economic conditions of local communities.

While the existing body of literature provides valuable insights into the various components of geospatial technology, information management systems, decentralized planning, and community development, the OFSDP represents a unique and complex case study that merits comprehensive exploration. This ambitious project offers an invaluable opportunity to assess the real-world implications and outcomes of these technologies and strategies within the specific and challenging context of Odisha. It provides a platform to scrutinize the effectiveness of such initiatives in addressing the intricate and interconnected challenges faced by forest ecosystems and the communities intricately linked to them.

This paper thus endeavours to contribute to this rich tapestry of knowledge by conducting a thorough examination of the OFSDP, delving into its experiences, successes, and challenges. It offers a nuanced exploration of how the OFSDP has harnessed geospatial technology and information management systems within the realm of decentralized planning, aiming to benefit forest fringe dwelling communities in the Odisha forestry sector. Through this analysis, we aim to contribute to a deeper understanding of the transformative potential of these technologies and strategies, not only in the context of Odisha but also in shaping the future of forestry and community development on a broader scale.

METHODOLOGY:

Design and development of Geographic Information System (GIS) solutions and preparing Management Information System (MIS) reports that facilitates in advanced planning and effective implementation of all activities of Odisha Forestry Sector Development Project, Phase-II (OFSDP-II), Ama Jangala Yojana (AJY) and OFSDS-OMBADC Livelihood Projects is the key to successful project implementation. In view of the objectives of Odisha Forestry Sector Development Society (OFSDS) as stated hereinbefore a Geomatics Centre has been established to strengthen the strategic planning and monitoring and evaluation of activities being implemented in different projects. The methodology adopted under the project for application of geospatial technology with information management systems in decentralised planning revolves around the following principles.

Principles for application of geospatial technology and spatial and non spatial data management:

The application of geospatial technology involves procurement and processing of satellite imageries and spatial data. The preparation of thematic maps is integral to this aspect. It involves preparation of Base Maps, Forest Cover Maps, Forest Types Maps etc. to facilitate the officials for planning the forestry interventions and livelihood programme etc. Forest Cover Change analysis is an important aspect to assess the impact of project implementation.

The focus is also on creation of baseline information and baseline thematic maps with the high-resolution satellite imageries and spatial data procured from NRSC and FSI, ORSAC, FITGC etc. for analysis and for planning on implementation of Community managed Monitoring, Reporting & Verification- REDD+ Readiness under OFSDP-II. Concurrent data validation and verification is done at regular intervals.

Process of Application Development for MIS based solutions

The process of application development for MIS based solutions involves development of project / component specific MIS/GIS Applications System. This entails formulation of different modules, sub modules on different project components. The project also facilitates in formulating simple data collection tools and interfaces for uploading the information at field level. Emphasis is also laid on integration of innovative tool and applications for data consistency and correctness in the entry modules. As and when required MIS reports and dynamic information are generated and provided. Further robust linkage of Mobile App Application to the IMS Database of OFSDP-II has also been established.

RESULTS AND DISCUSSION:

The methodology stated hereinbefore has resulted in the following outputs.

A. Map preparation using Remote Sensing and GIS Technology

Different thematic Maps were prepared from the satellite imageries that have been procured from NRSC. The latter were analysed to facilitate planning & implementation of project interventions particularly on plantation, changes in canopy density etc.

66 LISS IV imageries cover the entire state of Odisha. Out of these 66, 62 nos. of cloud free LISS IV imageries (with 5.8m resolution) of 2021-22 were procured from NRSC, Hyderabad. The satellite imageries have been processed for layer stacking and NDVI has been executed. These imageries were used for analysing the Forest Cover Change in Batch-I VSS area across the OFSDP-II Divisions. Further Cartosat-I imageries of 2.5 resolution for the period from 2015-2019

i.e prior to project implementation, have been procured from NRSC, Hyderabad to facilitate analysis of the ground situation in the scale of 1:5000. This analysis is facilitating in the implementation of Community based Monitoring, Reporting & Verifications (CMRV) and Biomass Study for REDD+ activity of the OFSDP-II Project.

Cartosat-I imageries and LISS IV imageries of same dates have been merged & pan-sharpened using High Pass Filter (HPF) and Hyperspherical Colour Space (HCS) Resolution Merge techniques of Erdas Imagine Software to obtain the multispectral imageries of 2.5 resolution. All the available imageries covering the project area have been merged and stored in the database. The Forest Cover Density is determined from the merged imageries for the VSS assigned area referring to the FSI Data, NDVI, FCD, Google Earth and have been classified into 8 Density Classes as shown in Table No. 1.

Table No. 1: Forest canopy Density Classes	
Canopy Density Classes (in %)	**Description**
0-10	Scrub
10-20	Open-I
20-30	Open-II
30-40	Open-III
40-50	MDF-I
50-60	MDF-II
60-70	MDF-III
>70	Very Dense

The Forest Canopy Density class has been digitized for all 1211 VSS of Batch as per details given below in Table No 2.

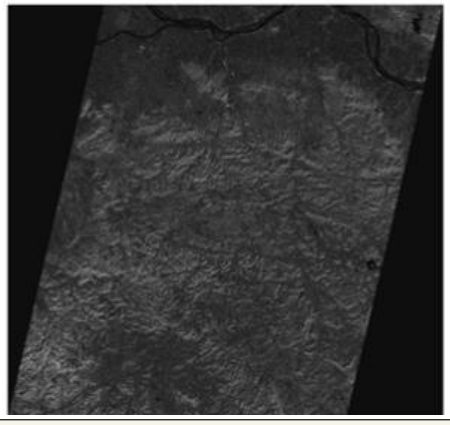
Table No 2: Status of Forest Canopy Density Classification in VSS Assigned Area, OFSDP-II

S. No.	Name of Division	Total VSS	Batch1 VSS	Batch2 VSS	Batch3 VSS	Batch4 VSS	Batch 4 VSS (Additional	Digitization completed
1	Athmallik	75	20	25	30		75	
2	Baripada	135	46	70	19		135	
3	Boudh	71	20	20	23		8	71
4	Dhenkanal	150	25	27	52	46		150
5	Gh. North	100	25	24	25	25		99
6	Ghumsur South	65	20	20	20		5	65
7	Jharsuguda	88	29	51	5		3	88
8	Karanjia	80	20	20	20	20		80
9	Rairangpur	107	40	61	7		108	
10	Sambalpur	100	55	20	25		100	
11	Subarnapur	84	25	25	25		9	84
12	Sundargarh	156	30	60	30	30	6	156
	Total	**1211**	**355**	**423**	**281**	**121**	**31**	**1211**

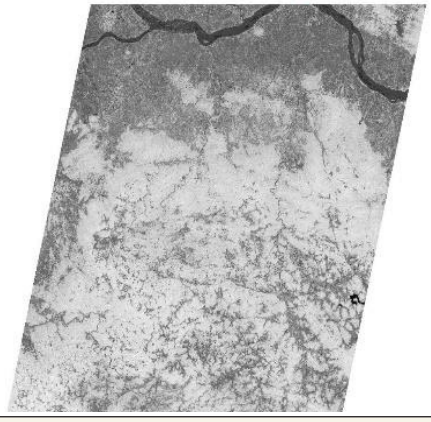
The digitization of the Forest Density Class has been executed in ArcGIS 10.2 Advanced Desktop application. The Open and Moderately Dense area were examined minutely from Google Earth Pro and polygons were then extracted. AVI, BSI and CSI of FCD computations were carried out on LISS-IV imageries and referred to for digitization as shown in Figure 1. The digitized maps were prepared after through ground truthing of the FSI supplied Forest type and Forest Density maps as shown in Figure 2.

Figure 1: Estimation of Advanced Vegetation Index, Bare Soil Index, Canopy Shadow Index and FCD generation.

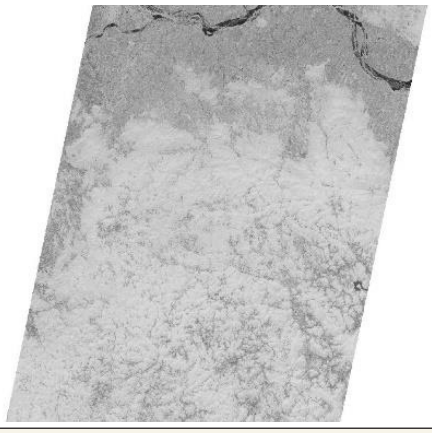
Evaluation of Advanced Vegetation Index of a satellite image



Evaluation of Bare Soil Index of a satellite image



Evaluation of Canopy Shadow Index of a satellite image



Generation of FCD map of the same area in QGIS

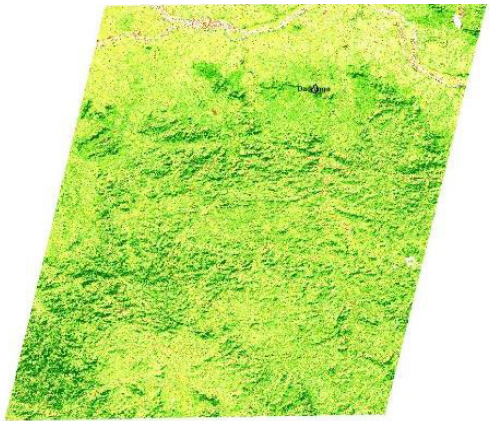
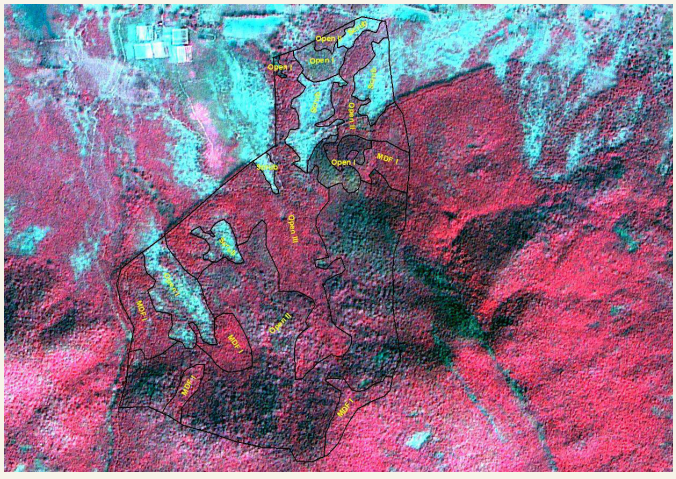
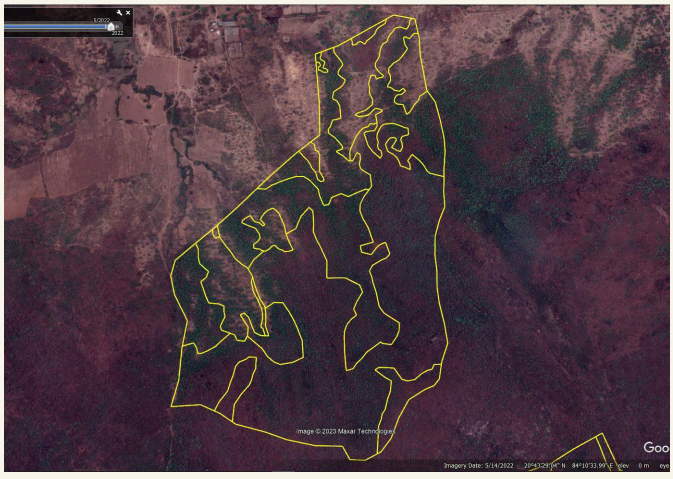


Figure 2: (a) Digitization of VSS assigned area of the CARTOSAT I and LISS IV Pan sharpened merged images (spatial resolution 2.5 mtr approx.).

The case of Dadranga VSS in Boudh DMU is shown below



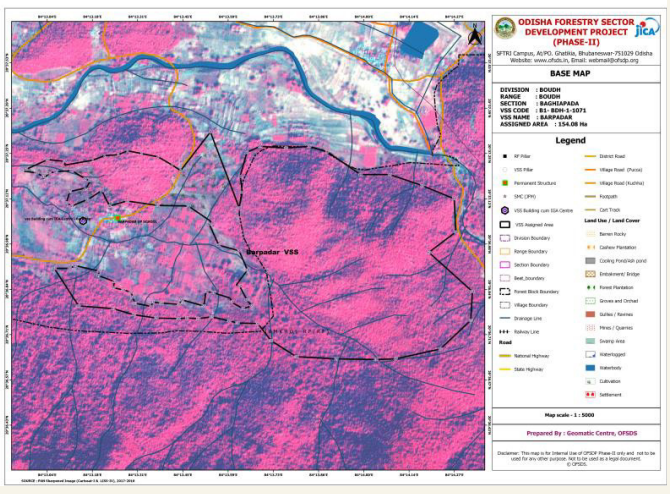
(b) Utilization of Google earth satellite imageries for digitization



An Atlas consisting Base Maps and Forest Cover Density with Treatment Maps in the Scale of 1:5000 of each VSS assigned area is prepared by super imposing the VSS assigned area polygon over the multispectral imageries of 2.5 resolution. This is depicted in Figure 3. This has been done for all the 1211 VSS under the project. The ground truthing of Forest Density maps and Forest Type maps is also done to assess the veracity of the FCD maps prepared.

Figure 3: Preparation of Base map, Forest Density and Treatment maps

(a) Base map of Barapadar VSS in Boudh DMU



(b) Forest Density and Treatment Map of Barapadar VSS in Boudh DMU

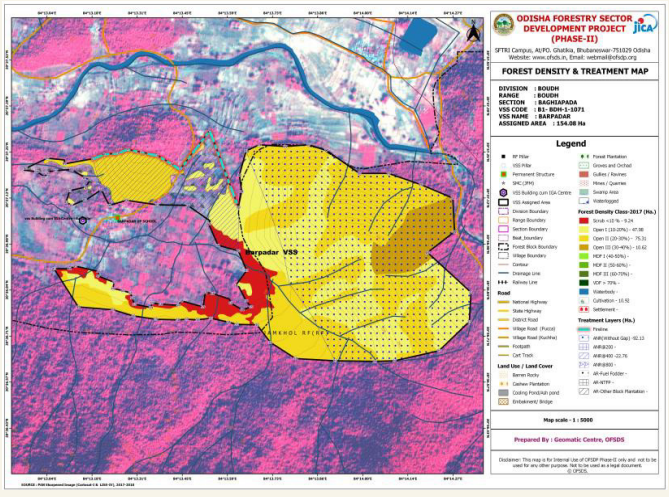
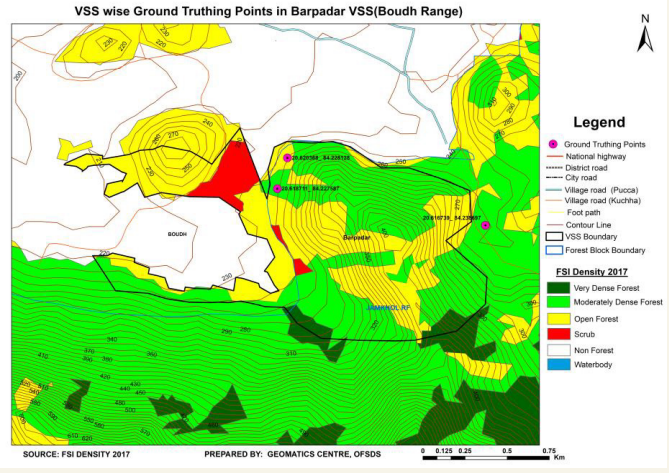
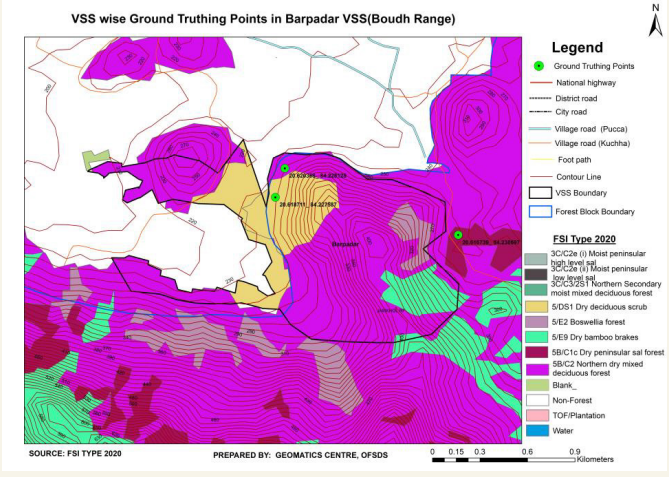


Figure 4: Ground truthing of Forest Density and Forest Type

(a) Ground truthing of forest density in Barpadar VSS of Boudh DMU



(b) Ground truthing of forest type in Barpadar VSS in Boudh DMU



Different maps with the locations of the VSSs, super imposed with the facilities / provision like road, drainage system, distance etc. were prepared for the potential VSSs / EDCs to facilitate planning and implementation of different Income Generating Activities through the Borrowing entities (SHGs, CIGs and PoPs) taken up under the project. This is shown in the figure given below.

Figure 5: Map showing VSS location alongwith infrastructure for planning and implementation of different income generation activities

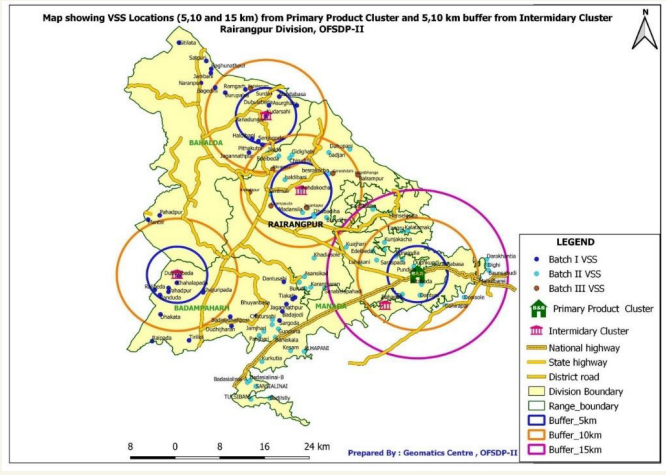
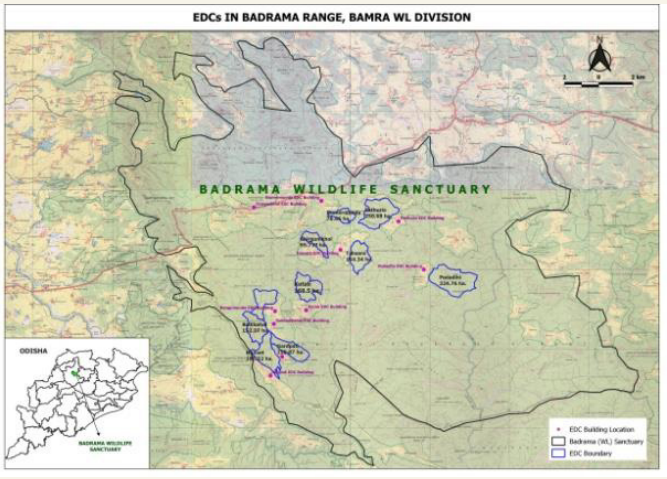


Figure 6: Map showing EDC location of Badrama Wildlife Sanctuary for taking up aromatic rice cultivation



A map showing the EDC locations of Badrama Range of Bamra Wildlife Division was prepared for taking up aromatic Rice Cultivation under Satoyama Initiative.

B. Preparation of Reports in MIS Domain and development of new applications

The MIS reports are generated on weekly basis to review the data entry progress and followed up with the field officials to complete the data entry. Further, the target and achievement for all treatments are being compiled on weekly basis and reported to respective sections at PMU. The CMRV report Card of Batch-I VSS has been generated and analysed to understand the strengths and weaknesses in the VSS. Similarly, The Gender Mainstreaming data captured under are being analysed by the concerned Experts of PMC & PMU. Validation in term consistency and accuracy of data is being conducted regularly at PMU level.

New modules are being continuously developed and linked to the IMS portal to facilitate better project monitoring. A list of such applications that have been developed recently has been given below.

1. CMRV Report Card- This module has been developed to collect CMRV data and generate the CMRV status in form of Report card for each VSS.

2. Gender Mainstreaming- The module has been developed to collect the data and generate the report on Gender Mainstreaming adopted in VSSs.

3. ESMSF- Similarly, a module with four forms has been developed to collect data on Environment Safeguards, Social Safeguards, Assessment and Applicability of ESMSF.

4. VSS Building cum IGA Facilitation Centre- A module has been developed to show the locations of all VSS Building along with information on assets available.

5. Farm Forestry- The Model wise Farm Forestry module has been developed & linked in IMS to monitor the various plantations outside forest area.

6. Potential Product Availability Module for capturing the primary producer wise availability of potential produces, quantity, status of current value addition & market situation etc. has also been prepared and activated.

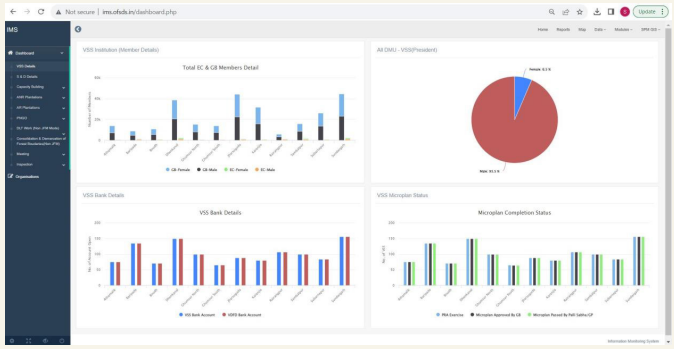
7. APIs were developed for retrieving information on Farm Forestry and Capacity Building of PMU for the Mobile App-OFSDP-II.

8. APIs were developed to link up ANR & AR Treatments Sites under JFM activities in OFMS Portal, the MIS/GIS portal of the State Forest Headquarters, Odisha.

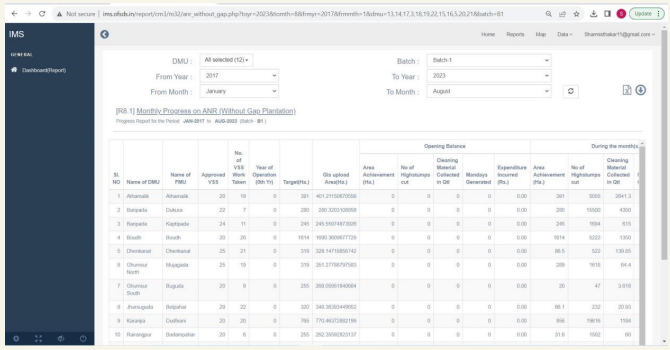
Some of the modules that have been developed are depicted in the following figure 7.

Figure 7: Information Management System developed in house

(a) Dashboard of the MIS based data management



(b) Generation of Monthly Progress Report



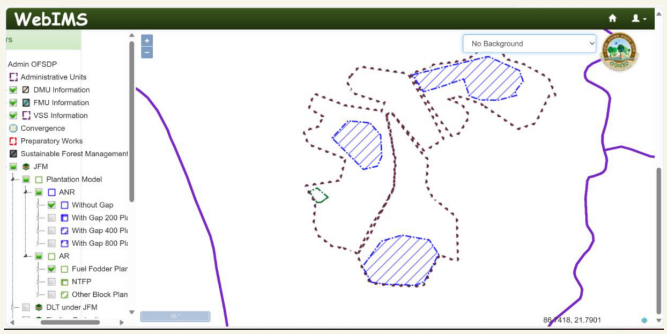
C. Monitoring and Evaluation

Intensive monitoring and evaluation of the project interventions is being done on a regular basis. A total 125612 Ha assigned area of 1211 VSS of 12 Divisions under OFSDP-II has been surveyed, demarcated and pillar posted. The GPS coordinates of the pillars posted has resulted in 1552 number of patches. The polygons of 1552 patches of VSS assigned area generated from WebGIS of IMS Portal have been cross checked and verified.

Similarly, the treatment information has been downloaded from the IMS portal and compiled for target accomplishment. Component wise data is verified against the target and achievements. A total 59718.88 Ha treatments in 3488 sites of Assisted Natural Regeneration (2336 sites) & Artificial Regeneration (1152 sites) have been verified. The Drainage Line Treatments executed both in Joint Forest Management and Non-Joint Forest Management mode are being verified continuously. The GPS location of each activity is being cross checked with Google and is also being verified. Simultaneously, the verification of data uploaded for other treatment modules of Consolidation of Forest Boundary, Establishment of Fire line is in progress. Some of the monitoring activities have been depicted in the Figure 8 given below:

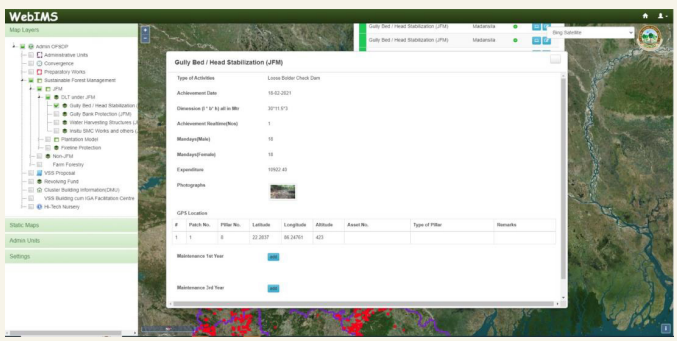
Figure 8: WebMIS based monitoring of project activities (Map based and Bing Satellite based)

(a) WebMIS based monitoring of project activities



(b) Bing Satellite based monitoring of activities

(c) WebIMS monitoring of individual structures



CONCLUSION

In the heartland of Odisha, the Odisha Forestry Sector Development Project - II has emerged as a beacon of innovation, aiming to reconcile the imperatives of forest conservation with the aspirations of forest fringe communities. This study embarked on a rigorous exploration of the OFSDP, scrutinizing the intricate interplay of geospatial technology and information management systems in the context of decentralized planning. The culmination of this

investigation yields a myriad of insights that hold profound implications for both the forestry sector in Odisha and broader efforts in sustainable community-based resource management.

The research journey unveiled a mosaic of findings that underscore the significance of the OFSDP - II's innovative approach:

1. Technological Empowerment: Geospatial technology, encompassing GIS, GPS, and remote sensing, emerged as a catalyst for data-driven decision-making. The integration of advanced geospatial tools facilitated real-time monitoring of forest cover changes, resource allocation, and community engagement, enhancing the project's responsiveness to environmental dynamics.

2. Inclusive Governance: Information management systems played a pivotal role in promoting transparency and accountability in project implementation. These systems empowered local communities with access to critical data, fostering their active participation in decentralized planning and the equitable distribution of forest benefits.

3. Community Resilience: Forest fringe communities participating in the OFSDP reported tangible improvements in their socio-economic well-being. The project's emphasis on community-led initiatives, combined with geospatial technology's role in resource mapping and livelihood diversification, contributed to enhanced livelihoods and forest-dependent income sources.

4. Environmental Stewardship: Spatial analysis of geospatial data revealed notable progress in forest conservation efforts, with evidence of increased forest cover and improved resource management. The project's commitment to sustainable forestry practices was underscored by the data-driven approach to mitigating deforestation and habitat degradation.

The findings of this research carry profound implications for the forestry sector in Odisha and extend beyond to global forestry and community development endeavours:

- The OFSDP represents a model of success in balancing conservation goals with community empowerment. Its integration of geospatial technology and information management systems can serve as a blueprint for similar projects aiming to harness data for sustainable forest management.

- The study highlights the need for continued investment in capacity building and technology transfer to empower local communities with the skills and tools necessary for meaningful participation in decision-making processes.

- As technology continues to evolve, future projects can explore emerging trends such as machine learning and artificial intelligence to further enhance the effectiveness of geospatial technology and information management systems in forestry management.

- Research into the social and cultural dimensions of decentralized planning within forest fringe communities can offer deeper insights into the dynamics of community engagement and sustainable resource management.

The Odisha Forestry Sector Development Project embodies a vision of sustainable development where forest conservation and community empowerment coalesce. Its innovative use of geospatial technology and information management systems has illuminated a path toward harmonious coexistence between people and forests. As the world grapples with the pressing need for environmental stewardship and inclusive development, the lessons drawn from the OFSDP serve as a testament to the transformative power of technology, community engagement, and data-driven decision-making. In the years to come, the legacy of the OFSDP will continue to inspire and inform the global discourse on sustainable forestry practices and the pursuit of a more equitable and ecologically resilient future.

Please send your comments and inputs to:

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