



# International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

© Agronomy

[www.agronomyjournals.com](http://www.agronomyjournals.com)

2024; SP-7(3): 377-387

Received: 13-01-2024

Accepted: 18-02-2024

**Kumar Kamalendradev Dansana**

(1) Central Tasar Research and Training Institute (CTRТИ), Central Silk Board, Ranchi, Jharkhand, India

(2) Office of Assistant Director, Department of Sericulture, Directorate of Textiles & Handloom, Koraput, Odisha, India

**Hasansab A Nadaf**

Basic Tasar Silkworm Seed Organisation (BTSSO), Central Silk Board, Bilaspur, Chhattisgarh, India

**Vishal Mittal**

Central Tasar Research and Training Institute (CTRТИ), Central Silk Board, Ranchi, Jharkhand, India

**NB Chowdary**

Central Tasar Research and Training Institute (CTRТИ), Central Silk Board, Ranchi, Jharkhand, India

**T Selvakumar**

Basic Tasar Silkworm Seed Organisation (BTSSO), Central Silk Board, Bilaspur, Chhattisgarh, India

**Priyanka Nayak**

Office of Assistant Director, Department of Sericulture, Directorate of Textiles & Handloom, Koraput, Odisha, India

**Corresponding Author:**

**Kumar Kamalendradev Dansana**

(1) Central Tasar Research and Training Institute (CTRТИ), Central Silk Board, Ranchi, Jharkhand, India

(2) Office of Assistant Director, Department of Sericulture, Directorate of Textiles & Handloom, Koraput, Odisha, India

## Vana Samrakshana Samiti (VSS) of Nabarangpur in empowerment of tasar sericulturists

**Kumar Kamalendradev Dansana, Hasansab A Nadaf, Vishal Mittal, NB Chowdary, T Selvakumar and Priyanka Nayak**

DOI: <https://doi.org/10.33545/2618060X.2024.v7.i3Se.502>

### Abstract

Tasar sericulture stands as a pivotal avenue for sustainable livelihoods and economic empowerment in Nabarangpur District, Odisha, particularly for forest-dwelling communities dependent on Tasar block plantations. This practice not only mitigates labor migration but also ensures substantial income generation for Village Forest Communities closely associated with Tasar plantations. With a focus on utilizing existing forest department plantations spanning 350 hectares, Vana Samrakshana Samiti (VSS) members engage in Tasar silkworm rearing, promising an additional income stream and fostering rural development. The seamless alignment of Tasar sericulture with tribal lifestyles, offering simplicity, cost-effectiveness and skill-free practices, renders it particularly beneficial for women, providing steady income during agricultural lean seasons. Nabarangpur exhibits thriving community-driven forest conservation efforts, exemplified by 346 active VSS units. Notably, 18 VSS units oversee meticulous supervision, resulting in nearly 100% survivability of Tasar host plants. The Burja VSS in Umerkote range showcases significant involvement in Tasar sericulture, spearheading a 40-hectare plantation project that underscores community-driven environmental stewardship. Critical steps for enhancing Tasar sericulture in Nabarangpur encompass training, awareness campaigns, monitoring, stakeholder coordination, financial assistance and technology adaptation. These measures promise to augment cocoon production and foster socioeconomic development in the region. This research paper delves into the transformative impact of Tasar sericulture, specifically through the lens of Vana Samrakshana Samiti (VSS) in Nabarangpur, offering insights into sustainable livelihood strategies and community-driven forest conservation efforts.

**Keywords:** Vana Samrakshana Samiti, economic empowerment, tasar sericulturists

### Introduction

Nabarangpur District, nestled in the southwestern part of Odisha, has long been known for its Tasar silk production—a tradition handed down through generations. Tasar silk, derived from the silkworm species *Antheraea mylitta* D., has been a source of sustenance and livelihood for the inhabitants of this region. The cultural significance of tasar is deeply ingrained in the local ethos, shaping rituals, attire and economic activities. However, like many traditional practices, tasar culture faced the challenges of fluctuating production, technological backwardness, unorganized production system, lack of entrepreneurship, limited stakeholders etc (Ray 2010)<sup>[18]</sup>. It was in this backdrop of challenges that the Vana Samrakshana Samiti (VSS) emerged as a transformative force, advocating for the preservation and advancement of tasar culture in Nabarangpur District thereby empowering the tasar sericulturists.

To understand the significance of VSS in the context of tasar culture, it is imperative to delve into the historical roots of sericulture in Nabarangpur District. The origins of tasar culture in this region can be traced back centuries, entwined with the rural way of life. Historically, tasar silk found its place in royal attires, symbolizing elegance and affluence. Over time, it permeated into the everyday lives of the people, becoming an integral part of their cultural identity. In the state of Odisha, the production of tropical tasar silk through the rearing of *A. mylitta* D. silkworms (Nadaf *et al.*, 2019 and 2021)<sup>[12-13]</sup> is an ancient and deeply rooted tradition. This traditional practice of sericulture is prevalent in several districts of Odisha, including Angul, Balasore, Boudh, Deogarh, Dhenkanal, Jajpur, Kalahandi, Keonjhar, Mayurbhanj, Nabarangpur, Nuapada,

Sambalpur, Sonapur and Sundergarh. Tribal farmers in these districts rely on naturally occurring tasar food plants from the forests to rear tasar silkworms. However, as the world progressed into the modern era, traditional practices faced challenges of globalization and industrialization. The art of tasar silk production is encountering hurdles related to sustainable practices. It was against this backdrop of change that community-driven initiatives, particularly in the form of VSS, emerging as saviors of this rich cultural heritage.

Participatory Forest Management (PFM) emerged as a pivotal strategy within the framework of the National Forest Policy (NFP) in 1988. This innovative program aimed to protect forests through active involvement and support from communities residing in forest-dependent areas, ensuring both conservation efforts and livelihood sustenance. Central to this initiative was the concept of Community Forest Management (CFM), representing a significant movement where local communities played a vital role in forest protection. Under the CFM model, the emphasis was placed on sustainable forest development. This approach focused on utilizing forest resources without disrupting the delicate balance of the ecosystem, including its flora and fauna. Crucially, the initiative prioritized the preservation, conservation and protection of wildlife. Additionally, it delegated more power and responsibilities to local communities, empowering them to actively participate in the safeguarding of their natural environment. At the grassroots level, the implementation of this participatory approach was overseen by the Joint Forest Management Council (JFMC), operating at the village level and known as the Vana Samrakshana Samiti (VSS). These committees, comprising dedicated community members, became instrumental in the protection, conservation and sustainable use of forests, exemplifying the successful synergy between local communities and conservation efforts. Vana Samrakshana Samiti is defined as "an independent, formal, democratic village-based community institution comprising inhabitants of a village constituted for the development/management of earmarked forests as per the Orissa JFM Resolution" (Anonymous 2007) [3].

The inception of VSS marking a turning point in the conservation efforts of tasar culture in Nabarangpur District. Recognizing the need for collective action, local communities, under the guidance of visionaries and conservationists, established the VSS. The member of VSS depends heavily on forest for subsistence need and income from gathered forest produce. These VSS are closely associated with forest department and other line department and helps in sustainable development of forest simultaneously improving socio-economic position of members of VSS. The VSS not only helping in afforestation but also collect and sale the forest produces for their livelihood generation.

In this context, a tripartite Memorandum of Understanding (MoU) for "Vanya Programme in Odisha" was formalized on the 9th of May 2022. This significant agreement was inked between the Forest, Environment and Climate Change Department of the Government of Odisha, the Central Silk Board, Bengaluru and the Handlooms, Textiles and Handicrafts Department of the Government of Odisha. This MoU serves as the cornerstone for the execution of the "Odisha Tasar Silk Development Project (O-TSDP)" within the state. The primary objective of this initiative is to establish sustainable livelihoods for forest dwellers through Tasar Sericulture activities, thereby creating economic opportunities and improving the quality of life for the communities involved. This envisioned five-year project is anticipated to generate livelihoods for the members of VSS by

embracing Sericulture farming techniques. In doing so, it will not only create sustainable employment opportunities but also foster a broader scope for sustainable development. Moreover, this initiative aims to empower women through initiatives like Mission Shakti Women's Self-Help Groups (WSHG) across the state, ensuring a comprehensive approach to economic and social progress. Under this initiative, tasar forestry activities encompass the plantation of Asan and Arjuna food plants, specifically designed to benefit rural communities, particularly tribal farmers. These activities are geared towards providing essential resources and economic opportunities to the local populace, enhancing their livelihoods and promoting sustainable agricultural practices. The responsibility for Tasar silkworm rearing and cocoon production will be shouldered by the Odisha Forest Department in collaboration VSS across 18 Forest Divisions within the state. Concurrently, the sericulture wing of the Handlooms, Textiles and Handicrafts (HT&H) Department will offer crucial technical support, particularly in Tasar-favorable host plantation and oversee the marketing of Tasar Cocoon. This marketing endeavor will be facilitated through a network involving 59 Primary Tasar Rearer Cooperative Societies (PTRCS) and SERIFED. Furthermore, to ensure the successful implementation of this project, the Central Silk Board, Government of India, will extend financial support under the Silk Samagra-II scheme (Himanshu 2022) [8].

Against this backdrop, this study was undertaken with the specific objective of examining the pivotal role played by the Vana Samrakshana Samiti (VSS) in the advancement of tasar culture within Nabarangpur District.

## Review of Literature

The literature pertaining to present studies are listed hereunder:

### Vana Samrakshana Samiti (VSS)

The tribals of Adilabad District of Andhra Pradesh actively engage in the operations of 'Vana Samrakshana Samiti'. These initiatives, led by the tribal populace, serve the dual purpose of safeguarding the forests while also providing essential income for the tribal residents. Since the establishment of the Vana Samrakshana Samiti (VSS), there has been a notable increase in the involvement of women members, particularly in the collection of specific forest products. The active participation of tribal members significantly reinforces the concept of Participatory Forest Management (PFM) concerning forest protection and sustainable management (Muthyalu, 2013) [11].

In alignment with the National Forest Policy of 1988 and the Circular on Joint Forest Management (JFM) issued by the Central Government in 1990, the Andhra Pradesh Forest Department (APFD) established Village Forest Communities, referred to as Vana Samrakshana Samiti (VSS), in 1992. These VSS groups, composed of family units from forest-dependent communities, were created to actively engage these communities in forest protection and production forestry activities. The essence and motivation behind VSS are rooted in the Constitutional (73rd Amendment) Act of 1992, making it essentially a community-based self-help group and a rural local body (Thomas 2003; Sundar 2013) [25, 23].

In 1992, the Government of Andhra Pradesh embraced Joint Forest Management (JFM) as a strategic approach to restore deteriorated forests. Since its inception, 7718 JFM committees, locally known as Vana Samrakshana Samiti (VSS) in Telugu, have been operational, involving approximately 1.54 million people. These committees effectively manage 1.52 million hectares, which accounts for 23.8% of the total forest area in the

state. Subsequently, in 2002, JFM was rebranded as Community Forest Management (CFM), signifying the government's dedication to fostering deeper community engagement in forest management efforts (Andhra Pradesh Forest Department, 2011; Sundar and Vineet, 2020) <sup>[1, 24]</sup>.

Within the Telugu Ganga afforestation initiative, the Forest Department has established diverse forest plantations covering an extensive area of 6930 hectares. Notably, *T. arjuna* emerged as the predominant species in both monoculture and mixed plantations. The meticulous maintenance of these plantations falls under the purview of 100 Vana Samrakshana Samiti (VSS). During trial rearing of Tasar silkworm (*A. mylitta* D.) on *T. arjuna* plantations, impressive results were achieved, with a yield ranging from 12,800 to 14,500 cocoons per hectare per season. This translated into an income for each member of the Vana Samrakshana Samiti, ranging between Rs 2500 to Rs 3000 within a span of one month. The potential for further enhancement in income through tasar culture is substantial. Implementing on-site training and technology dissemination, coupled with robust extension support, holds the promise of doubling the earnings of VSS members engaged in tasar sericulture (Prakash *et al.*, 2011) <sup>[16]</sup>.

The Vana Samrakshana Samiti (VSS) structure stands out as a highly effective approach for forest maintenance and the promotion of ecotourism. Notably, a significant proportion of these communities are tribal, for whom the forests are not just resources but their very lifeblood. What sets VSS apart is its focus on training, specifically geared towards environmental conservation. The initiative has successfully empowered tribal communities in environmental matters, marking a notable achievement. Collaborating closely with the Kerala Forest Department, VSS plays a crucial role in the meticulous monitoring of both ecotourism activities and forest protection operations, ensuring a harmonious balance between conservation and local engagement (Kuttencherry and Arunachalam, 2020).

In the study conducted by Nataraju *et al.* (2013) <sup>[15]</sup>, the analysis of women's empowerment focused on income generation, employment status and additional employment opportunities. The findings revealed a consistent upward trend in income levels and a decline in unemployment rates among women following their participation in Vana Samrakshana Samiti (VSS) activities within the forest fringe villages of Andhra Pradesh. This demonstrates the positive impact of VSS involvement on the economic empowerment of women in these communities.

Rekha Panigrahi (2006) <sup>[19]</sup> stated that community forestry initiatives represent the collective response of rural communities to combat forest depletion. Typically, these initiatives are spearheaded by the poorer and marginalized sections of society, whose lives and livelihoods are intricately linked with the forests. The introduction of Community Forest Management (CFM) initiatives has not only garnered recognition and pride for numerous villages but has also served as a powerful motivator, encouraging the protection of non-protecting forest patches.

According to Dhanuraj (2006) <sup>[6]</sup>, the success of Vana Samrakshana Samiti (VSS) is notably evident in areas where there is effective community leadership and active involvement of officers. VSS acts as an efficient mechanism to raise awareness among people about the necessity of conservation efforts. Moreover, VSS significantly reduces the burden on the forest department by educating forest dwellers about the preservation of forest resources. It serves as a valuable platform for discussions on various issues, including nature, ecology, employment and more, making it a versatile tool for community

engagement and environmental awareness.

### Tasar Culture

In Odisha state, sericulture primarily revolves around the cultivation of tasar and mulberry silk. Among these, tasar silk holds a special significance as it constitutes a major portion of Odisha's overall silk production. Odisha is renowned as a traditional tasar producing state, with tasar culture deeply ingrained in the livelihoods of tribal communities residing in various districts. Specifically, tasar sericulture is a vital occupation in tribal pockets situated in districts such as Deogarh, Kalahandi, Keonjhar, Koraput, Rayagada, Mayurbhanj, Sonpur, Dhenkanal, Anugul, Nabarangpur, Keonjhar, Sundargarh and Boudh, as highlighted in the Seri-States of India report in 2019 <sup>[21]</sup>.

According to Rathore *et al.* (2023) <sup>[17]</sup>, the tropical tasar silkworm, specifically the *A. mylitta* (Daba ecorace), is the predominant species being cultivated in ten states across India. This sericulture activity plays a crucial role as a major supplementary source of income, particularly for marginalized tribal communities, with a significant contribution from women. In recent years, the impact of global climate change has become increasingly evident. The tropical tasar silkworm is reared in open fields, as highlighted in the findings of Nadaf *et al.* (2022) <sup>[24]</sup>, making it susceptible to the direct influence of varying climatic conditions, which in turn affects crop yield and productivity. Furthermore, it's worth noting that the grainage practices associated with tasar differ significantly from those related to mulberry sericulture.

According to Chowdary *et al.* (2022) <sup>[3]</sup>, various training sessions, skill enhancement programs, capacity-building initiatives and awareness campaigns have been organized. These efforts aim to enhance the skills and capabilities of tasar rearers, thereby contributing to the improvement in the quality of tasar seed cocoon and seed production.

As reported by Das and Dwibedi (2012) <sup>[4]</sup>, sericulture is a longstanding and traditional profession for 90% of the scheduled tribes and 5% of the scheduled castes in Odisha. Engaging in sericulture provides them with a significant and stable income. This occupation offers a livelihood to numerous small and marginal farmers, especially in the tribal-dominated districts, as highlighted in the research by Jatin Kumar Swain in 2023 <sup>[9]</sup>.

According to the Odisha Economic Survey 2021-22, the state cooperative organizations/societies such as S. Bastralaya, Boyanika, Odisha Cooperative Tassar & Silk Federation Ltd (SERIFED) and Primary Weavers Co-operative Societies (PWCS) achieved a yarn/tasar cocoon sale amounting to Rs. 2,698.35 lakh. Moreover, as reported by Jatin Kumar Swain in 2023 <sup>[9]</sup>, the Mahila Kisan Sashaktikaran Pariyojana (MKSP) covered a total of 4014 households involved in tasar cultivation across seven blocks in three districts.

According to the Disaster Management Plan for 2018-19 <sup>[7]</sup> by the Department of Handlooms, Textiles and Handicrafts in Odisha, tasar activities are actively practiced in several districts. These districts include Mayurbhanj, Keonjhar, Sundargarh, Deogarh, Dhenkanal, Angul, Jajapur, Boudh, Sonapur, Kalahandi, Nuapada, Nawrangpur, Balasore and Sambalpur. In these districts, there are a total of 16,449 tasar farmers and 62 Tasar Rearer Cooperative Societies (TRCS) involved in these activities.

As per information provided by Shalya in 2020 <sup>[22]</sup>, the District Mineral Foundation (DMF) tasar rearing project in Odisha involves the plantation of host trees, specifically Arjun and Asan, on degraded revenue lands. The selection of these lands is



based on a sericulture map developed by the Central Silk Board, which considers factors such as soil quality and favorable climatic conditions for the cultivation of tasar trees. This initiative aims to rehabilitate and utilize degraded lands for tasar rearing and promote sustainable sericulture practices.

In the tribal-dominated districts of Mayurbhanj, Keonjhar, Sundargarh, Kandhamal, Rayagada, Koraput, Gajapati, Kalahandi, Nawarangpur, Jajpur, Deogarh and Dhenkanal in Odisha, tasar sericulture stands out as the primary source of livelihood for rural communities. Odisha's diverse forest landscape, comprising four different types of forests, includes tropical humid forests covering 80% of the total forest area, providing abundant primary tasar food plants. The state boasts 15,000 hectares of natural forest, of which tasar farming is practiced on approximately 6,000 hectares of economic plantation. Remarkably, 66.62% of the tasar production comes from the race daba variety, which has been reared, while the remaining 33.38% is sourced from wild cocoons. Within these hilly districts, over 46,828 families belonging to Scheduled Castes (SC) and Scheduled Tribes (ST) are registered as primary members of the tasar culture. The majority of these practitioners fall under the Below Poverty Line (BPL) category. Among the 10,000 registered tasar farmers in the state, 68%, 24% and 3% cultivate a single crop, two crops and three crops per year, respectively (Jatin Kumar Swain, 2023)<sup>[9]</sup>.

According to Jayram *et al.* (2022), tasar sericulture holds the potential to leverage available family labour for gainful employment, thereby offering livelihood opportunities to the weaker sections of society. This form of sericulture not only generates employment but also serves as an income source, especially for economically disadvantaged individuals. By harnessing existing natural resources, tasar sericulture provides a viable avenue for creating employment and improving the economic condition of marginalized communities

Dewangan, S.K (2013) <sup>[5]</sup> emphasizes that tasar sericulture and the silk industry are pivotal for livelihood generation. Tasar sericulture stands out as a significant cash crop due to its minimal investment requirements, short gestation period, high employment potential and lucrative returns. Sericulture is inclusive, benefiting individuals across various societal sections, including large farmers and landless individuals, the elderly and the youth, as well as both men and women. Additionally, the silk industry in India holds profound socio-cultural and traditional significance, playing a vital role in the rural economy.

Over the past few decades, the progress in agriculture, industrialization and urbanization has led to a decline in forest coverage, causing biodiversity erosion. In this context, tasar culture, deeply rooted in the concentrated tribal belts across various states, plays a crucial role in sustaining the livelihoods of tribal communities. These populations depend on biodiversity utilization for their sustenance and tasar culture has emerged as a traditional practice in these regions. In India, tasar culture is not just an industry; it is a tradition. For a significant period, it remained obscure, practiced exclusively by tribal, hill folks and aboriginal communities residing in the remote forest areas of central plateau and northeastern regions (Vishaka *et al.*, 2020)<sup>[26]</sup>.

### Material and Methods

The research mentioned here was conducted under office of Assistant Director of Sericulture in Koraput at Pilot Project Center (PPC), also known as Tasar Seed Production and Extension Center (TSPEC) Chikli. It is discussed here under following headings.

### Geographical Overview

Nabarangpur nestled in the south-western region of Odisha, shares borders with Chhattisgarh to the north and west, Koraput district to the south and Kalahandi & Rayagada districts to the east. The majestic river Indravati delineates the boundary between Nabarangpur and Koraput district. Covering a vast geographical expanse of 5294 sq km, Nabarangpur district experiences diverse terrains and climates.

### Tribal Diversity and Livelihoods

Nabarangpur is a vibrant tapestry of cultures, home to 13 distinct tribal communities including Bhotra, Gond, Paraja, Kandha, Bhumias, Halva, Kanha Goua, Bonda Paraja and Gadava. These tribes have woven their lives intricately with the land, relying predominantly on cultivation and forest resources for their livelihoods. With over 90% of the population engaged in farming, the district stands as an agricultural stronghold.

### Agricultural Landscape

The district's agricultural practices are deeply intertwined with the rhythm of nature. Rain-fed crops, including paddy, maize, cashew, pulses and vegetables, form the backbone of Nabarangpur's agricultural sector. The monsoon, with an annual rainfall of 1631.40 mm, plays a pivotal role in shaping the region's agricultural calendar. Mondai, a widely celebrated festival, marks the culmination of the harvest season, reflecting the community's dependence on nature's cycles.

### Forest Cover and Environmental Significance

Nabarangpur boasts a rich environmental heritage, with approximately 46.51% of its total geographical area covered by lush forests. Spanning 2462.73 sq km, these forests serve as the lifeblood of the district, supporting diverse flora and fauna. The district's unique biodiversity and reliance on forest resources underline the delicate balance between conservation and sustenance.

### Data Collection

Secondary data regarding the socio-economic and agricultural landscape, VSS operating and involved alongwith their activities promotion of in tasar sericulture at Nabarangpur was collected from various sources, including the District Census Handbook (2011), Statistical Data of Nabarangpur District (2011), the Disaster Management Plan (2018-19)<sup>[7]</sup> of the Department of Handlooms, Textiles and Handicrafts, Odisha, Divisional Forest office and others. The data collected is presented in tabular and graphical form.

### Results and Discussion

The data collected on important statistics of Nabarangpur districts including VSS is discussed hereunder.

### Important statistics of Nabarangpur District

The data from Table 1 reveals that Nabarangpur district is primarily rural with 891 villages, significantly fewer than Odisha's 51,311 villages, indicating a dispersed rural settlement pattern. The district accounts for 2.83% of Odisha's households, implying smaller average household sizes likely due to its rural nature. While Nabarangpur constitutes 2.9% of Odisha's total population, it is not heavily populated, with a population density of 231 persons per square kilometer, lower than Odisha's average of 270. This lower density suggests a sparser population distribution, possibly due to the district's rural and forested landscape. Despite the rural setting, Nabarangpur boasts a higher

sex ratio of 1019 compared to Odisha's 979, indicating a relatively better gender balance. The district's 3.24% share of Odisha's rural population underscores its predominantly agrarian and rural character, with 4.21% of Odisha's cultivators and 4.8% of agricultural laborers, reflecting a substantial engagement in agriculture. However, Nabarangpur has a relatively lower proportion of Scheduled Caste (2.4%) communities compared to the state average, while its significant Scheduled Tribe

population (7.1%) signifies tribal dominance in the district. The literacy rate of 1.7% among Odisha's literate population suggests a need for educational interventions. In summary, Nabarangpur emerges as a predominantly rural, agrarian district with dispersed settlements, a balanced gender ratio and significant tribal presence. The lower literacy rate and substantial agricultural engagement indicate areas requiring focused developmental efforts.

**Table 1:** Important statistics of Nabarangpur District

Sl. No.	Particulars	Odisha	Nabarangpur	
		Number	Number	Percentage of Odisha
1.	Villages (No.)	51,311	891	1.73
2.	Normal house hold (No.)	96,05,629	2,72,537	2.83
3.	Total Population	4,19,74,218	12,20,946	2.9
4.	Population Density (/Km <sup>2</sup> )	270	231	-
5.	Sex Ratio (No./1000 male)	979	1019	-
5.	Rural total population (No.)	3,49,70,562	11,33,321	3.24
6.	Total SC population (No.)	71,88,463	1,77,384	2.4
7.	Total ST population (No.)	95,90,756	6,81,173	7.1
8.	Literate person (No.)	2,67,42,595	4,70,379	1.7
9.	Total cultivator (No.)	41,03,989	1,73,086	4.21
10.	Total Agricultural laborers (No.)	67,39,993	3,28,783	4.8

Source: District census handbook Nabarangpur District 2011

### Nabarangpur district Agriculture at a glance

**Table 2:** Nabarangpur district Agriculture at a glance

Sl. No.	Particulars	Unit	Statistics
1.	Total area	ha	529100
2.	Non-agricultural land		22037
3.	Barren and uncultivated land		12001
4.	Cultivable land		12720
5.	Net area sown		238542
6.	Forest area		58046
7.	Rainfall	mm	1432.8

Source: District Statistical hand book Nabarangpur 2018

Table 2 provides a snapshot of the agricultural landscape in Nabarangpur district: Nabarangpur district encompasses a total area of 529,100 hectares, indicating the overall landmass available for various uses. Out of the total area, 22,037 hectares are classified as non-agricultural land. This category likely includes urban areas, infrastructure and other non-farm usage. A portion of the district, measuring 12,001 hectares, is categorized as barren and uncultivated land. This signifies land that is not suitable for cultivation or any productive agricultural activity. Nabarangpur has 12,720 hectares of cultivable land, denoting areas with agricultural potential. This land can be utilized for farming, indicating the district's agricultural capacity. The net area sown, spanning 238,542 hectares represents the total land under active cultivation. This figure indicates the actual land utilized by farmers for growing crops, reflecting the district's agricultural productivity. The presence of a significant forest area, covering 58,046 hectares, highlights the district's rich biodiversity and ecological importance. It also suggests a balance between agricultural land use and environmental conservation efforts. Nabarangpur receives an average annual rainfall of 1432.8 mm. Adequate rainfall is crucial for agriculture and this figure provides insight into the region's water availability for crop cultivation. In summary, the table illustrates Nabarangpur's diverse land usage, including agricultural, forested and non-agricultural areas. The presence of substantial cultivable land and a significant forest area indicates

the district's potential for both agriculture and environmental conservation. Additionally, the reported rainfall figure is vital for understanding the region's agricultural productivity and water availability, crucial factors for sustainable farming practices.

### Tasar Sericulture at Koraput Sericulture zone

**Table 3:** Information on Tasar Sericulture at Koraput Sericulture zone (2022-23)

Sl. No.	Particulars	Details
1	District	Nabarangpur
2	TRCS (No.)	01 <sup>#</sup>
3	Farmers (No.)	33
4	Plantation maintenance (Ha.)	10
5	DFLs Utilized (Lakh No.)	0.092
6	Cocoon produced (in Kahan)	102-37-2

Source: Office of Asst. Director of sericulture, Koraput  
#Formation of TRCS is under progress.

Table 3 provides specific details about Tasar Sericulture activities in the Koraput Sericulture zone (2022-23), focusing on Nabarangpur district: The district is the focal point of tasar Sericulture activities within the Koraput Sericulture zone. There is one TRCS (Tasar Rearers' Cooperative Society) in Nabarangpur district. It's important to note that the formation of this cooperative society is in progress, indicating ongoing efforts to organize and empower local tasar rearers collectively. There are 33 tasar farmers in Nabarangpur district. These individuals are actively involved in tasar cultivation, contributing to the local sericulture industry. Existing plantations covering 10 hectares are under maintenance. A total of 0.092 lakh disease-free layings have been utilized and the cocoon production is reported as 102-37-2. The data indicates ongoing tasar sericulture activities in Nabarangpur district, with efforts focused on maintaining existing plantations, utilizing disease-free layings and few number of tasar farmers. The formation of a TRCS underscores the importance of community-based efforts in the local sericulture industry, highlighting a collaborative approach for sustainable tasar silk production.



Tasar Larva



Tasar Pupae

### VSS Operating at Nabarangpur

**Table 4:** Name of Forest Range with number of VSS in Nabarangpur district

Sl. No.	Name of Forest Range	Number of VSS
1	Umerkote	34
2	Dabugaon	46
3	Kodinga	41
4	Nabarangpur	26
5	Kosagumuda	32
6	Jharigan	38
7	Papahandi	36
8	Chandahandi	32
9	Tentulikhunti	34
10	Raighar	27
Total		346

Sources: Divisional Forest Office, Nabarangpur

Table 4 presents data on the number of Village Forest Communities (VSS) in different forest ranges within Nabarangpur district. The table indicates that Dabugaon forest range has the highest number of VSS with 46, followed closely by Kodinga with 41, Jharigan with 38 and Umerkote with 34. Other ranges like Papahandi, Tentulikhunti and Kosagumuda have a substantial number of VSS ranging from 32 to 36, while

Nabarangpur and Raighar have 26 and 27 VSS respectively. Chandahandi stands at 32 VSS. In total, there are 346 VSS distributed across these forest ranges. This distribution highlights the significant community engagement in forest management across various regions of Nabarangpur district. The data suggests a comprehensive grassroots approach to conservation and sustainable forest management, with active participation from local communities in each forest range.

### VSS involved in Tasar Sericulture

At present, there are 346 active Vana Samrakshana Samiti (VSS) operating within the Nabarangpur forest division, signifying the widespread community engagement in forest conservation efforts. As part of the Odisha Tasar Silk Development Project (O-TSDP), the forest department initiated Tasar food plantation activities, covering an impressive area of 200 hectares in the fiscal year 2021-22, followed by an additional 150 hectares in the subsequent year, 2022-23, within the Nabarangpur Division. This substantial plantation effort was strategically undertaken across 07 distinct ranges within the Nabarangpur district. To ensure the effective supervision and management of the total 350 hectares dedicated to tasar host plantation, involving the participation of 346 VSS groups, a collaborative approach has been adopted. Specifically, 18 VSS

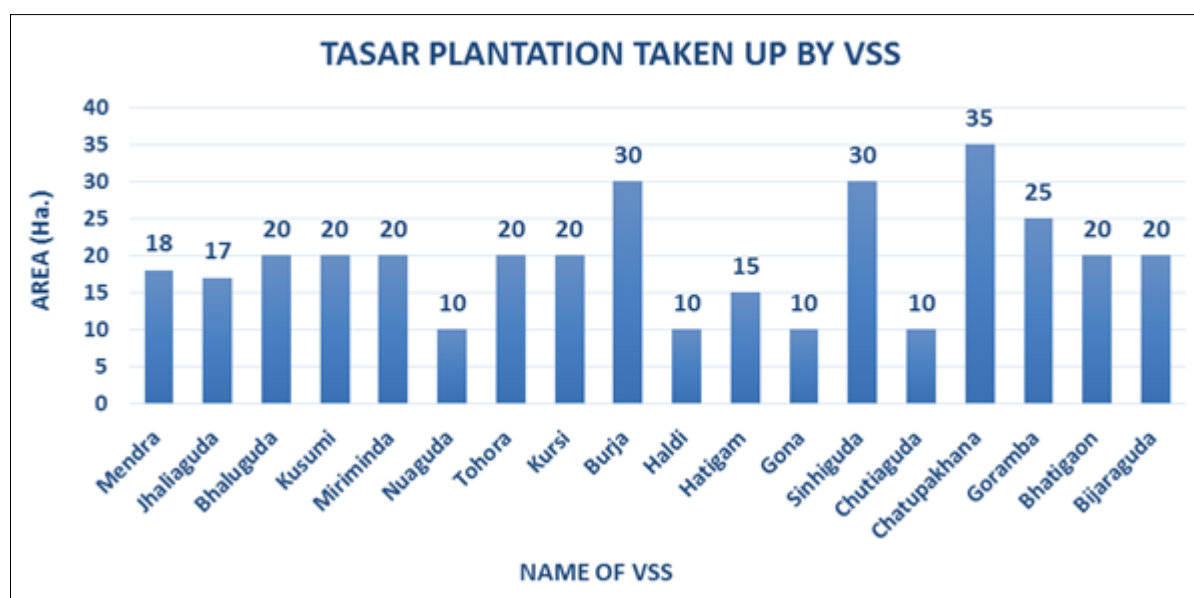
units have been actively engaged in tasar sericulture activities. These dedicated VSS groups are drawn from multiple ranges within the Nabarangpur forest division, including Dabugaon Range, Kodinga Range, Umerkote Range, Raighar Range, Nabarangpur Range, Jharigaon Range and Tentulikhunti Range.

This widespread involvement of VSS demonstrates a community-driven commitment to the sustainable cultivation of tasar silk and the preservation of local ecosystems within the Nabarangpur district.

**Table 5:** Details of tasar plantation taken up by VSS

Sl. No	Name of the Range	Name of VSS	Location site	Area (Ha.)
1	Dabugaon	Mendra	Sarguli	18
2		Jhaliaguda	Jhaliaguda	17
3		Bhaluguda	Bhaluguda	20
4	Kodinga	Kusumi	Kusumi PRF	20
5		Miriminda	Miriminda PRF	20
6		Nuaguda	Nuaguda	10
7	Umerkote	Tohora	Baghabea	20
8		Kursi	Kursi PRF	20
9		Burja	Tel Nadi RF	30
10	Raighar	Haldi	Haldi (Beheda PRF)	10
11		Hatigam	Hatigam RF	15
12		Gona	Gona (Vharsundi RF)	10
13	Nabarangpur	Sinhiguda	Sindhiguda	30
14		Chutiaguda	Chutiagua	10
15	Jharigaon	Chatupakhana	Chatupakhna RF	35
16		Goramba	Goramba	25
17	Tentulikhunti	Bhatigaon	Bhatigaon	20
18		Bijaraguda	Bijaraguda	20
Total				350

Sources: Divisional Forest Office, Nabarangpur



**Fig 1:** Tasar Plantation (Ha.) by different VSS in Nabarangpur district

Table 5 and Figure 1 provide a comprehensive overview of the tasar plantation initiatives undertaken by various VSS across different forest ranges within Nabarangpur District. This detailed analysis aims to delve into the significance, challenges and outcomes of these efforts, shedding light on the community-driven approach to sustainable forestry and sericulture in the region.

#### Significance of Tasar Plantations

Tasar silk production holds paramount importance in the socio-economic fabric of Nabarangpur District. By cultivating tasar host plants, the VSS not only contributes to the thriving silk industry but also engages in biodiversity conservation. Tasar plants, primarily Asan and Arjun, serve as crucial habitats for

the tasar silkworms, fostering their growth and eventual cocoon production. Through these efforts, VSS members actively participate in preserving indigenous flora and fauna, thereby enhancing the district's ecological balance.

#### Community-Led Initiatives

The table illustrates the active involvement of diverse VSS groups across multiple forest ranges. For instance, Dabugaon VSS has established tasar plantations in Sarguli, covering 18 hectares. Similarly, Jhaliaguda, Bhaluguda and Kodinga VSS have meticulously developed their respective plantations. This community-driven initiative not only empowers VSS members but also strengthens their bond with the land, promoting a sense of environmental stewardship.



### Impact on Livelihoods and Economy

The establishment of tasar plantations not only contributes to biodiversity conservation but also significantly impacts the local economy. Through sericulture, VSS members generate a steady income, thereby elevating their socio-economic status. The sale of tasar cocoon, silk and related products provides a source of livelihood diversification, reducing dependency on traditional agricultural practices. This economic empowerment fosters financial stability within tribal communities, facilitating overall socio-economic development.

### Environmental Conservation and Sustainability

Beyond economic gains, tasar plantations have far-reaching implications for environmental conservation. By planting tasar host trees, VSS members actively participate in afforestation efforts. These trees act as carbon sinks, mitigating the effects of climate change and enhancing the overall environmental quality of Nabarangpur District. The sustainability of these plantations aligns with global conservation goals, contributing to India's commitment to preserving its rich biodiversity.

### Challenges

Despite the commendable efforts showcased in the table, challenges persist. Limited resources, unpredictable weather patterns and pest infestations can hinder the success of tasar plantations.

### Activities of vss in promoting tasar sericulture

The Tasar Sericulture activities facilitated VSS in Nabarangpur are demonstrating significant growth and sustainability. These efforts are underpinned by the active involvement of VSS members in plantation activities, ensuring not only their own employment but also receiving essential support from the forest department. The implementation of the Compensatory Afforestation Fund Management and Planning Authority

(CAMPA) scheme has been instrumental in the completion of plantation work spanning 350 hectares. This extensive effort involved various tasks, such as cleaning forest lands through weeding, marking designated areas, digging pits, supplying necessary inputs, transporting saplings from nurseries and conducting the actual plantation. One notable aspect of these initiatives is the meticulous supervision and monitoring carried out by both VSS members and forest division representatives. This joint effort ensures the successful implementation of the plantation projects. The choice of saplings, planted at the age of 18 months, is indicative of a strategic approach, promoting the robust growth of tasar host plants. The high survivability rate of nearly 100% speaks about the careful planning and execution of these activities.

Furthermore, the support system provided to the VSS members extends to the application of essential inputs like Farm Yard Manure (FYM), Bio-fertilizers and chemical fertilizers, all of which contribute significantly to the health and vitality of the plantations. Regular weeding, conducted twice a year, further enhances the growth conditions, ensuring that the tasar host plants face minimal competition for resources. Crucially, the financial assistance and support provided to the VSS members are facilitated through the Direct Benefit Transfer (DBT) mode. This streamlined approach ensures the efficient disbursement of funds, allowing the VSS members to focus their energies on the actual work rather than bureaucratic hurdles.

Moreover, the VSS members are actively engaged in safeguarding the Tasar host plantations through continuous monitoring and supervision. Their commitment to protecting these vital resources not only highlights their sense of ownership but also underlines the sustainability of these initiatives. By investing their time and efforts, these community members are not only ensuring the success of the current plantations but are also contributing significantly to the long-term preservation of tasar silk production in Nabarangpur.

**Table 6:** Activities of VSS in Promoting Tasar Sericulture

Aspect of Activities	Description
Implementation Scheme	CAMPA Scheme
Total Plantation Area	350 hectares
VSS Involvement	Actively engaged in plantation activities, ensuring employment and receiving support from the forest department
Plantation Tasks	Cleaning forest lands, marking areas, digging pits, supplying inputs, transporting saplings and conducting plantations
Supervision and Monitoring	Meticulously carried out by both VSS members and forest division representatives, ensuring successful implementation
Sapling Age	18 months, promoting robust growth of tasar host plants
Survivability Rate	Nearly 100%, indicating careful planning and execution
Input Application	Farm Yard Manure (FYM), Bio-fertilizers and chemical fertilizers applied once a year
Weeding Frequency	Conducted twice a year, ensuring minimal competition for resources
Financial Assistance	Provided through Direct Benefit Transfer (DBT) mode, streamlining fund disbursement
VSS Involvement in Protection	Actively engaged in safeguarding tasar host plantations through continuous monitoring and supervision
Community Commitment	Demonstrates a strong sense of ownership, underlining the sustainability of the initiatives
Contribution to Long-term Preservation	Ensures the success of current plantations and contributes significantly to the long-term preservation of tasar silk production in Nabarangpur
Collaborative Approach	Forest department and VSS members collaborate effectively, fostering environmental conservation, economic growth and community empowerment
Success Factors	Synergy between traditional knowledge, modern techniques and shared commitment to preserving Nabarangpur's natural heritage

In essence, the collaboration between the forest department and the VSS members in Nabarangpur exemplifies a model of sustainable development. Through meticulous planning, efficient

utilization of resources and active community participation, these tasar Sericulture initiatives are not only providing employment but also fostering environmental conservation,



economic growth and community empowerment. The success of these efforts can be attributed to the synergy between traditional knowledge, modern techniques and a shared commitment to preserving the natural heritage of Nabarangpur.

Burja Vss, Umerkote Burja VSS located in the Umerkote range of Nabarangpur Forest division plays a significant role in the tasar sericulture initiatives. Situated within the Burja Gram Panchayat of Umerkote Block, Burja Village is approximately 7 km away from Umerkote block and about 70 km from Nabarangpur district. The plantation site is specifically located in the Tel Nadi RF, marked by latitude N17.743637 and longitude E82.180947, covering a substantial area of 40 hectares.

The VSS is organized through its Executive Committee (EC), comprising 15 members, including 11 elected representatives (06 are women) and 4 members from various entities such as the forest department, Sarpanch (Village Head), Ward Member and forest guard (secretary). The village primarily houses tribes like Bhotra and Gond communities. Within Burja VSS, there are a total of 456 members, with 238 females and 218 males. The average family size in this community ranges from 5 to 6 individuals per family.

The female members of the families are notably active, not only in household chores but also in various field activities. In several cases, male members take on childcare responsibilities, allowing females to engage in fieldwork. The village's economic landscape is characterized by an average annual income ranging between 10,000 to 12,000 rupees. The livelihoods of most members depend on cultivation and Non-Timber Forest Products (NTFP). Paddy, maize and cashew are among the primary crops cultivated by the community.

Crucially, tasar sericulture is in a growing phase within this community. With the ongoing initiatives and the tasar plantation efforts, it is anticipated to become a major source of livelihood generation for the residents in the near future. This shift represents a significant economic opportunity for the community, indicating a transition towards more sustainable and potentially lucrative income sources. The active participation of the community, particularly the involvement of women in economic activities, showcases a progressive approach toward gender roles and highlights the potential of tasar sericulture to uplift the economic status of the entire village.

**Table 7:** Composition of Executive committee of VSS

Sl. No.	Designation	Elected/Nominate	Number of member
1.	Chairperson	Elected	01
2.	Vice-Chairperson	Elected	01
3.	Treasurer	Elected	01
4.	Members Elected	Elected	07
5.	Village opinion Leader	Elected	01
6.	Members Secretary	Ex-Officio	01
7.	Ward Member	Ex-Officio	01
8.	Concern forest guard	Ex-Officio	01
9.	Nominated Members	Concern Villagers	01
Total			15

The Tel Nadi RF witnessed a significant environmental initiative through the completion of a 30-hectare plantation project involving Arjuna (*Terminalia arjuna*) and Asan (*Terminalia tomentosa*) plants. This endeavor, carried out under the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) scheme, marked a substantial step towards

environmental conservation and biodiversity enhancement. The plantation, orchestrated by the dedicated members of Burja Village Forest Committee (VSS) in Umerkote, was meticulously planned and executed, ensuring the sustainable growth of these valuable tree species. Prior to the plantation, meticulous planning and collaboration were essential. Two crucial meetings were conducted, bringing together key stakeholders including the Range Officer, Umerkote Forest officials and the proactive members of Burja VSS. These meetings served as platforms for informed decision-making and strategic discussions. One of the pivotal outcomes of these discussions was the choice of planting Asan and Arjuna plants, a decision rooted in the vision of the Odisha Tasar Silk Development Project (O-TSDP) for the Vanya program in Odisha. This strategic alignment highlighted the integration of local initiatives with larger state-level developmental goals, showcasing a harmonious blend of community-driven efforts and statewide conservation strategies. The geographical coordinates of the plantation site, latitude N19743637 and longitude E82.180947, pinpointed a specific location within the Tel Nadi RF. This precise selection emphasized the strategic approach adopted in the plantation project, ensuring optimal growth conditions for the Arjuna and Asan plants. The choice of these plant species is noteworthy, considering their ecological significance and potential contributions to the region's biodiversity.

Furthermore, the active involvement of the Burja VSS members underscored the spirit of community-led environmental stewardship. Their dedication and hands-on participation were instrumental in the successful execution of this plantation initiative. This collaboration between local communities and forest officials exemplifies a sustainable model of environmental conservation. It not only ensures the preservation of native flora but also empowers communities, fostering a sense of ownership and responsibility towards the environment.

In essence, the completion of this plantation project signifies more than just the growth of trees; it represents a collective commitment to environmental sustainability, biodiversity conservation and community development. The careful selection of plant species, the meticulous planning and the active involvement of community members serve as inspiring examples for future environmental initiatives. This endeavor stands as a testament to the transformative power of community-driven conservation efforts, highlighting the potential for positive change when local communities and governmental bodies join forces for a common cause.



Plantation site of VSS



Tasar Silkworm Rearing

### Steps for improvement of tasar sericulture at Nabarangpur district

In light of the ongoing formation of one TRCS in Nabarangpur district, the current involvement of only 33 tasar farmers and the limited coverage of existing plantations spanning 100 hectares, it is imperative to implement strategic steps for the advancement of tasar sericulture in the region. Active engagement of VSS members has played a pivotal role in completing plantation efforts covering an impressive 350 hectares. To further enhance the scope and sustainability of tasar sericulture in Nabarangpur, several following key measures are essential.

1. Providing proper training to members of VSS groups- Because tasar sericulture is new to VSS members, essential training should be provided to them in order to improve tasar cocoon production and so generate more income.
2. Create awareness among the members of VSS groups- It is critical that members understand the tasar culture in order to boost production.
3. Exposure visit and field visit to potential areas- It is critical since members are still in the learning stage and visiting potential locations will improve their impression.
4. Regular monitoring and supervision- Because the tasar silkworm feeds on the leaves of the tasar food plant, regular monitoring of the plantation area is critical for protecting the plants from wild animals.
5. Proper co-ordination between sericulture officials and forest officials- To improve socioeconomic condition and bring about rural development, the sericulture and forest organisations should further collaborate more for timeliness of activities.
6. Space for adaptation to new technology – There should be focus on use of new technology instead of traditional and failure technologies.

The ongoing coordinated efforts will contribute to expanding plantations, increasing the number of tasar farmers and promoting enhanced number of Disease-Free Layings (DFLs) rearing. This initiative will lead to higher cocoon production, ultimately boosting raw silk production in the region.

### Conclusion

The district of Nabarangpur stands at the precipice of transformative change, with its ongoing tasar sericulture initiatives poised to usher in a new era of sustainable development, environmental conservation and community empowerment. The data presented in this comprehensive report

presents a vivid picture of the district's socio-economic landscape, highlighting both its challenges and its immense potential. Nabarangpur emerges as a predominantly rural district, characterized by dispersed settlements and a significant agricultural footprint. Its population, while sparse, is engaged actively in agriculture, with a substantial portion dedicated to cultivating land. The district's tribal communities play a crucial role, with Scheduled Tribes forming a significant portion of the population. Additionally, the presence of VSS further underscores the district's deep-rooted connection with its natural resources. In this context, tasar sericulture stands as a beacon of hope. Through meticulous planning, active community involvement and strategic collaboration between local communities and government bodies, tasar sericulture initiatives have not only revitalizing the local silk industry but have also created avenues for economic growth and environmental conservation. The active participation of VSS members, especially women, demonstrates the power of community-led initiatives. These efforts have not only bolstered the silk industry but have also empowered local communities, particularly women, who are actively engaged in tasar cultivation. Moreover, the choice of plant species for tasar host plantations, the careful planning and the financial assistance provided through streamlined channels showcase the district's commitment to sustainable practices. Challenges persist, ranging from limited resources to unpredictable weather patterns. However, these challenges are met with determination and innovative solutions. The district's potential for tasar sericulture is vast, offering an opportunity to diversify livelihoods, preserve biodiversity and foster economic stability. With targeted interventions, such as training programs, awareness campaigns, exposure visits and technological adaptations, these challenges can be transformed into opportunities for growth and development. As Nabarangpur moves forward, a clear roadmap emerges. The ongoing formation of Tasar Rearers' Cooperative Societies (TRCS), the active involvement of VSS members and the strategic plantation efforts are key building blocks. By fostering a culture of learning, raising awareness and embracing modern technology, the district can propel its tasar sericulture initiatives to greater heights.

### Acknowledgement

The authors express sincere gratitude to Shri Madan Mohan Parichha, Officer in-charge, Pilot Project Centre, Chikli, Nabarangpur, for his support and cooperation throughout the duration of this study.

### References

1. Andhra Pradesh Forest Department. Andhra Pradesh state of forest report 2011; c2011. Available from: <http://re.indiaenvironmentportal.org.in/reports-documents/andhra-pradesh-state-forest-report-2011>
2. Chowdary NB, Sathyanarayana K, Nadaf Hasansab A, Vishaka GV, Chandrashekharaiah M, *et al.* Role Of BTSSO In Tasar Silkworm Seed Production. In: Souvenir cum Book of Abstracts of National Symposium on Vanya Sericulture: Opportunities Galore; 2022 Oct 28-29; Ranchi. p.141.
3. Anonymous. Vana Samrakshan Samiti- Management Manual. Orissa Forestry Sector Development Society; c2007. Available from: <http://ofsds.in/Publication/vssmanualeng.pdf>
4. Das SK, Dwibedi SK. Sericulture: A boon to poor farmers of Odisha. In: Proceedings of the conference New Dimensions of sustainable agriculture; c2012. p. 61-63.

5. Dewangan SK. Livelihood opportunities through sericulture a model of Gharghoda tribal block, Raigarh dist. American Journal of Environmental Science. 2013;9(4):343-347.
6. Dhanuraj D. Vana Samrakshna Samithi- A study on Thenmala and Palaruvi. Centre for Public Policy Research Tripunithuram; c2006. Available from: <https://www.cppr.in/wp-content/uploads/2012/10/VanaSamrakshnaSamithi-AStudyonThenmalaandPalaruvibyD.Dhanuraj.pdf>
7. Disaster Management Plan Department of Handlooms, Textiles and Handicrafts Odisha, Bhubaneswar; c2018. Available from: <https://www.osdma.org/wp-content/uploads/2019/09/Hand-Textile-2019.pdf>
8. Himanshu. MoU signed for Vanya Programme in Odisha. Kalinga TV; c2022. Available from: <https://kalingatv.com/state/mou-signed-for-vanya-silk-programme-in-odisha/>
9. Jatin Kumar Swain, Hasansab A Nadaf, Vishal Mittal, Kiranmaya Pradhan, Chowdary NB, Sathyanarayana K, *et al.* Studies on the performance of pilot project centers (PPCs) of Sundargarh. Pharma Innovation. 2022;12(4):1672-1683.
10. Jayaram H, Chowdary NB, Sathyanarayana K. Tasar Sericulture as A Source of Income and Employment– An Economic Analysis. Plant Archives. 2022;22(Special Issue):75-82.
11. Muthyalu M. Impact of Vana Samrakshana Samithi (VSS) in forest Development Activities with special Reference to Non-Timber Forest Produce (NTFP)- An Empirical Analysis. Journal of Business Management & Social Science Research. 2013;2(2):February. ISSN No 2319-5614.
12. Nadaf H, Rathore MS, Chandrashekhriaiah M, Vishaka GV, Sinha RB. Studies on comparative performance of different tasar silkworm grainage houses. Journal of Entomology and Zoology Studies. 2019;7(6):921-926.
13. Nadaf HA, Vishaka GV, Chandrashekharaiiah M, Rathore MS, Srinivas C. Scope and potential application of artificial intelligence in tropical tasar silkworm *Antheraea mylitta* D. seed production. Journal of Entomology and Zoology Studies. 2021;9(1):899-903.
14. Nadaf Hasansab A, Vishaka GV, Chandrashekharaiiah M, Chowdary NB, Rathore MS, Sathyanarayana K. Techniques to sustain weather conditions in tropical tasar seed production. In: Book of Abstract, National Seminar on Climate Smart Sericulture-2022: Approaches for Sustainable Sericulture; 2022 Oct 6-7; Bangalore. p.52.
15. Nataraju MS, Shashidhar R, Raghavendra SM. Women Empowerment Through National Afforestation Programme in Andhra Pradesh. Indian Journal of Extension Education. 2013;49(1 & 2):15-19.
16. Prakash PJ, Singh RSJ, Rao BVS, Kumar MV. *Terminalia arjuna* - a fast growing forest species and a source of livelihood to Vana Samrakshana Samithi members. Indian Journal of Ecology. 2011;38(Special Issue):145-148.
17. Rathore MS, Vishaka GV, Nadaf HA, Mary Shery AV. Adaptive strategies for mitigating adverse climatic conditions in tropical tasar seed production. In: Proceedings of the International Conference on Recent Innovations and Technological Advancements in Agriculture, Horticulture, Agricultural Engineering, Sericulture, Food Science, Biotechnology and Rural Entrepreneurship 2023; 2023 Aug 11-12; The Indian Agriculture College (Affiliated to Tamil Nadu Agricultural University, Coimbatore), Near Kanyakumari, Radhapuram, Tirunelveli Dt., Tamil Nadu, India.
18. Ray M. Livelihoods through Tasar Sericulture: Issues before Small Producers. News Reach; c2010. Available from: <https://www.pradan.net/sampark/wp-content/uploads/2019/08/Livelihoods-through-Tasar-Sericulture-Issues-before-Small-Producers-By-Madhabananda-Ray.pdf>
19. Rekha Panigrahi. Democratization of Forest Governance: Myths and Realities (An analysis of implications of decentralized forest policies and processes in Orissa, India). Paper presented at the Eleventh Biennial Conference of the International Association for the Study of Common Property; 2006 Jun 19-23; Bali, Indonesia.
20. Rethesh PT, Jagadeesh KK. A Case Study on the Impact of Tourism on the Tribal Life in Vayalada, Calicut, Kerala. Part of the Studies in Systems, Decision and Control book series (SSDC, volume 487); c2023.
21. Seri-States of India-A Profile. Central Silk Board, 2019, 180. Available from: <https://csb.gov.in/wp-content/uploads/2019/02/Seri-States-Profiles-2019.pdf>
22. Shalya C. District Mineral Foundation (DMF): Implementation Status and Emerging Best Practices. Centre for Science and Environment, New Delhi; c2020.
23. Sudar B. An Analysis of the Property Rights of Forest Dependent Communities: The Indian Context. VIKALPA. 2013;38(3):79-102.
24. Sundar B, Vineet V. Time Discount Rate of Forest-Dependent Communities: Evidence from Andhra Pradesh, India. VIKALPA. 2020;45(4):1-14.
25. Thomas K. Andhra Pradesh community self-help model (Centre for Good Governance Collected Working Papers, Volume 2). 2003. Accessed on May 4, 2012 from: <http://www.cgg.gov.in/pdfs/WP-77-92.pdf>
26. Vishaka GV, Rathore MS, Chandrashekharaiiah M, Nadaf Hasansab A, Sinha RB. Tasar for Tribes: A way of life. Journal of Entomology and Zoology Studies. 2020;8(1):374-377.