

Traditional Plant-Based Dyeing Practices in Guwahati, Northeast: Sustainability and Socio-Economic Implications

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Abstract

India boasts a glorious culture of ecological textile traditions rooted in traditional plant-based dyeing techniques. This tradition represents indigenous knowledge systems, ecological strength, and the economic process associated with the region at large in the context of Guwahati, a door to the Northeastern Region in India. Competition from the market, growth of the industry, and the speed of urbanisation raise questions regarding the economic viability or sustainability of the industry. This research paper will describe the role of plant-based dyeing technology from a qualitative secondary research approach based on publications and studies. It has even been argued that despite the fact that these technologies provide a means of livelihood for the artists and are more sustainable, i.e., more environmentally friendly, than synthetic dyes, these technologies still face the challenge of socioeconomic marginalisation. In this paper, solutions to improve the scaling up of environmentally friendly textile technologies while avoiding the loss of knowledge systems are considered, focusing on traditional textile dyeing from a sustainability and urbanism perspective.

Keywords: *Natural dyes; Guwahati; sustainability; indigenous textile practices; socio-economic implications*

Introduction

For generations, India has produced textiles using natural dyes made from plants (Mahanta and Tiwari, 2005). Traditionally, these dyes, which were derived from botanical resources such as leaves, bark, roots, and fruits, were used on cotton and silk textiles. Plant-based dyeing techniques are still used in small-scale, informal forms in Guwahati, Assam's largest city, especially by the artisan population of rural origin. **Traditional knowledge** and **urban economic** pressures co-exist in a dynamic framework created by the city's function as a commercial and cultural centre.

The twentieth century witnessed a period of rapid growth in synthetic dyes, coinciding with the **emergence** of the textile industry, which transformed the global textile industry (Arputharaj et al., 2016). The synthetic dyes are associated with a number of **environmental consequences**, which include the discharge of hazardous wastes, water pollution, and health risks; nevertheless, they can exert high efficiency with cost-effectiveness and consistent shade strength (Elshemi et al., 2024). The plant-based dyes can also fulfil the requirements of environmental sustainability because they are **biodegradable** (Sutradhar et al., 2015). The conventional textile practices are becoming highly applicable with environmental sustainability in urban settlements like Guwahati, where the issue of managing hazardous wastes is still a challenge for the industrial sector.

Furthermore, apart from the environmental impact of the process of plant-based dyeing of fabrics and yarns, there is immense social significance involved in the process as well. For instance, with **globalisation** and the increased supply of manufactured and dyed textiles in the market, native industry owners have to contend with competition at the local level. Also, with rising environmental and ethical concerns, there will be new market opportunities. This particular study aims to assess the **socioeconomic implications** of the process of native plant-based dyeing in Guwahati from a secondary research perspective with regard to sustainable lifestyle options and conservation of culture.

Traditional Plant-Based Dyeing Practices in Guwahati

Guwahati's conventional method for dyeing products has its base in the Assamese style for textile creation in rural areas and is incorporated into the city through the migration of artisans. Conventional plants used for the traditional Assamese style of product dyeing are: *Rubia cordifolia* produces red colour using the extract of the plant, while *Indigofera tinctoria* produces blue colour using the extract of the plant (Mahant and Tiwari, 2005; Terrone and Borthakur, 2012). As part of adapting to new customer trends in metropolitan cities, artisans in this market blend tradition with new style.

The collection of plants, extraction of colour, mordanting, and finally dyeing can be considered the general process of dyeing (Sutradhar et al., 2015). Natural mordants like alum and ash, which do not affect the environment much, are considered to be the best in the process of dyeing. The network of families and communities plays an important role in the reproduction of knowledge; hence, it seems to be causing a threat to their decline, with the younger generation seeking more secure options in metropolitan cities.

Another important part of Assamese culture is the use of natural colours on their traditional fabrics or textiles. Colours and designs that reflect regionalism and cultural symbolism are reflected in the dress worn, which is called the **Mekhala chadar**. Natural dyeing of fabrics also reflects the growing strength of natural dyeing in the markets of Guwahati City.

Sustainability Dimensions

One of the major benefits associated with the use of plant-based techniques for dyeing fabrics is environmental friendliness. It can be said that the process of **natural dyeing** is not harmful to nature since natural dyes are **biodegradable** compared to synthetic ones used for dyeing fabrics, which sometimes result in the release of chemicals into water resources. This consideration can be more applicable to the context of Guwahati since it can be said to be **water pollution-prone**. The environmental footprint of traditional techniques on nature can be said to be low since this method utilises resources often on a renewable basis in small quantities (Sutradhar et al., 2015).

For example, practices such as reusing dye baths or planning activities such as dyeing by season can help reduce **water consumption**. In contrast, when we talk about industrial practices, there is waste that needs to be addressed, and that waste is filled with chemical content, along with water used on a large scale, as discussed by (Arputharaja et al., 2016). The benefits to nature offered by this process of dyeing make it closer to **sustainability practices**, such as maintaining equilibrium within nature, no pollution, etc.

On the other hand, the lack of scale and organisation impedes the substantial environmental impact of plant-based dyeing. The rare practice of incorporating craft in planning strategies as part of **urban sustainability policies** and **environmental legislation** is an opportunity to relate environmental governance and cultural heritage.

Socio-Economic Implications

Plant-based dyeing processes contribute to the livelihoods of people living in Guwahati City, as it generates employment opportunities for the artists and traders involved in the market. Besides, the processes occur at levels that allow for flexible hours of work, applicable at the cooperative organisation as well. This aspect is vital in the urban market as the economy faces unemployment and job insecurity.

The naturally colored textiles have a ready market that specifically demands these sorts of products that are considered to be sustainable in nature. The markets in Guwahati offer a lot of outlets for the sale of the products, in addition to the budding nature of the tourists' activities.

Such practices are considered **informal**, which also aids in controlling access to these facilities, such as loans, training, and development of companies. Lack of support in the use of **technology**, **marketing**, and **entrepreneurship** among artists makes them find ways to complicate the improvement of their production. This, therefore, shows the need to link the protection and empowerment of artisans economically.

Institutional and Urban Context

The **rapid urbanisation** of Guwahati is having an impact on the traditional method of **dyeing**. For example, though **rapid urbanisation** of the youth is an opportunity for them to participate in serving in different sectors of employment, the fact that it is a regional centre helps in cultural tourism.

However, handlooms and handicraft programs, which are sponsored by the government, fall under the **Ministry of Textiles (Ministry of Textiles, 2022)**. However, it is possible that urban implementation may not take into account the needs of the artist using plant dyes. Making the availability of **marketing** and **training facilities** and supply chains for the production of natural dyes easily obtainable is still a problem.

The environmental regulations intended for the control of industrial pollution ultimately focus on the environmental benefits of traditional dyeing methods. However, these mechanisms may not be pertinent to the direct context of artisans. In the schemes of green city development and heritage protection, in the planning schemes for the green development of Guwahati, so far, there has been no place for traditional crafts.

Within this institutional setting, national and state-level policy schemes play a critical role in shaping the opportunities and constraints faced by traditional plant-based dyeing practitioners in Guwahati.

Schemes and Institutional Framework Supporting Traditional Dyeing

Scheme	Implementing Authority	Key Objectives	Relevance to Plant-Based Dyeing	Key Limitations
National Handloom Development Programme (NHDP)	Ministry of Textiles, Government of India	Raw material support, skill upgradation, infrastructure, and marketing	Indirectly sustains natural dyeing through support for handloom-based production	No explicit focus on environmental sustainability or natural dyes
Ambedkar Hastshilp Vikas Yojana (AHVY)	Ministry of Textiles, Government of India	Artisan clustering, training, and collective organisation	Supports informal dye artisans by improving market access and bargaining power	Sustainability and indigenous knowledge protection were not addressed
Pradhan Mantri Vishwakarma Scheme	Government of India	Skill certification, financial inclusion, and social security	Provides formal recognition to traditional dye artisans	Broad scope limits targeted support for eco-friendly dyeing
North-East Handloom and Handicrafts (NEHH) Scheme	Ministry of Development of North Eastern	Entrepreneurship, infrastructure, market access	Relevant to Guwahati as a regional market	Commercial focus outweighs sustainability concerns

	Region (DoNER)		hub for Northeast artisans	
Assam Handloom & Handicraft Development Initiatives (ARTFED / Dept. of Handloom & Textiles)	Government of Assam	Training, design development, exhibitions, craft clusters	Directly supports artisans operating in Guwahati	Limited documentation and promotion of plant-based dye knowledge

Challenges and Power Asymmetries

Nonetheless, assuming that different forms of these support systems are available at hand to help various national and state governments, it has not stopped traditional forms of plant-based dyeing from facing different **structural inequalities**. This being largely due to the reason that traditional manufacturers who work in the production of industrial fabrics and various synthetic dyes are associated more with economies of scale and distribution systems, along with various institutional support systems. **Traditional dyeing** artists are associated more with unauthorized systems in production without access to different financial, technological, and marketing systems.

In addition to this, the **appropriation of knowledge** also increases these inequalities. **Business** and **commercial designers** use indigenous knowledge for dyeing their materials without any system to recognise the indigenous knowledge providers fairly. The deterioration of the artisan community is due to the lack of legal and policy instruments to preserve indigenous knowledge.

Moreover, **artisans** who use **plant-based dyes** are underserved or undersold within the decision-making, planning, and development of policies. As much as the current programs are clear on supporting commercialisation, planning is excluding artisan planning. As a result, artisans are being **marginalised**, and they do not have the power to decide policies that guide or affect their traditions, commercialisation, and contribution to the environment.

This power imbalance has made them conscious of the big gap that lies between the expected and wished policies and the situation at hand. If there is no appropriate policy towards

knowledge protection in informality, the traditional mode of dyeing faces marginalisation in its own right.

Conclusion

The traditional practices of plant-based dyeing have huge **socioeconomic resilience**, **cultural heritage**, and **environmental sustainability** perspectives among people living in or around Guwahati. While traditional practices and procedures provide better alternatives to the use of artificial shades, which have adverse impacts on the environment and contribute little to socioeconomic growth, they are nonetheless limited by institutional, market, and socioeconomic factors, especially for an urban area. The importance of traditional practices for plant-based dyeing towards **urban development** and sustainability lies in the need for an institutional support system for its viability and association. In these regards, there is a need to ensure legal recognition for traditional knowledge, better access to markets, and overall institutional practices for modern urban areas.

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