

1. Research Design

a) Site Selection and Community Entry

Community Selection Justification:

The research was conducted in Konakhola, Keraniganj, a semi-urban, peri-rural settlement near Dhaka. This area exemplifies marginalized communities in Bangladesh, where socio-economic disparities, limited access to formal education, and restricted employment opportunities shape daily life and livelihood strategies (Chambers, 1997). Rural and peri-urban communities in Bangladesh often face systemic inequalities due to historical neglect, social stratification, and economic marginalization. By studying Konakhola, the research aims to understand how these factors influence livelihood resilience, resource use, and social dynamics at the community level.

The Hindu community in Konakhola has historically experienced both social and economic disadvantages. Families rely heavily on informal and seasonal labor, which is often unpredictable but essential for household survival. Women, in particular, play a central role in maintaining household income through activities such as collecting cow dung for fuel, cutting betel nuts, and crafting decorative items. These activities demonstrate innovative adaptation to environmental and economic constraints, and highlight the critical role of women in supporting both households and local economies. Studying this community allows researchers to explore how marginalized groups contribute to local production, sustain livelihoods, and maintain social cohesion, even while living on the margins of society.

Furthermore, Konakhola provides a unique case for participatory research because of its interconnectedness with nearby industrial and agricultural areas, allowing for insights into how rural communities adapt to economic opportunities and pressures in a semi-urbanizing landscape. This setting enables the study to capture both traditional and emerging livelihood practices, offering a comprehensive understanding of rural adaptation in contemporary Bangladesh.

Approach to Establishing Community Relationships:

Establishing meaningful relationships in a marginalized community requires trust-building, transparency, and culturally sensitive engagement. Researchers began with informal visits and conversations with local elders, women, and other key community members to introduce themselves and explain the purpose of the study. These early interactions allowed researchers to learn about local norms, routines, and expectations, which is critical for ensuring respectful and effective engagement.

Participatory research principles guided all interactions. The research team emphasized co-learning, ensuring that community members were active participants rather than passive subjects. Community meetings were organized to facilitate collective discussion, where women and other marginalized groups could express their perspectives on livelihoods, resource use, and community challenges. This approach empowered participants to take

ownership of the research process, ensuring that the findings would reflect local realities and priorities, rather than being imposed externally (Narayanasamy, 2009).

By emphasizing participation, dialogue, and mutual respect, researchers were able to create an environment where community members felt safe sharing knowledge, insights, and experiences. This also helped identify potential areas for community-driven interventions in the future, enhancing the relevance and impact of the research.

Ethical Considerations and Consent Procedures:

Ethical considerations were central to the design and implementation of the research. Participation was entirely voluntary, and the purpose, methods, and potential outcomes of the study were clearly communicated to participants in a culturally appropriate and understandable way. Oral informed consent was obtained from all participants, as written consent may not always be feasible or culturally suitable in rural Bangladeshi contexts (Islam, 2014).

Researchers ensured confidentiality and anonymity when recording observations, interviews, and photographs. Care was taken to avoid sharing sensitive personal information or identifying individuals in the research reports. Gender and cultural norms were strictly respected, particularly in engaging with women; female researchers accompanied women during certain livelihood activities to ensure comfort and adherence to local customs.

The research followed a non-extractive approach, meaning it prioritized the community's benefit. Data collection was designed not only to generate academic knowledge but also to support local development efforts, inform policy discussions, and highlight the contributions of marginalized groups to household and local economies. By documenting adaptive strategies, seasonal livelihoods, and resource management practices, the research seeks to create a repository of knowledge that can be used for planning, training, and empowering the community, ensuring long-term positive impact.

b) Methodology Implementation Plan

Transect Walk Implementation:

The Transect Walk is a foundational participatory research method widely used to explore communities and their environments in a systematic and inclusive manner. In the context of Bangladesh, where rural and peri-urban communities often have complex social, economic, and ecological systems, transect walks help researchers understand how people interact with land, natural resources, infrastructure, and economic opportunities (Walpole & Sheldon, 1999).

In Konakhola, Keraniganj, transect walks were conducted along carefully selected routes that covered residential areas, resource collection sites, agricultural plots, and craft production zones. Community members actively guided the researchers, pointing out areas for cow dung collection (used for fuel), betel nut cutting, and craft-making activities such as plastic flower

production. Their participation ensured that the observations reflected real community priorities, daily challenges, and strategies for survival, rather than outsider assumptions.

Data collection included detailed field notes, photographs, informal interviews, sketches, and GPS mapping. Observing the spatial arrangement of homes, resource sites, and industrial areas provided insight into how accessibility, land use, and proximity influence seasonal livelihood strategies. For example, women often choose tasks near residential areas during wet seasons, reflecting a practical adaptation to environmental conditions and household responsibilities.

In addition, transect walks serve a dual purpose:

They collect valuable research data and empower participants by recognizing their local knowledge and expertise. By actively engaging the community, the method strengthens local capacity for problem identification and resource management, which is particularly relevant in Bangladesh, where formal planning and government support may be limited.

Farmers Field School (FFS) Implementation:

The Farmers Field School (FFS) is an interactive participatory methodology that promotes hands-on learning, knowledge sharing, and collaborative problem-solving. In Konakhola, FFS sessions were organized to focus on livelihood improvement, sustainable resource management, and practical skills enhancement for both women and men.

During the sessions, participants engaged in practical demonstrations of sustainable agricultural practices, resource-efficient techniques, and innovative income-generating activities. Discussions were held to compare traditional knowledge with new approaches, fostering peer-to-peer learning and collective decision-making (Reijntjes, Haverkort, & Waters-Bayer, 1992).

FFS emphasizes an iterative learning process, where participants test new ideas, provide feedback, and refine their strategies over time. In Bangladesh, this method is particularly useful because it bridges gaps between formal agricultural knowledge and local community practices, helping marginalized groups, especially women, enhance their productivity, diversify income, and improve household resilience.

Moreover, FFS sessions serve as a platform for social empowerment, as participants gain confidence, develop leadership skills, and strengthen community networks. By integrating practical training with participatory discussion, FFS creates a sustainable framework for community-driven development, where solutions are locally relevant and supported by collective knowledge.

Resource Mapping Implementation:

Resource Mapping is a participatory tool that allows communities to visually document natural resources, land use, infrastructure, and economic activities. In Konakhola, community

members actively created maps highlighting areas for cow dung collection, betel nut cutting, craft production, water sources, and proximity to industrial zones.

This method encourages community dialogue about resource allocation, constraints, and opportunities, providing a shared understanding of local assets and challenges (Pretty & Vodouhê, 1997). It also links spatial information with livelihood strategies, allowing researchers to see patterns in labor allocation, seasonal work, and household decision-making.

Resource mapping in Bangladesh has a particular significance because many rural communities lack formal planning tools or official recognition of their resources. By producing these maps, the community can plan more effectively, advocate for support, and make informed decisions about resource management and economic activities. The process also fosters collective awareness and ownership, ensuring that interventions are designed to meet real local needs.

In addition, the visual outputs of resource mapping such as hand-drawn maps, annotated photographs, and diagrams can be used as teaching and training tools in future FFS sessions, creating a cycle of learning, adaptation, and knowledge dissemination. This aligns with participatory research principles, where the co-production of knowledge empowers communities and enhances sustainability.

Integration of Methods:

By combining Transect Walks, Farmers Field Schools, and Resource Mapping, the research team was able to triangulate data, cross-check findings, and obtain a comprehensive understanding of the community. Each method contributed differently:

Transect walks offered direct observation of daily life, land use, and environmental challenges.

FFS facilitated active learning, skills development, and discussion of adaptive strategies.

Resource mapping enabled visual representation of resources, labor distribution, and community priorities.

Together, these participatory methods ensure that research is inclusive, reflective of local knowledge, and oriented toward actionable outcomes that can support sustainable development in marginalized communities like Konakhola.

1. Field Implementation: Transect Walk Observations

Introduction to Transect Walk Observations

The transect walk is a participatory research tool that enables researchers to systematically explore a community's landscape, resources, social structures, and economic activities. In Bangladesh, where rural and peri-urban communities often face complex socio-economic

challenges, environmental vulnerabilities, and limited formal employment opportunities, the transect walk allows for direct observation, local participation, and contextual understanding.

In Konakhola, Keraniganj, the transect walk was used to examine land use patterns, seasonal livelihood strategies, resource distribution, environmental conditions, and social networks. Special attention was paid to the roles of women and marginalized groups, who are central to sustaining household incomes and community resilience. Observations were collected through field notes, informal interviews, photographs, sketches, and discussions with community members, ensuring that local knowledge and perspectives were incorporated into the research.

1. Livelihood Strategies: Seasonal and Adaptive Approaches

The Hindu community in Konakhola demonstrates adaptive and diversified livelihood strategies, which vary seasonally and are shaped by economic necessity, environmental conditions, and household responsibilities. Women are at the core of these strategies, contributing to household survival while supporting broader community economies.

Dry Season (Winter):

During the dry season, women engage in the collection and processing of cow dung, a traditional practice used to produce fuel cakes for cooking and heating. Cow dung is collected from nearby agricultural and industrial areas, such as Sharif Agro. After collection, it is dried, shaped into fuel cakes, and stored for sale. This labor-intensive process requires knowledge of drying times, shaping techniques, and storage conditions to maintain product quality. Income generated from fuel sales is relatively stable during the dry season and forms a major portion of the household budget. This income supports essential household expenses such as food, school fees, clothing, medical care, and household maintenance. Beyond economic importance, cow dung fuel production has cultural and ecological significance, reflecting the community's use of traditional energy sources and sustainable management of natural materials.

Wet and Summer Seasons:

During wet and summer months, households diversify income sources to cope with environmental challenges and seasonal fluctuations. Activities include betel nut cutting, craft production (such as plastic flowers), and small-scale agricultural labor. Betel nut cutting involves harvesting, cleaning, and drying nuts, which are then sold to local traders. This requires careful timing according to agricultural cycles and local demand. Craft production, particularly plastic flower making, is a home-based industry, often led by women. This work requires skill, patience, and creativity, providing supplementary income for households. These seasonal activities are physically demanding and have uncertain financial returns, yet they are critical for sustaining household livelihoods, highlighting the resilience, dedication, and resourcefulness of women in marginalized communities. The community's approach reflects a multi-strategy livelihood model, combining traditional knowledge, seasonal planning, and labor diversification to reduce vulnerability and enhance household stability.

Coping Mechanisms and Risk Management:

The community demonstrates adaptive strategies to manage environmental and economic risks, such as storing resources during surplus periods, staggering labor across family members, and using local networks to sell products efficiently. Children and younger family members often assist in labor, ensuring intergenerational knowledge transfer and supporting household productivity. This adaptive approach demonstrates the interconnectedness of social, economic, and environmental factors in sustaining livelihoods within marginalized communities.

Land Use and Environmental Observations

Konakhola exhibits diverse land use patterns, combining residential areas, small-scale agriculture, resource collection zones, and spaces utilized to support industrial labor. This multifunctional use of land illustrates the community's capacity for spatial planning and adaptive management in a resource-constrained environment. The proximity of the community to industrial areas enables households to link informal labor with formal economic activities, such as supplying fuel cakes to copper and gold workers. This interaction underscores the importance of marginalized labor in supporting local industrial productivity, despite limited visibility in formal economic statistics.

Environmental vulnerabilities are significant. The community faces extreme weather events, seasonal flooding, heat waves, and heavy rainfall, which can disrupt both household and income-generating activities. Limited drainage, sanitation, and access to clean water exacerbate these challenges, particularly for women and children who spend extended hours in labor-intensive work.

Observations revealed that households employ environmental coping strategies, including elevating workspaces, timing labor to avoid peak heat or heavy rain, and sharing resources to reduce workload risks.

These adaptive land use practices demonstrate community-based knowledge, environmental awareness, and resilience, which are crucial for sustainable development planning in semi-urban areas of Bangladesh.

Social and Economic Insights

Women as Central Economic Actors:

Women in Konakhola play a crucial role in sustaining household economies and contributing to community-level economic activities. They are primarily responsible for multiple income-generating activities, including cow dung collection and processing, craft production, and seasonal agricultural work. Despite their labor being largely informal and undervalued in formal economic metrics, it is indispensable for household survival, school expenses for children, and basic healthcare. Their work also supports local industries, such as copper and gold workshops, by providing essential resources like fuel.

Contribution of Marginalized Groups:

Other marginalized groups in the community, including lower-income households and elderly members, contribute significantly to economic productivity. Their participation, though often invisible to formal institutions, highlights the interdependence between informal labor and the formal economy. For example, the fuel and crafts produced by women directly support industrial workers and local market systems, illustrating how informal livelihoods sustain broader economic functions (Chambers, 1997; Narayanasamy, 2009).

Community Cohesion and Collective Labor:

Observations from the transect walk revealed strong social cohesion. Women often collaborate in labor-intensive tasks, such as processing fuel or making crafts, while family members assist in seasonal agricultural work. Knowledge and skills are shared among households, fostering mutual support during environmental hazards like flooding or extreme heat. This collaborative dynamic not only strengthens resilience but also promotes social solidarity and trust within the community.

Integration of Traditional Knowledge and Innovation:

The community demonstrates a blend of traditional and innovative practices. For instance, cow dung collection is a long-standing traditional livelihood, but women integrate it with craft production, small-scale trade, and seasonal agricultural labor. This combination of activities illustrates the community's adaptive strategies for coping with environmental risks, market fluctuations, and socio-economic constraints. Such integration enhances household resilience, long-term livelihood sustainability, and knowledge transfer across generations.

Importance of Participatory Approaches:

The research underscores the value of participatory methodologies. By actively involving community members in guiding the transect walk, sharing personal experiences, and validating findings, researchers gained a holistic understanding of the socio-economic and environmental dynamics. Participatory approaches also empower the community, making them co-creators of knowledge rather than passive subjects. This engagement ensures that research outputs are relevant, actionable, and reflective of lived realities.

The insights from Konakhola illustrate broader issues in peri-urban Bangladesh:

Marginalized women's labor is often under-recognized in policy frameworks despite its critical contribution to household and local economies. Informal labor networks are essential to sustaining local industry and economic systems. Community cohesion, traditional knowledge, and adaptive practices enhance resilience in contexts of environmental and economic vulnerability.

Development and Policy Relevance**Recognition of Women's Labor:**

The findings indicate that development interventions must explicitly recognize and support women's contributions. Policies should focus on skill development, training, and capacity-building programs tailored to women's work in fuel production, craft-making, and seasonal

agriculture. Such recognition can lead to enhanced income security, improved social status, and increased empowerment.

Support for Informal Industries:

Informal industries, including household-based craft production and local fuel supply chains, are key economic drivers in peri-urban areas. Policy measures should facilitate market access, financial inclusion, and infrastructure support, enabling marginalized communities to strengthen livelihoods sustainably. For instance, providing safe storage facilities, access to raw materials, and transportation support can increase efficiency and profitability.

Environmental Resilience and Risk Mitigation:

The community faces challenges such as flooding, heatwaves, poor sanitation, and exposure to industrial pollutants. Development initiatives should promote environmentally sustainable practices, including safe waste management, climate-resilient storage techniques, and community-based water and sanitation improvements. Supporting these strategies reduces vulnerability, enhances productivity, and safeguards health, particularly for women who are most engaged in labor-intensive work.

Community-Driven Development and Participatory Planning:

The use of Transect Walks, FFS, and Resource Mapping provides a foundation for community-led development programs. Participatory planning ensures that interventions are context-specific, locally relevant, and socially inclusive. Involving community members in decision-making strengthens ownership, accountability, and sustainability of development initiatives.

Integration into Local Governance and NGO Programs:

Insights from the research can guide local government, NGO, and national development programs. Seasonal labor patterns, resource distribution maps, and social network analysis provide evidence-based inputs for policy formulation. This ensures that development strategies address the real needs of marginalized peri-urban communities, focusing on livelihood security, women's empowerment, and environmental resilience.

Capacity Building and Long-Term Sustainability:

Policy interventions should also focus on building local capacity, such as training women as facilitators, establishing peer learning groups, and promoting knowledge sharing across households. These measures ensure the continuity of adaptive strategies, strengthen social cohesion, and foster sustainable livelihoods over time.

Data Analysis and Findings

Livelihood and Economic Resilience

The findings highlight that women in Konakhola are the backbone of household economies, ensuring survival through multi-strategy livelihoods. Unlike formal wage labor that depends

on steady jobs, their economic activities are fragmented yet interconnected, enabling them to adapt to seasonal, market, and environmental fluctuations.

Dry Season Livelihoods:

Women's engagement in cow dung collection and fuel production is particularly noteworthy. Cow dung is sourced from Sharif Agro and nearby areas, processed into fuel cakes, and then sold both locally and to industrial workers. This work requires knowledge of fuel quality, efficient drying techniques, and negotiation skills for market sales. Although considered "low-status" work by broader society, within the community it is seen as a lifeline for household survival.

Wet and Summer Season Livelihoods:

As environmental conditions change, women diversify into other activities like betel nut cutting and plastic flower crafting. These activities require dexterity, patience, and endurance, as they are physically demanding with fluctuating income levels. However, such seasonal diversification demonstrates economic resilience families are not dependent on a single livelihood stream, which reduces the risk of total economic collapse during crises.

Socio-Economic Resilience:

The ability to combine multiple forms of work, adjust labor allocation according to season, and engage in both resource-based and craft-based economies reflects an adaptive capacity that is often overlooked in development discourse. It shows how marginalized communities navigate structural inequalities through resilience and creativity, ensuring that households remain financially afloat even under systemic constraints.

Resource Utilization and Sustainability

The community's use of cow dung as fuel illustrates an innovative and sustainable resource practice.

Environmental Sustainability:

Rather than depending on costly, imported, or environmentally harmful energy sources, the community relies on renewable, locally available biomass. This practice not only reduces household expenditure but also recycles organic waste into a usable form of energy, contributing to environmental sustainability.

Traditional Ecological Knowledge:

The skills involved in fuel preparation such as shaping, drying, and storing are part of traditional ecological knowledge passed down across generations. This knowledge reflects the community's ability to balance natural resource use with economic necessity, a principle consistent with low-external-input and sustainable agriculture (LEISA) approaches (Reijntjes et al., 1992).

Blending Old and New Strategies:

What makes Konakhola unique is the combination of this traditional practice with newer forms of income generation, like plastic flower making, which responds to urban market demands. This fusion of tradition and modernity highlights the community's capacity for innovation while maintaining cultural continuity.

Community Integration and Networks

Livelihoods in Konakhola are deeply embedded within broader economic and social networks, both locally and regionally.

Linkages with Industry:

The fuel produced from cow dung is supplied to copper and gold workshops in nearby industrial zones. This shows how informal household labor supports formal industries, even though it remains unrecognized in official economic statistics.

Local Market Participation:

Craft products like plastic flowers enter local urban markets, creating linkages between marginalized communities and city-based consumer demand. This makes households part of a wider economic chain, albeit at the lowest, most vulnerable end of it.

Social Cohesion and Mutual Support:

Within the community, strong networks of reciprocity exist. Women share labor during busy seasons, exchange small amounts of resources (such as fuel cakes or food items), and provide collective childcare to allow others to work. These forms of cooperation are essential for survival in contexts where state support systems are limited or absent.

Community Resilience:

These findings show that the strength of the community lies in its networks not only economic but also social. Resilience is not simply an individual trait but a collective capacity, where households rely on trust, collaboration, and informal safety nets to withstand shocks.

Cross-Method Insights

The use of Transect Walks, Farmers Field School (FFS), and Resource Mapping enriched the analysis by combining spatial, social, and experiential data.

Transect Walks:

These provided direct observations of how land and resources are used. Researchers could see where fuel was produced, where crafts were made, and how agricultural land was allocated. It also revealed environmental risks like poor drainage and flood-prone areas.

FFS (Farmers Field School):

FFS sessions created a space for collective learning and reflection, where participants shared knowledge about sustainable agriculture, seasonal planning, and resource management. These discussions showed that women and farmers are not passive but active learners and innovators, capable of improving their livelihoods through shared knowledge.

Resource Mapping:

Resource maps, created by community members, visualized spatial inequalities in resource access, showing which areas are overused, which are under threat, and which provide opportunities. This visual process not only informed the researchers but also empowered the community to see and reflect on their own practices.

Co-Production of Knowledge:

When these methods were combined, the findings became more holistic. For example, fuel production observed in the transect walk was confirmed and discussed in FFS sessions, and then located spatially in resource maps. This triangulation ensured validity while highlighting the importance of participatory knowledge co-production in development research (Chambers, 1997; Pretty & Vodouhê, 1997).

2. Action Plan Development

The field observations and participatory methods in Konakhola highlight the urgent need for a comprehensive, community-driven action plan that not only addresses livelihood challenges but also builds long-term resilience. The action plan is structured around recommendations, implementation strategies, and sustainability measures, each designed to ensure inclusiveness, empowerment, and socio-economic improvement for marginalized groups, particularly women.

1. Capacity Building

Skill development workshops should focus on enhancing both traditional and modern livelihood skills. For example, women engaged in plastic flower crafting could benefit from training in design innovation, product diversification, and finishing techniques to make their goods more competitive in urban markets. Similarly, agricultural training should include integrated pest management, composting, water-efficient farming, and post-harvest handling. Digital literacy programs could also be introduced, enabling younger community members to access online platforms, explore e-commerce opportunities, and connect with broader networks. This would help bridge the gap between rural skills and global market demands.

2. Market Linkages

Currently, community members rely heavily on middlemen, which reduces their profit margins. Establishing direct linkages to both formal markets (urban retail shops, fairs, exhibitions) and informal markets (local bazaars, roadside sales) can significantly improve income levels. Partnerships with cooperatives, private companies, and e-commerce platforms (like Daraz or Facebook shops in Bangladesh) should be pursued to promote community-produced goods. Introducing branding and packaging training would further help products gain visibility, credibility, and consumer trust, ensuring fair pricing and sustained demand.

3. Resource Sustainability

The community's reliance on cow dung, land, and natural resources highlights the need for eco-friendly practices. Measures such as rotational resource collection, improved storage, and safe waste disposal systems can protect long-term environmental health. Introducing renewable energy options like biogas from cow dung could reduce health risks (from smoke exposure) while providing alternative income sources. Awareness campaigns on climate change adaptation can help families anticipate risks such as flooding or heatwaves and prepare livelihood strategies accordingly.

3. Women-Led Cooperatives

Cooperatives empower marginalized groups by pooling resources, sharing risks, and strengthening bargaining power. Women's cooperatives in Konakhola could oversee craft production, fuel sales, or even small-scale savings and credit systems. Cooperatives would also enhance collective investment in equipment (drying sheds, storage units, craft tools) and facilitate access to microfinance and government subsidies. Beyond economics, cooperatives promote social cohesion, mutual support, and collective decision-making, reinforcing women's leadership roles within the community.

Implementation Strategies

Collaboration with Local NGOs: Partnering with NGOs that specialize in livelihood development, women's empowerment, and environmental management ensures access to expertise, funding, and advocacy platforms. NGOs can help train women, provide small grants, and create pathways to markets. **Engagement with Community Leaders:** Local leaders, elders, and religious figures play a crucial role in community acceptance. Their involvement guarantees that interventions remain culturally appropriate, inclusive, and widely adopted.

Integration of FFS and Transect Walks: Farmers Field Schools and periodic transect walks should not only be tools for research but also for monitoring, reflection, and iterative improvement. They provide spaces where the community can evaluate what is working, adapt to challenges, and refine strategies collectively. **Youth and Student Engagement:** Involving local youth and undergraduate students (through internships or university-NGO partnerships) could support data collection, knowledge sharing, and introduce fresh perspectives and innovations.

Sustainability Measures

Community Ownership: For interventions to succeed, communities must own and lead the process, rather than simply participate as beneficiaries. This includes decision-making authority in project planning, implementation, and evaluation. **Monitoring and Evaluation Frameworks:** Establishing long-term, participatory monitoring systems will track progress on livelihood improvements, market participation, and environmental sustainability. Community members should be trained to collect and analyze data, ensuring transparency and accountability.

Knowledge Documentation and Dissemination: The community's traditional practices, survival strategies, and innovations should be documented and shared through reports, visual

media, or local exhibitions. This will not only preserve indigenous knowledge but also provide evidence for policy advocacy and replication in other marginalized communities (Sontheimer, Callens, & Seiffert, 1999). Policy Engagement: Finally, linking community-level interventions with local government bodies (Union Parishads), NGOs, and national development programs ensures that grassroots insights inform larger policy reforms. This could lead to inclusive policies on microfinance, social protection, and women's economic empowerment.

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