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**AN ANALYTICAL STUDY OF THE EDUCATIONAL SYSTEM IN THE  
SUNDARBAN REGION**

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**Amlan Mandal<sup>\*1</sup> & Dr. Manikanta Paria<sup>2</sup>**

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<sup>1</sup>Ph.D. Scholar, Department of Education, Jadavpur University, Kolkata, India.<sup>2</sup>Assistant Professor, Department of Education, Jadavpur University, Kolkata, India.

Article Received: 13 February 2026, Article Revised: 04 March 2026, Published on: 24 March 2026

**\*Corresponding Author: Amlan Mandal**

Ph.D. Scholar, Department of Education, Jadavpur University, Kolkata, India.

DOI: <https://doi-doi.org/101555/ijarp.2044>**ABSTRACT**

This study presents an analytical examination of the educational system in the Sundarban region, with particular attention to its structural characteristics, barriers to equitable access, the effects of remoteness and disaster vulnerability on schooling continuity, and the role of infrastructure, teacher availability, and digital inequality in shaping educational quality. The study adopts a qualitative-analytical and secondary-data-based methodology, drawing upon policy documents, demographic records, government reports, and published scholarship relevant to the Sundarbans and adjoining districts. The analysis is guided by a combined Capability Approach and Social Exclusion framework, which helps explain why formal educational provision does not always translate into meaningful educational opportunity in ecologically fragile and socially marginalized settings. The study finds that the educational condition of the Sundarbans is marked by territorial expansion alongside deep structural unevenness. Riverine geography, transport difficulty, poverty, ecological shocks, infrastructural inadequacy, teacher-related constraints, and digital deprivation collectively weaken access, continuity, and quality. The findings further indicate that educational exclusion in the region is not accidental but is produced through the interaction of spatial isolation, livelihood insecurity, and institutional limitations. The study argues that the future of education in the Sundarbans depends on region-specific, resilient, and equity-based planning rather than generic rural educational expansion alone. It concludes that meaningful educational transformation in the region requires not only more schools, but stronger conversion conditions that enable children to attend, remain, learn, and progress under conditions of vulnerability.

**KEYWORDS:** *Educational inequality; disaster vulnerability; remoteness; social exclusion; capability approach; digital divide*

## **INTRODUCTION**

In today's interconnected world, globalisation has created a closely linked global community through trade, culture, and technology, increasing the need for skills such as adaptability, technological proficiency, creativity, problem-solving, continuous learning, and cultural understanding (Mandal et al., 2025; Adak et al., 2024). Education plays a central role in human development, social justice, and long-term regional and national transformation. India's National Education Policy 2020 states that education is fundamental to achieving "full human potential" and to developing an equitable and just society. Similarly, Sustainable Development Goal 4 calls for inclusive and equitable quality education and the promotion of lifelong learning opportunities for all. In legal terms, the Right of Children to Free and Compulsory Education Act, 2009 guarantees free and compulsory elementary education for children aged six to fourteen and provides for the availability of a neighbourhood school. Yet the realization of this right is uneven across regions. The Sundarban region presents one of the clearest examples of how geography can shape educational opportunity. The region is marked by riverine landscapes, island settlements, transport dependency, fragile embankments, exposure to cyclones and floods, and persistent livelihood vulnerability. The World Bank's landscape narrative on the Sundarban notes that communities in and around the region are highly vulnerable to tropical cyclones, storm surges, erosion, flood, drought, and frequent tidal inundation, all of which disrupt lives and livelihoods. Such conditions inevitably affect schooling, attendance, continuity, and educational planning.

In South 24 Parganas, a key district of the Indian Sundarbans, the district administration records a 2011 literacy rate of 77.51 percent, but district averages alone do not capture internal inequalities across remote and forested blocks. The educational condition of the Sundarbans therefore requires an analytical study that moves beyond aggregate literacy and asks how access, quality, continuity, and equity are differently experienced in vulnerable local contexts.

## **Research Questions**

This study addresses the following questions:

- i. What are the main characteristics of the educational system in the Sundarban region?
- ii. What factors obstruct equitable access to quality education in the region?

- iii. How do disaster vulnerability and remoteness affect continuity of schooling?
- iv. In what ways do infrastructure, teacher availability, and digital inequality shape educational quality?
- v. What policy directions could improve the educational future of the Sundarbans?

### **Objectives of the Study**

This article has the following objectives:

1. To analyze the present condition of the educational system in the Sundarban region.
2. To identify the major structural barriers affecting educational access and quality.
3. To examine how geography, poverty, and ecological vulnerability shape educational outcomes.
4. To assess the prospects for strengthening the educational system through policy and local intervention.
5. To suggest policy directions for improving educational equity, resilience, and quality in the Sundarbans

### **METHODOLOGY**

This article adopts a qualitative-analytical and secondary-data-based methodology. It draws on official policy and legal documents, district demographic records, government education-related reports, World Bank materials, and published studies on school access, educational quality, and crisis-related disruption in the Sundarbans and adjoining districts. This approach is appropriate because the objective is analytical interpretation rather than primary field measurement. The method allows the article to connect institutional frameworks with grounded regional realities.

### **Theoretical Framework**

This study is most effectively interpreted through a combined Capability Approach and Social Exclusion framework, because the educational reality of the Sundarban cannot be explained by enrolment figures alone. The Capability Approach, associated especially with Amartya Sen and later educational scholarship, argues that development should be judged by people's real freedoms and substantive opportunities, not merely by formal provision. In educational terms, this means that the presence of a school, a student's name on a register, or a legal entitlement to schooling does not by itself prove that the learner actually has the freedom to attend regularly, learn well, progress safely, and convert schooling into life chances. UNESCO's work on education and capabilities similarly emphasizes that education

must be understood in relation to what learners are genuinely able to be and do, rather than only through narrow access indicators.

Applied to the Sundarban region, this perspective is especially useful because children's educational opportunities are shaped by environmental and locational constraints that lie beyond the school gate. The region is a riverine and island-based delta where settlements are dispersed, transport is difficult, and communities are highly exposed to cyclones, erosion, flooding, and embankment failure. The World Bank's analyses of the Sundarban landscape describe these communities as highly vulnerable to repeated climate and disaster shocks, while district-level realities show a large rural settlement spread that complicates public service delivery. In such a setting, a child may be formally "included" in the school system but still lack the real capability to reach school safely, attend continuously, study after disasters, or participate in digital learning.

From a capability standpoint, therefore, education in the Sundarban should be assessed through several interrelated freedoms: the freedom to physically access school, the freedom to continue education without repeated interruption, the freedom to learn in a minimally adequate environment, and the freedom to convert schooling into future social and economic mobility. A legal framework such as the Right to Education Act guarantees elementary education, but capability analysis asks a deeper question: do children in ecologically fragile and socially vulnerable locations possess the actual means to use that right? When embankments collapse, routes are submerged, household income is disrupted, or schools function with weak infrastructure and teacher shortages, the formal right remains intact but the effective capability is reduced.

This is where the Social Exclusion perspective becomes equally important. Social exclusion refers not only to poverty in a narrow income sense, but to structured disadvantage through which certain populations are systematically pushed to the margins of institutions, services, and opportunities. UNICEF's education materials repeatedly stress that children are often excluded from education on the basis of poverty, gender, ethnicity, disability, location, and crisis exposure. In the Sundarban context, exclusion operates through geography, caste-tribe concentration in remote habitations, livelihood precarity, weak transport, and low state reach in difficult terrains. In other words, educational inequality here is not accidental; it is produced through layered forms of marginality.

The social exclusion lens helps explain why formal availability and actual accessibility often diverge. Research on South 24 Parganas has shown that school access is uneven at the habitation level and that forested blocks had a higher proportion of school-less habitations

than non-forested blocks; some SC/ST habitations also lacked schools within habitation norms. This means exclusion is spatially concentrated and socially patterned. Children in such areas may not be excluded by law, yet they are excluded in practice through distance, transport barriers, and the higher cost of participation. Thus, exclusion in the Sundarban is both territorial and social: where one lives, and the kind of social vulnerability one belongs to, significantly influence educational opportunity.

A broad theoretical reading also shows that capability deprivation and social exclusion reinforce one another. A child from a poor household in a remote embankment-side village may face boat dependence, seasonal livelihood stress, inadequate learning materials, and a school environment weakened by low infrastructure quality. A block-level study in Basanti found that when infrastructure and pupil-teacher ratio were considered together, a very large majority of schools fell into unsatisfactory quality categories. In such a case, the learner is not simply poor; the learner is institutionally disadvantaged because the quality of the educational environment itself is weaker. Capability is restricted not only by family poverty but by the poor conversion environment around the child.

The combined framework becomes even more powerful when we consider disaster vulnerability. In mainstream educational analysis, cyclones and floods may appear as external shocks, but in the Sundarban they are recurring structural conditions. Recent research on school education in North and South 24 Parganas during cyclone Amphan and COVID-19 found that disaster disruptions and already low living standards together severely damaged the continuity of quality schooling. Under the capability approach, this means children lose substantive educational freedom through interrupted attendance, damaged institutions, psychosocial stress, and household economic crisis. Under social exclusion theory, it means already-marginal populations suffer greater educational loss because they have fewer buffers, less mobility, and weaker recovery capacity.

The framework also clarifies the issue of the digital divide. During the pandemic period, studies in West Bengal found a sharp difference between private and government school students in online access, along with lower access among rural children. From a capability perspective, digital infrastructure is now part of the conditions that enable educational functioning; without devices, connectivity, electricity, and digital support, learners cannot convert curricular provision into actual learning. From a social exclusion perspective, digital education may reproduce inequality when already disadvantaged groups are least able to access remote learning. In the Sundarban, where connectivity and household resilience are

uneven, digital exclusion is not a technological inconvenience; it is a new form of educational exclusion.

Another strength of this combined framework is that it shifts attention from a narrow “school problem” to a broader human-development problem. Capability analysis reminds us that education expands agency, aspiration, voice, and future choices. Social exclusion analysis reminds us that institutional systems often fail particular groups repeatedly unless policy directly targets them. Therefore, the educational challenge in the Sundarban cannot be solved only by increasing school counts. It requires improving the whole set of conditions that allow children to remain in school and learn meaningfully: safe transport, resilient buildings, teacher presence, social support, digital access, and livelihood-sensitive retention measures. UNESCO’s capability-oriented work and UNICEF’s focus on excluded children both support this broader understanding of educational justice.

In the Sundarban, then, the issue is not simply educational provision but unequal capability to convert provision into meaningful learning. A school may exist on paper, but the child’s educational freedom can still be undermined by remoteness, flooded routes, embankment breaches, fragile household income, social disadvantage, and weak institutional support. The map and field images above visually reinforce this theoretical point: the fragmented island geography, damaged embankments, inundated settlement spaces, and storm-affected infrastructure are not background scenery; they are part of the structural environment within which education is pursued. For that reason, a combined Capability Approach and Social Exclusion framework provides a strong conceptual base for analyzing the educational system of the Sundarban in broad, realistic, and policy-relevant terms.

## DISCUSSION

**Objective I.** To identify the main characteristics of the educational system in the Sundarban region

The educational system of the Sundarban region is marked by a combination of territorial expansion and structural unevenness. On the one hand, schooling has expanded over time across the broader South 24 Parganas district; on the other hand, access and quality remain highly unequal across forested, riverine, and remote island spaces. Halder’s district-level work shows that the study of education in this region must move beyond simple school counts and consider actual spread, infrastructure, and attainment across different local settings.

The major characteristics may be discussed as follows:

- **Rural, dispersed, and riverine educational geography:** The region is not organized like a compact mainland educational zone. Settlements are scattered and linked through embankments, waterways, and fragile transport routes, so educational planning is shaped by physical geography as much as by administration. The Sundarban landscape is described by the World Bank as ecologically fragile and highly exposed to flooding, erosion, and tidal processes.
- **Uneven spatial distribution of schools:** School expansion has taken place, but accessibility differs sharply from one habitation to another. In particular, forested and difficult-access areas remain more educationally disadvantaged than better-connected parts of the district.
- **Dominance of government-supported schooling:** In blocks such as Basanti, the school system is primarily public in character, which means that the quality of state provisioning has a direct effect on educational experience in the region.
- **High dependence on basic infrastructure for learning continuity:** Because many learners come from low-income households, the school is not only a place of instruction but also a critical institutional support point. Where buildings, toilets, classrooms, electricity, or water are weak, the educational system itself becomes fragile.
- **Strong vulnerability to disruption:** Education here is inseparable from ecological stress. Cyclones, flooding, embankment breaches, and livelihood loss repeatedly affect attendance, retention, and recovery. This makes the educational system of the Sundarbans a system of “interrupted continuity,” not simply a static rural school network.

**Objective II.** To examine the factors that obstruct equitable access to quality education in the region

Equitable access to quality education in the Sundarbans is obstructed by a set of interconnected structural factors, not by one single cause. This is important analytically because the barriers are cumulative: physical distance interacts with poverty, weak infrastructure, and social disadvantage.

The main obstructing factors are:

- **Geographical remoteness:** Many habitations are physically isolated. Halder’s study found that forested blocks had a higher proportion of school-less habitations than non-forested blocks, showing that physical location directly shapes access.

- Transport and mobility constraints: In a region dependent on waterways, embankments, and long local travel routes, a school may exist administratively yet remain difficult to reach in practice. This especially affects regular attendance and transition to higher levels of schooling.
- Poverty and livelihood insecurity: In vulnerable households, schooling often competes with income stress, domestic labour, migration pressure, and the need to recover after environmental shocks. This reduces the ability of families to support sustained schooling. The World Bank's Sundarban analysis repeatedly links ecological hazard to livelihood disruption, which has clear educational implications.
- Habitation-level inequality: Access is not equal across caste-tribe and settlement categories. Halder's work also indicates that some SC/ST habitations lacked schools within habitation norms, suggesting that educational disadvantage is both spatial and social.
- Quality deficit inside schools: Even where access exists, the quality of schooling may be weak due to poor infrastructure and unfavourable pupil-teacher conditions. That means access without quality still produces educational inequality.
- Digital exclusion: Modern educational participation increasingly depends on digital connectivity, but rural West Bengal showed much lower access than better-served groups during the pandemic period. This widened inequality rather than reducing it.

**Objective III.** To analyze how disaster vulnerability and remoteness affect continuity of schooling

This objective is central to any serious study of Sundarban education because the region's schooling system operates under recurring ecological stress. In the Sundarbans, remoteness and disaster do not function as occasional background issues; they shape everyday educational continuity.

This can be discussed under the following points:

- Cyclones and flooding interrupt attendance: The World Bank describes the Sundarban as highly vulnerable to cyclones, storm surges, erosion, flood, drought, and frequent high-tide inundation, all of which disrupt life and livelihood. For school-going children, these disruptions translate into lost school days, route damage, and instability in family routines.
- Damage to access routes affects school continuity: Even when school buildings remain standing, breached embankments, damaged roads, and waterlogged local routes can cut

children off from school. In such a geography, continuity depends not only on school functioning but also on safe mobility.

- Household shocks reduce retention: Disaster affects income, housing, health, and food security. When family survival becomes the immediate priority, schooling often becomes irregular, especially for already vulnerable learners. This is one reason why ecological shocks can contribute to dropout and silent exclusion.
- Recovery is unequal across groups: Better-resourced households recover faster, while poorer households remain out of school longer. Thus, disaster widens existing inequalities rather than affecting all learners equally. This aligns with broader vulnerability logic in the World Bank's Sundarban documents.
- Institutional continuity becomes fragile: A system exposed to repeated shocks struggles to maintain regular teaching calendars, stable attendance, and steady learning outcomes. That is why the Sundarban educational system should be read as a "risk-exposed educational environment."

**Objective IV.** To assess how infrastructure, teacher availability, and digital inequality shape educational quality

Educational quality in the Sundarbans is not determined by curriculum alone. It is deeply shaped by three interrelated conditions: infrastructure, teacher availability, and digital access.

#### **A. Infrastructure**

- A Basanti block study assessed school quality using infrastructure and pupil-teacher ratio together and found that the quality problem was severe. The paper shows that infrastructure has a direct bearing on the learning environment rather than being a secondary issue.
- Poor classrooms, inadequate toilets, weak electricity access, lack of basic facilities, and limited learning resources reduce both participation and concentration, especially for younger learners.

#### **B. Teacher availability**

- The same Basanti study treated pupil-teacher ratio as a major quality indicator and assessed schools partly through that measure, which shows that teacher availability is central to quality evaluation in the region.

- In remote geographies, teacher deployment and retention become difficult. When staffing is inadequate or unstable, teaching quality, subject coverage, and student support all decline.

### C. Digital inequality

- West Bengal evidence from the pandemic period found a striking gap between private and government primary school learners in online access: 98.7% of students in private schools versus 33.7% of students in government primary schools in the study sample could access online education. The same study also found rural learners more disadvantaged than urban learners.
- In the Sundarbans, digital inequality becomes even more serious because connectivity, electricity, affordability, and device ownership are uneven. Therefore, digital learning may deepen educational inequality unless public support systems are built around it.

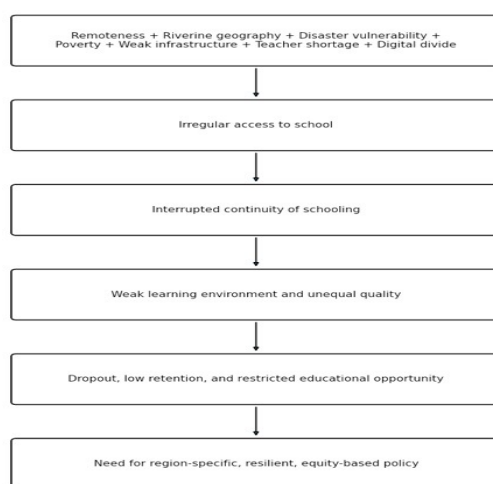
**Objective V.** To explore what policy directions could improve the educational future of the Sundarbans

The educational future of the Sundarbans requires region-specific policy, not generic rural education policy alone. Existing state-level planning documents already show concern about enrolment, transition, and dropout, and West Bengal's 2025–26 Samagra Shiksha review flagged a high annual average dropout rate based on UDISE+ 2023–24 data, advising the state to examine the reasons and act on them.

The main policy directions may be written as follows:

- **Habitation-based school planning:** District averages are not enough. Policy should identify school-less and difficult-access habitations separately and target them through micro-level mapping. Halder's habitation-level evidence strongly supports this approach.
- **Disaster-resilient educational infrastructure:** In a region exposed to cyclones and inundation, schools must be planned as resilient institutions with safer structures, recovery plans, and continuity mechanisms.
- **Transport-sensitive educational support:** Educational access in the Sundarbans depends heavily on mobility. Policy should therefore support safe routes, local transport solutions, and context-based access measures for remote learners.

- **Focused dropout reduction at transition stages:** Since West Bengal’s policy discussions highlight dropout concerns, special attention is needed at upper-primary to secondary transition, especially in vulnerable rural belts.
- **Teacher incentive and retention measures:** Remote-service incentives, improved posting policy, and better support for teachers in difficult locations would directly strengthen educational quality. The quality literature on Basanti makes clear that staffing conditions are central to system performance.
- **Low-cost digital inclusion:** Digital policy in the Sundarbans should not assume universal internet access. Offline-compatible, low-bandwidth, school-supported, and community-based digital models would be more realistic for the region.
- **Integrated social support for vulnerable learners:** Since ecological and livelihood shocks disrupt schooling, educational policy should work with broader support systems so that children are not pushed out by family crisis.



**Figure 1: Structural factors shaping education in the Sundarban Region.**

## CONCLUSION

The present study shows that the educational system of the Sundarban region cannot be understood through enrolment figures, literacy rates, or school availability alone. Its educational reality is shaped by a wider structure of environmental risk, territorial isolation, poverty, infrastructural weakness, and unequal institutional reach. Although schooling has expanded across the broader region, the benefits of that expansion remain unevenly distributed across forested, riverine, and remote island areas. As a result, the Sundarbans represent not simply an underdeveloped rural educational space, but a region where educational opportunity is persistently conditioned by geography and vulnerability.

The study also makes clear that barriers to equitable education in the Sundarbans are cumulative and interconnected. Remoteness affects physical access; weak transport affects attendance; poverty affects retention; ecological shocks affect continuity; and infrastructural as well as digital deficiencies affect the quality of learning. Teacher shortage and difficulty of staff retention further deepen these disadvantages. Thus, educational inequality in the Sundarbans is not the result of one isolated problem but of multiple overlapping constraints that limit children's actual freedom to benefit from schooling. This confirms the usefulness of the Capability Approach and Social Exclusion framework in explaining why formal educational rights may coexist with restricted educational outcomes in practice.

Another important conclusion of the study is that disaster vulnerability is not an external interruption to education in the Sundarbans; it is one of the region's recurring structural conditions. Cyclones, flooding, embankment failure, damaged local routes, and livelihood disruption repeatedly interrupt school participation and weaken educational continuity. These effects are not socially neutral. Children from poor and already vulnerable households bear a greater burden because they have fewer protective resources and weaker recovery capacity. In this sense, ecological insecurity magnifies pre-existing educational exclusion and pushes many learners toward irregular schooling, low retention, and long-term disadvantage.

The study further concludes that educational quality in the Sundarbans must be defined in integrated terms. Quality is shaped not only by curriculum or formal school presence, but also by infrastructure, pupil-teacher conditions, continuity of teaching, and access to digital support. Where classrooms, water, electricity, and learning resources are inadequate, and where teachers are insufficient or difficult to retain, institutional quality becomes fragile. Digital inequality adds another layer of disadvantage, especially in contexts where connectivity, devices, and affordability are uneven. Therefore, quality education in the Sundarbans requires a broader understanding of the learning environment rather than a narrow focus on administrative provision.

In light of these findings, the study argues that the educational future of the Sundarbans depends on region-specific, resilience-oriented, and equity-based policy measures. Habitation-level planning, disaster-resilient school infrastructure, transport-sensitive access support, focused dropout reduction, teacher incentive systems, and realistic low-cost digital inclusion are essential for strengthening the region's educational foundation. Ultimately, the central insight of this study is that the challenge of education in the Sundarbans is not simply to expand schooling, but to create the social, spatial, and institutional conditions through

which children can genuinely convert educational provision into meaningful learning and future opportunity.

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