Asian Multidisciplinary Research Journal of Economy and Learning

Volume 3, Issue 10, 2026 Page 10-18, 2026, Article No. AMJEL.119
ISSN: 3063-1424

Infrastructure Recovery and Disaster Disruption in Southeast Aceh: Documentary Evidence on Agricultural Connectivity

Garryko Samosir*, Rizki Mulia* and Erika Revida

Regional and Rural Development Planning Program, Graduate School, Universitas Sumatera Utara, Medan, Indonesia

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

https://doi.org/10.70471/sephe093

Original Research Article

Received: 29/09/2026
Published: 31/10/2026

ABSTRACT

This event-based document analysis describes reported infrastructure damage, recovery measures, and agricultural exposure in Southeast Aceh Regency, Indonesia, from 2024 through 15 October 2026. The case boundary is the regency, and the units of analysis are dated events and published agricultural production indicators. The evidence comprises official statistics, public-works and disaster reports, and dated news reports; peer-reviewed studies are used only to interpret possible connectivity pathways. Official statistics show 73,335.46 tons of paddy in 2024 and 65,112 tons in 2025, an 11.2% descriptive decline, while the separate 2025 rice figure is 37,510 tons. Reports document completed improvement of 4.80 km of the Lawe Kinga–Simpang Seberang road, ongoing Pantai Dona Bridge reconstruction at 43.25% on 15 July, a Kumbang Jaya suspension bridge reported completed on 15 September, a proposed Kuning I flyover, and subsequent flood and landslide disruption. Reporting on 15 October recorded 153.74 ha of flooded agricultural land and 2,787 affected residents. These records establish reported events and exposure; they do not measure route reliability, travel time, shipments, logistics costs, crop loss, or farmer income. The article therefore documents resilience-relevant conditions and literature-informed agricultural connectivity pathways without evaluating infrastructure resilience or claiming causal effects.

Keywords: agricultural connectivity; documentary analysis; disaster disruption; road infrastructure; Southeast Aceh

Corresponding authors: Email: samosirgarryko@gmail.com

Cite as: *Samosir, G., Rizki Mulia, & Erika Revida. (2026). Infrastructure Recovery and Disaster Disruption in Southeast Aceh: Documentary Evidence on Agricultural Connectivity: English. Asian Multidisciplinary Research Journal of Economy and Learning, 3(10), 10-18. https://doi.org/10.70471/sephe093*

1. Introduction

Southeast Aceh Regency (Aceh Tenggara) is a mountainous region where agricultural production, settlements, and markets depend on road access. Badan Pusat Statistik (BPS) Aceh reported 73,335.46 tons of paddy in 2024 and 65,112 tons of paddy plus 37,510 tons of rice in 2025. Paddy and rice are distinct statistical measures. These figures establish a production context, not evidence of farm-to-market flows or a transport effect.

Documentary sources record infrastructure damage following late-2025 flooding and a sequence of repair, improvement, and renewed disruption during 2026. The Balai Pelaksanaan Jalan Nasional (BPJN) Aceh reported completion of 4.80 km of improvements on the Lawe Kinga–Simpang Seberang road. In contrast, the Pantai Dona Bridge was still under reconstruction at 43.25% physical progress on 15 July, while a 265-m suspension bridge in Kumbang Jaya was reported completed on 15 September. A flyover at Kuning I was announced as an option, while river normalization was reported as continuing; these measures were at different implementation stages (BPJN Aceh, 2026; Kementerian Pekerjaan Umum, 2026a, 2026b; ANTARA News Aceh, 2026a, 2026b). Later reports described renewed flooding and landslides, including obstruction of the Kutacane–Blangkejeren corridor and agricultural land exposure (Badan Penanggulangan Bencana Aceh [BPBA], 2026; Badan Nasional Penanggulangan Bencana [BNPB], 2026; ANTARA News, 2026).

Transport-network research examines vulnerability and resilience through disruption, network structure, service continuity, and recovery (Berdica, 2002; Mattsson & Jenelius, 2015). Separate studies report relationships between rural-road improvement and village income patterns, transport infrastructure and agricultural productivity, and infrastructure constraints in remote agricultural supply chains (Zulham et al., 2025; Abbas Khan et al., 2025; Wahyudi et al., 2025). These studies inform possible mechanisms; they do not establish that the same effects occurred in Southeast Aceh.

This article asks: (1) What road and bridge damage, access disruptions, and recovery measures were reported in Southeast Aceh from 2024 through 15 October 2026? (2) Which aspects of agricultural connectivity are directly established in those records, and which remain literature-informed inference? The contribution is a source-located chronology of reported events and implementation stages. The analysis does not measure transport-network resilience, agricultural distribution outcomes, or causal effects.

2. Methods

2.1 Research Design and Evidence Base

This event-based qualitative document analysis covers reported events in Southeast Aceh Regency from 2024 through 15 October 2026. The case boundary is the regency, but the unit of analysis is each dated, source-reported hazard or infrastructure milestone; the study does not map the full road network or analyze selected farm-to-market routes. No production zones, collection points, or markets are treated as fixed nodes because the records do not provide a consistent route map. The period begins with the 2024 agricultural baseline and ends with the latest dated event included in the corpus. The purposive corpus comprises official statistics, disaster updates, public-works reports, and dated news reports that identify a statistic, event, infrastructure action, or access condition in Southeast Aceh. Official agencies are treated as primary records; ANTARA items are secondary reports and are not counted as independent confirmation without a separate agency record. Peer-reviewed studies are used to interpret possible pathways, not as evidence of local event impacts. Table 1 lists the documents and their analytical roles; the References provide their URLs.

Table 1. Document inventory and analytical use

Source and date	Document title	Analytical use
BPS Aceh, 2025; 2024 data	"Luas panen, produktivitas, dan produksi padi menurut kabupaten/kota di Provinsi Aceh, 2024"	2024 paddy baseline.
BPS Aceh, 2026; 2025 data	"Produksi padi dan beras menurut kabupaten/kota di Provinsi Aceh, 2025"	Separate 2025 paddy and rice indicators.
Ministry of Public Works, 13 Jan 2026	"Tinjau Jembatan Pantai Dona di Aceh Tenggara, Menteri Dody beri solusi bangun sabo dam"	Earlier damage and sabo-dam planning.
BPJN Aceh, 24 Jun 2026	"Dukung arahan Presiden Prabowo, BPJN Aceh tuntaskan peningkatan struktur dan pelebaran 33 ruas jalan daerah melalui Program IJD"	Reported completion of Lawe Kinga–Simpang Seberang improvement.
Ministry of Public Works, 20 Jul 2026	"Kementerian PU percepat penanganan Jembatan Pantai Dona untuk percepat pemulihan di Aceh"	Pantai Dona Bridge reconstruction progress.
ANTARA News Aceh, 15 Sep 2026	"TNI rampungkan pembangunan jembatan gantung perintis di Aceh Tenggara"	Secondary report of Kumbang Jaya bridge completion.
ANTARA News Aceh, 18 Sep 2026	"Menteri PU bangun flyover sebagai solusi banjir di Aceh Tenggara"	Secondary report of a flyover option and river works.
BPBA, 26 Sep 2026	"Banjir Aceh Tenggara rusak lahan pertanian dan sejumlah infrastruktur, air mulai surut"	Reported flood impacts and infrastructure damage.
BNPB, 11 Oct 2026	"Perkembangan situasi dan penanganan bencana di tanah air 11 Oktober 2026"	National situation update and reported access disruption.
ANTARA News, 15 Oct 2026	"BPBA: 153,7 hektare lahan pertanian terdampak banjir di Aceh Tenggara"	Secondary report of exposure totals and affected residents.
Peer-reviewed studies, 2002–2025	Berdica (2002); Mattsson and Jenelius (2015); Abbas Khan et al. (2025); Wahyudi et al. (2025); Zulham et al. (2025)	Conceptual interpretation of network vulnerability, recovery, rural roads, and agricultural supply chains.

2.2 Coding and Source Comparison

A source matrix recorded the event date, publication date, location, reported damage or access condition, implementation status, agricultural indicator, and source. Entries were coded as (1) hazard or physical damage, (2) explicitly reported access disruption, (3) agricultural production or exposure, (4) recovery status, or (5) literature-informed interpretation. The status labels distinguish announced, planned, ongoing, and completed measures. Statements in the documents are separated from the article's interpretation. Official sources take precedence for official statistics and implementation status; a later report is treated as an update, not as an independent measurement. The procedure is source-level comparison, not statistical triangulation.

Worked example: the 15 October ANTARA report attributes to BPBA a total of 153.74 ha of flooded agricultural land and reports 2,787 affected residents, while also describing landslide material obstructing the Kutacane–Blangkejeren road (ANTARA News, 2026). The matrix codes these statements as reported agricultural exposure and reported access obstruction. They support a description of exposure and a route interruption; they do not establish crop loss, travel-time change, transport cost, market disruption, or household income effects. Because the news item attributes the figures to BPBA, it is not treated as independent corroboration.

3. Results and Discussion

3.1 Results

3.1.1 Agricultural and Connectivity Context

BPS Aceh reports paddy production of 73,335.46 tons in 2024 and 65,112 tons in 2025, a descriptive decline of approximately 11.2% (Badan Pusat Statistik Provinsi Aceh, 2025, 2026). The 2025 rice-production figure of 37,510 tons is a separate measure and is not compared with the paddy series. No 2026 production series is analyzed. The comparison is contextual and cannot be attributed to road damage; weather, harvested area, productivity, inputs, pests, and other factors were not isolated.

BPJN Aceh reported that the 2025 Inpres Jalan Daerah program improved 33 road segments totaling 119.62 km across Aceh, including 4.80 km on Road 044 Lawe Kinga–Simpang Seberang (Balai Pelaksanaan Jalan Nasional Aceh, 2026). The source describes the work as supporting agricultural logistics access. The manuscript contains no route or shipment data with which to evaluate its effect on actual agricultural flows.

Table 2. Descriptive paddy and rice production indicators in Southeast Aceh

Indicator	2024	2025	Interpretation
Paddy production (tons)	73,335.46	65,112	Approx. 11.2% descriptive decline; no causal attribution.
Rice production (tons)	Not reported in cited 2024 table	37,510	Separate 2025 rice measure; do not compare with paddy series.

Source: BPS Aceh tables for 2024 and 2025 (Badan Pusat Statistik Provinsi Aceh, 2025, 2026). Paddy and rice are different production categories.

3.1.2 Reported Hazard and Recovery Chronology

Table 3 organizes the dated events and infrastructure measures by source-reported implementation status. It distinguishes completed works from ongoing reconstruction, announced options, and continuing works. The dates and descriptions are documentary milestones; they do not measure service continuity or the performance of the road network.

Table 3. Source-reported infrastructure and disaster events, 2025–October 2026

Date	Reported event and implementation status	Source-supported relevance and limit
27 Nov 2025 onward	Damage to Pantai Dona Bridge and access is described retrospectively; recovery planning followed. (Kementerian Pekerjaan Umum, 2026a)	Documents a disruption and planning response; no shipment or travel-time effect is measured.
24 Jun 2026	Completed: BPJN reported 4.80 km of Lawe Kinga–Simpang Seberang road improvement under the IJD program. (Balai Pelaksanaan Jalan Nasional Aceh, 2026)	The source states a logistics purpose; realized agricultural flows are not observed.
15 Jul 2026	Ongoing: Pantai Dona Bridge reconstruction was at 43.25% physical progress, with completion targeted for 31 Dec 2026. (Kementerian Pekerjaan Umum, 2026b)	A progress milestone, not a completed recovery outcome.
15 Sep 2026	Reported completed and load-tested: a 265-m pioneer suspension bridge in Kumbang Jaya. (ANTARA News Aceh, 2026a)	Secondary news report; no independent service-use data are available.
18 Sep 2026	Announced option: a Kuning I flyover. Ongoing: river normalization was reported as continuing. (ANTARA News Aceh, 2026b)	The proposal and continuing works are distinct stages; neither is treated as a completed outcome.
26 Sep 2026	Flooding was reported to affect agricultural land, embankments, roads, bridges, and access. (Badan Penanggulangan Bencana Aceh, 2026)	Agency report of renewed hazard exposure; no quantified distribution effect.

Date	Reported event and implementation status	Source-supported relevance and limit
9–15 Oct 2026	Floods and landslides affected several districts; Kutacane–Blangkejeren was reported obstructed. On 15 Oct, 153.74 ha of agricultural land and 2,787 residents were reported affected. (BNPB, 2026; ANTARA News, 2026)	The October area is reported exposure, not crop loss. ANTARA attributes its totals to BPBA and is not independent corroboration.

The 15 October report attributes 153.74 ha of flooded agricultural land to BPBA: 74.5 ha of paddy and 43.24 ha of maize in Bambel, plus 36 ha of paddy in Lawe Sumur. It also reports 783 affected households, or 2,787 residents, and obstruction of the Kutacane–Blangkejeren road (ANTARA News, 2026). These values describe reported exposure and affected population, not crop loss, lost output, or income loss. The 2024–2025 paddy comparison and the October 2026 exposure figure refer to different indicators and periods.

3.1.3 Literature-Informed Pathways for Agricultural Connectivity

Infrastructure blockage can plausibly delay movement of farm inputs and harvested products; detours can increase travel time and handling requirements; uncertain access can affect traders' schedules; and road failure can constrain emergency logistics. These are literature-informed pathways, not case findings. The cited studies describe transport, productivity, and supply-chain relationships in other settings (Abbas Khan et al., 2025; Wahyudi et al., 2025; Zulham et al., 2025). The Southeast Aceh documents do not contain farmer or trader accounts, freight costs, shipment volumes, travel-time measurements, or post-harvest observations.

The local documents directly establish only a limited set of connectivity-relevant facts: reported road or bridge damage, a reported obstruction of the Kutacane–Blangkejeren corridor, and the status of several repair or improvement measures. The report for the Lawe Kinga–Simpang Seberang project explicitly describes a logistics purpose, but no subsequent agricultural flow is measured. Accordingly, the article discusses potential distribution implications without presenting delays, cost increases, market reliability, or emergency-supply effects as observed outcomes.

3.1.4 Field Response and Local Operational Capacity

Infrastructure resilience is not determined solely by construction. During and after disasters, local actors, government personnel, community networks, and relief groups help bridge the period between access failure and full reconstruction. The field documentation supplied for this manuscript illustrates the presence of the two authors in the broader field context and records humanitarian assistance distributed during a recent disaster response. These photographs are used as contextual documentation; they are not treated as quantitative evidence of program effectiveness.



Figure 1. Field actors involved in the case documentation: (a) Garryko Samosir during field activity; (b) Rizki Mulia in IPDN uniform. Source: author-supplied documentation, 2026.



Figure 2. Humanitarian assistance distribution after a disaster in Southeast Aceh; Rizki Mulia is shown in the brown shirt in the foreground group. Source: author-supplied documentation, 2026.

3.2 Discussion

3.2.1 Documentary Findings and Resilience-Relevant Conditions

The documentary record shows a sequence of reported damage, repair, improvement, and renewed hazard exposure. This sequence is relevant to transport resilience, but it does not constitute a resilience assessment. The cited resilience literature commonly examines network vulnerability, service continuity, redundancy, and recovery (Berdica, 2002; Mattsson & Jenelius, 2015). The present source set provides dates and reported work stages but no closure durations, travel-time series, alternative-route analysis, network criticality, or recovery-time measures.

The documents provide limited evidence about agricultural connectivity. The BPS production figures describe paddy and rice output in different years and categories, while the October report describes flooded agricultural area and an obstructed road. Neither indicator shows how much produce moved, whether traders changed routes, or whether farm-gate prices or household income changed. These distinctions prevent the article from attributing production variation or distribution outcomes to infrastructure conditions.

Infrastructure measures also differ in status. The Lawe Kinga–Simpang Seberang improvement was reported completed; Pantai Dona Bridge reconstruction was ongoing in July; the Kumbang Jaya suspension bridge was reported completed in September; the Kuning I flyover was an announced option; and river normalization was reported as continuing. Sabo-dam planning was described in an earlier ministry report (Kementerian Pekerjaan Umum, 2026a, 2026b; BPJN Aceh, 2026; ANTARA News Aceh, 2026a, 2026b). These records do not demonstrate that the planned or ongoing measures reduced later disruption.

3.2.2 Relationship to Prior Studies

The Southeast Aceh chronology is consistent with transport-network research that treats disruption and recovery as distinct from a measured resilience outcome. Road vulnerability studies emphasize that the consequences of a closure depend on network structure and available alternatives, while resilience reviews identify continuity and recovery as dimensions requiring explicit indicators (Berdica, 2002; Mattsson & Jenelius, 2015). This study does not have the network and service data needed to apply those measures.

Research on rural-road improvement and agricultural supply chains provides plausible context for why reliable access may matter (Abbas Khan et al., 2025; Wahyudi et

al., 2025; Zulham et al., 2025). The present case adds a dated record of reported hazard and recovery events, but it does not extend those studies with observed farm-to-market outcomes. The literature is therefore used to formulate questions for later field and network analysis, not to fill gaps in the case evidence.

3.2.3 Planning Implications Requiring Further Assessment

A follow-up assessment could map agricultural production areas, collection points, markets, bridges, and alternative routes to determine which links are critical. Such a ranking would require spatial network data and validated origin–destination information; it is not produced by the current document analysis.

The reports on river normalization, the proposed Kuning I flyover, and sabo-dam planning identify measures at different stages rather than completed outcomes. Their engineering suitability and effect on access should be assessed through hydrological, sediment, and slope-stability studies before they are presented as resilience solutions (Kementerian Pekerjaan Umum, 2026a; ANTARA News Aceh, 2026b).

A later study could document maintenance and construction quality assurance, closure duration, service restoration, and the availability of fallback routes. Interviews with farmers, traders, and transporters, together with travel-time and shipment observations, would be needed to test whether reported infrastructure disruptions changed agricultural distribution. These are proposed research steps, not results of this article.

3.2.4 Limitations

This study uses a purposive documentary corpus rather than an exhaustive search of agency records. It contains no mapped road network, selected farm-to-market routes, closure-duration series, travel times, freight invoices, shipment volumes, farmer or trader interviews, commodity-price panel, or post-harvest measurements. It therefore cannot evaluate network resilience or estimate infrastructure effects on agricultural distribution, production, prices, or income. Disaster figures may be provisional or revised. No 2026 production series is included. The reported road and bridge events are not linked to measured agricultural flows.

4. Conclusion

The documentary record contains agricultural production indicators for 2024 and 2025, infrastructure recovery measures during 2026, and renewed flood and landslide exposure through 15 October 2026. They show completed, ongoing, and announced interventions at different stages, alongside reports of agricultural land exposure and a road obstruction. The record supports a documentary account of resilience-relevant disruption and recovery; it does not assess infrastructure resilience or demonstrate effects on agricultural distribution.

The reported events motivate further corridor and agricultural-logistics assessment. Mapping routes and alternatives, measuring closure and recovery times, and collecting farmer, trader, and transport data would be necessary before ranking interventions or claiming distribution benefits. Any engineering recommendations should be tested against local hydrological and geomorphological conditions.

Implications for Future Assessment

(1) Map production areas, collection points, markets, and transport links before ranking road or bridge investments by network criticality.

(2) Assess hydrology, sediment movement, and slope stability at repeatedly affected sites before selecting structural or catchment measures.

(3) Collect closure duration, access-restoration dates, travel times, and alternative-route availability to evaluate service continuity and recovery.

(4) Document construction status, maintenance, supervision, and independent verification for each intervention.

(5) Use farmer, trader, transporter, and market data to test effects on logistics costs, post-harvest loss, selling prices, and agricultural access.

Ethics and Data Availability

Ethics and consent: This document analysis uses public statistics, disaster reports, public-works records, and news reports. It did not recruit, interview, or observe human participants.

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