

POST-FLOOD REVITALIZATION OF A MELON GREENHOUSE AS A COMMUNITY EMPOWERMENT STRATEGY IN RURAL BANYUMAS, INDONESIA

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Abstract

A flood on 6 February 2025 damaged the melon greenhouse owned by Jingkang Village, Ajibarang District, Banyumas Regency, Indonesia, and halted cultivation previously managed collectively by a Women Farmers Group. This study examines how the greenhouse was revitalized after the flood and how the accompanying change in management arrangements unfolded. A qualitative descriptive design with a case study approach was used. Data were gathered through observation, in-depth interviews with the manager and members, and documentation, then analysed using the Miles and Huberman interactive model and verified through source and technique triangulation. The revitalization process is read through a five-stage framework, while the change in management is explained through the sustainable livelihoods framework. Revitalization proceeded through identification, planning, implementation, reorganization of management, and continuity, and began only eleven months after the flood. The central finding is a shift from collective management to individual management under a village land lease, adopted after the group lost its working capital and promised village assistance failed to materialise. Financed entirely from the manager's own capital, revitalization restored productive function and preserved an existing marketing partnership, although the benefits of the asset narrowed to a single household.

Keywords: *community empowerment; managerial autonomy; melon greenhouse; post-flood recovery; revitalization*

INTRODUCTION

Agriculture remains the backbone of the rural economy in Indonesia, serving at once as a source of livelihood, a basis of household food security, and a driver of regional growth (Mukarramah et al., 2025). It nevertheless faces compounding pressures from climate change, shrinking productive land, price volatility, and limited access to modern technology, which have encouraged a shift towards more controlled, technology-based production, one expression of which is the greenhouse (Ardiansyah et al., 2024).

Greenhouses allow temperature, humidity, and light to be regulated and protect crops from pests and extreme weather, thereby raising both yield and quality (Nurhayati et al., 2024). For melon in particular, adoption correlates with improved farmer welfare in Indonesia (Hanani et al., 2024), and a greenhouse managed through a village institution also serves as a vehicle for community-based economic strengthening.

Such technology-based assets nevertheless remain exposed to hydrometeorological hazards. Floods have been shown to reduce food availability and damage agricultural production facilities across several regions (Agustina et al., 2023), while post-disaster recovery in agriculture requires not only the repair of facilities but also the restoration of agro-ecosystem function and of livelihoods (Febiola et al., 2024). Studies of community recovery further indicate that the pace of recovery depends heavily on social networks and on the capacity of residents to work with whatever resources remain (Liu & Mostafavi, 2023).

This configuration is visible in the melon greenhouse programme of Jingkang Village, Ajibarang District, Banyumas Regency. The village government and residents built eight greenhouse units measuring 17 by 8 metres using village funds and entrusted their management to a Women Farmers Group (Kelompok Wanita Tani, hereafter KWT) as part of a village food security programme. The programme expanded from four units to eight and supplied

Golden Aroma melons to a modern retail market. On 6 February 2025 a flood inundated the site, damaging growing media, irrigation lines, plastic covers, and drainage channels, halting cultivation and exhausting the group's capital. Flooding is not an isolated event in this location, so the risk of recurrence forms part of the vulnerability context the manager faces.

The greenhouse then stood unused for roughly eleven months and risked becoming an abandoned village asset. Recovery began only on 4 January 2026, when one resident undertook to restore it using her own capital and to lease the land from the village government. The initiative restored the facility and at the same time changed the management arrangement from a collective group system to individual management, and it is this shift that the study takes as its point of departure.

Existing work on greenhouse revitalization has largely been conducted under normal conditions and centred on mentoring, education, or technology transfer (Suardika *et al.*, 2025), while work on post-disaster recovery has emphasised government strategy, assistance programmes, or land restoration in general (Delyana *et al.*, 2026), and community-based revitalization studies have mostly taken urban public assets or tourism sites as their object (Sari *et al.*, 2025). A gap therefore remains around the revitalization of a village-owned productive agricultural asset, carried out on residents' own initiative after a flood and accompanied by a change from collective to individual management.

The study matters for three reasons. First, technology-based agricultural facilities in rural areas are typically built with substantial village funds, so a failure to restore them after a disaster means not only the loss of production capacity but also stranded public expenditure and diminished confidence in comparable programmes. Second, most documented accounts of post-disaster recovery describe patterns that rest on mentoring, aid, or policy intervention, whereas many villages do not receive such intervention in time; knowledge of how residents recover assets without external support therefore carries considerable practical value. Third, the change in management that accompanies recovery is rarely interrogated in the revitalization literature, even though it determines who ultimately benefits from a village asset and who bears its risks.

Accordingly, this study addresses two questions: how the post-flood revitalization of the melon greenhouse in Jingkang Village proceeded, and how the accompanying change in management arrangements unfolded and what it implies for the continuity of the asset. Theoretically, the study extends the concept of revitalization from the scale of urban areas to that of a rural production facility and links it to the sustainable livelihoods framework in order to explain institutional change after a disaster. Practically, its findings can inform village governments designing support schemes for the recovery of productive assets and for the mitigation of recurrent hazards.

LITERATURE REVIEW

Post-Disaster Recovery in the Agricultural Sector

Law No. 24 of 2007 on Disaster Management and Government Regulation No. 21 of 2008 place the post-disaster phase under two principal activities: rehabilitation, directed at repairing facilities so that they function adequately again, and reconstruction, directed at rebuilding facilities, institutions, and community life in the affected area. In agriculture, recovery demands more than the repair of buildings, since it also involves restoring growing media, water systems, agro-ecosystem function, and livelihoods (Saraswati, 2026). Research on community recovery likewise shows that its pace depends on social networks and on the ability of residents to mobilise remaining resources (Liu & Mostafavi, 2023).

The Concept of Revitalization and a Note on Terminology

Etymologically, revitalization joins *re*, meaning again, to *vital*, meaning alive or of value, and denotes bringing something back to optimal function. (Martokusumo, 2022) treats it as a renewal approach restoring the vitality of an object through integrated attention to physical, social, economic, cultural, and environmental dimensions. (Roberts, 2016) formulates it as a comprehensive and integrated vision and action that resolves problems causing decline and produces lasting improvement in the economic, physical, social, and environmental condition of an area. Since the concept originates in urban renewal, it is applied here adaptively at the scale of an agricultural production facility rather than transferred literally.

This study uses the term revitalization rather than rehabilitation or reconstruction for a specific reason. Rehabilitation aims to return a facility to adequate function and reconstruction emphasises physical rebuilding, whereas what occurred at the research site encompassed physical recovery together with the revival of economic function, the reordering of the management system, and efforts to sustain use of a village asset. That broader scope is better captured by revitalization, with rehabilitation and reconstruction understood as activities contained within it.

Five Stages of Revitalization as an Operational Framework

For analytical purposes this study constructs five stages of revitalization, adapted from Minister of Public Works Regulation No. 18/PRT/M/2010 on Guidelines for Area Revitalization and from the principle of integration in (Roberts, 2016): identification of post-disaster conditions, planning, implementation, reorganization of management, and continuity. These stages are treated as an operational framework devised by the researchers to read events in the field rather than as a direct citation of any single theory.

Vulnerability, the Poverty Ratchet, and Rural People's Knowledge

The staged framework explains how revitalization proceeds but not why management arrangements change after a disaster. For that purpose the study draws on the sustainable livelihoods framework developed by (Chambers & Conway, 1992) and systematised by (Scoones, 1998) and (Development, 1999). The framework treats a livelihood as a combination of assets, namely human, social, natural, physical, and financial capital, managed by a household within a vulnerability context of shocks, trends, and seasonality. Institutional structures and processes determine access to those assets, so that when one form of capital is lost to a shock, actors construct a new livelihood strategy yielding different outcomes.

The notion of vulnerability within that framework can be traced to (Chambers, 1983), who formulated a deprivation trap linking poverty, physical weakness, isolation, vulnerability, and powerlessness. Chambers explains that vulnerability hardens into persistent poverty through a poverty ratchet, the loss of productive assets to a contingency that is difficult or impossible to reverse, and he names disaster, including flooding, as one of five triggering contingencies (Chambers, 1983) pp. 114–116. The concept helps to explain why some agricultural actors withdraw after a disaster while others endure. Chambers also stresses the importance of rural people's knowledge, which outsiders frequently overlook, and which positions residents as principal actors rather than programme recipients. In empowerment practice this orientation is expressed through the principles of participation, self-reliance, equality, and sustainability (Mardikanto & Soebiato, 2017), with self-reliance understood as the capacity to manage resources without complete dependence on external assistance (Pratama, 2025).

Relevant Prior Research and the Position of This Study

Scholarship on greenhouses, post-disaster recovery, and community-based revitalization has grown considerably over the past five years, but has developed along three tracks that have not yet converged: the benefits of greenhouses under normal conditions; the effects of disaster on agriculture and strategies for recovery, largely from the standpoint of government or mentoring programmes; and asset revitalization grounded in community participation, mostly taking markets, tourism sites, or urban public facilities as its object. Table 1 summarises the relevant prior research.

Table 1. Summary of relevant prior research and the gap addressed

Author (Year)	Focus and Context	Main Finding	Gap Addressed Here
Toiba et al. (2023)	Greenhouses for Semeru eruption survivors	Recovery proceeds through technology transfer and mentoring	Driven by external facilitators, not residents
Mulyati et al. (2024)	Participation in post-disaster economic recovery	Local potential becomes the basis of recovery	Programme level, not a single productive asset
Nabila et al. (2025); Suardika et al. (2025)	Greenhouse revitalization through group mentoring	Succeeds where continuous mentoring is present	Service reports; process not analysed
Fitrah et al. (2025)	Greenhouse revitalization based on the Internet of Things	New technology raises farmer income	Depends on new technology, not remaining assets
Slipilia (2025)	Government strategy for post-flood farmland recovery	Recovery depends on policy and stakeholder synergy	Government rather than field-actor perspective
Delyana et al. (2026)	Land restoration and economic revitalization after disaster	Empowerment can restore a local economy	Planned programme, not a spontaneous response

Table 1 shows that nearly all studies of greenhouse revitalization position an external party as the principal mover, whether through mentoring, service programmes, or the introduction of technology. Conversely, studies that position the community as sole mover generally do not take agricultural production facilities as their object and do

not unfold in a post-disaster setting. No study was found that traces the revitalization of a village-owned productive agricultural asset financed and carried out entirely by residents after a disaster while also documenting the accompanying change in management. It is here that the present study is located.

Analytically, the two frameworks are combined in layers: the staged framework reads the sequence of recovery, while the sustainable livelihoods framework explains the change in management as an adaptive strategy after the loss of the group's financial and social capital. The analysis therefore runs from a vulnerability context of flooding, through damage to physical and financial capital and a staged revitalization response, to a shift from collective to individual management and its implications for the distribution of benefits and the continuity of the asset.

METHOD

This study employs a qualitative approach of a descriptive type with a case study design. A qualitative approach was chosen because the research seeks to understand processes, meanings, and actors' experiences in a natural setting, with the researcher as the principal instrument (Sugiyono, 2013). Jingkang Village, Ajibarang District, Banyumas Regency, Central Java, was selected purposively because it possesses a community-based melon greenhouse that was damaged by flooding and subsequently revitalized on residents' own initiative. Fieldwork ran from December 2025 to July 2026, that is, from before revitalization began until the greenhouse had returned to production.

Informants were determined through purposive sampling on the basis of involvement, experience, and knowledge of the revitalization process. The principal informant was the greenhouse manager, who was involved at every stage; supporting informants were members who took part directly in recovery and cultivation work.

Three techniques were used to generate data. Observation covered the physical condition of the greenhouse after the flood, the repair of facilities, and cultivation activity following revitalization (Creswell, 2018). Semi-structured in-depth interviews explored the identification of damage, the formulation of plans, the execution of repairs, the change in the management system, and efforts towards continuity (Moleong, 2018). Documentation in the form of photographs taken before and after revitalization, cultivation records, and other supporting material was used to complement and verify the findings. Interviews were conducted in Indonesian and Javanese; the excerpts presented below are the authors' translations, with the original wording retained in the research records.

Data were analysed using the Miles and Huberman interactive model of data reduction, display, and the drawing and verification of conclusions (Miles et al., 2014). Reduction sorted material by the five stages of revitalization; display took the form of narrative accounts supported by excerpts, observations, and documentation; conclusions related field findings to both frameworks. Validity was tested through source triangulation, comparing the manager's account with those of members, and technique triangulation, comparing interviews with observation and documentation.

RESULTS AND DISCUSSION

The Melon Greenhouse of Jingkang Village

Jingkang Village lies in Ajibarang District, Banyumas Regency, in terrain dominated by highland and hills. Most residents earn a living from agriculture and plantation work and observe norms of mutual assistance that constitute social capital for local economic development. The melon greenhouse was built with village funds and initially managed collectively with the village government in order to empower village women, growing from four units to eight. Continuity was interrupted when the flood of 6 February 2025 damaged the facility, caused harvest failure, and exhausted production capital, so that collective management could not be maintained and the greenhouse ceased to be used for roughly eleven months.

Identification of Post-Disaster Conditions

The first stage of revitalization took the form of a direct inspection of the greenhouse once the floodwater had receded and after a prolonged period of disuse. The inspection covered the structure, drainage channels, growing media, and the water system. It established that most of the greenhouse area was covered by silt that blanketed the growing media and blocked the drainage channels. Irrigation pipes were damaged and the plastic cover was torn in several places. Notably, the melon plants had in fact survived to bear ripe fruit, but their quality declined because the fruit absorbed excess water and lost sweetness. The loss was therefore not a failure of growth but a failure of quality, with a direct effect on sale value. The manager described the situation as follows.

“It was bad at the time. After the flood the greenhouse was full of silt. The plants all survived and bore fruit right through to ripening, but the fruit was not sweet because it had taken up all that water. Some of the pipes were damaged, the plastic was torn in places, and the water channel for the greenhouse was blocked.”



Figure 1. Condition of the greenhouse affected by the flood

On the basis of this inspection the manager and the members still active identified five urgent needs: clearing the silt, repairing the drainage, replacing growing media, repairing the irrigation system, and providing capital to resume cultivation. These were ranked by severity and urgency, a step made unavoidable by limits of both funds and labour, so that the decision about what to repair first shaped the effectiveness of the next stage. Identification thus did not stop at observing damage but became a decision about sequence, accordingly with (Roberts, 2016), for whom identification sets the direction of revitalization so that recovery measures are properly targeted. That identification was carried out by the manager herself also demonstrates rural people’s knowledge in the sense given by (Chambers, 1983), knowledge born of experience in managing one’s own environment and serving as a valid basis for action.

Planning

Planning was carried out through deliberation between the manager and the members still active, taking into account the extent of damage, priority needs, and available resources. The principal motive for revitalization was the economic value the greenhouse had previously held as a supplementary source of household income.

“I thought it was a waste to leave the greenhouse abandoned like that. The yields used to add something to the family income. So the members who were still active and I thought about bringing it back to life. We talked it over first, what had to be fixed and where the money would come from.”

Among all the identified needs, repair of the drainage system was set as the first priority, since blocked channels were the main cause of standing water and carried a risk of renewed flooding in the wet season. As a funding strategy the manager approached the village government for polyvinyl chloride piping and for reimbursement of the labour cost of deepening the channel. That assistance did not materialise, and the manager bore the entire cost herself.

“After the flood I went to the village office to ask for piping so the water would run and it would not flood again. The village head told me to find workers first to dig the channel deeper. He said the village would buy the piping and the labour cost would be reimbursed. To this day that assistance has not come through. In the end I bought the piping myself and paid the workers myself.”

The episode shows that planning was adaptive: when the anticipated source of funding failed to appear, the strategy of implementation was adjusted to available means rather than the activity being abandoned. This supports (Roberts, 2016) in holding that planning for revitalization encompasses the setting of objectives, priorities, and resource allocation. The deliberation that preceded each decision also reflects the principle of participation (Mardikanto & Soebiato, 2017), in which residents act as decision makers rather than programme recipients.

Implementation

Implementation began on 4 January 2026 according to the division of labour agreed at the planning stage. Work opened with the removal of residual silt and flood debris and the reordering of growing media, followed by repairs to drainage, irrigation pipes, the plastic cover, and other supporting facilities. Once the greenhouse was ready, melon seeds were sown over a period of some eleven to thirteen days before seedlings were transferred to the growing media.

“We began the revitalization on 4 January 2026. First the women members and I cleaned out the greenhouse, which was full of silt, then mopped it, and tidied up the growing media again. After that the men repaired the water channel, the pipes, and the torn greenhouse plastic. Once the greenhouse

was clean we started sowing melon seed. Sowing takes about eleven to thirteen days. Once the seedlings are strong enough they are moved to the growing media inside the greenhouse.”



Figure 2. Melon seed sowing during the implementation stage

The account reveals a division of labour based on capability: women members handled silt removal, mopping, and the reordering of growing media, while men handled repairs to the water channel, pipes, and plastic. The two streams of work ran concurrently, which shortened recovery time. Once seedlings reached eleven to thirteen days and sufficient strength, they were transferred carefully so as to adapt to conditions inside the greenhouse. Maintenance then proceeded routinely through watering, fertilising, pruning of shoots, tying of stems, pollination, and pest and disease control up to harvest.

“We helped clean the greenhouse, lift out the silt, and repair the damaged parts. Once the greenhouse was ready we helped with planting and care so that it could produce again.”

Implementation thus did not stop at physical repair but continued until the entire production cycle had been reactivated, in line with the emphasis (Roberts, 2016) places on lasting improvement. Cooperation organised around a division of labour also demonstrates the capacity to draw on knowledge, skills, and experience accumulated before the flood. Unlike post-disaster greenhouse recovery resting on external mentoring (Toiba *et al.*, 2023) or new technology (Fitrah *et al.*, 2025), recovery in Jingkrang rested wholly on internal resources.

Reorganization of Management

Before the flood the greenhouse was managed collectively with the village government, financed from village funds, with tasks distributed by group agreement. Flood damage exhausted the working capital, most members did not resume cultivation, and the collective system could not be maintained.

“It used to be run together with the group. After the flood the capital was gone and many of them no longer carried on. Rather than leave the greenhouse empty, in the end I have run it myself with a friend who used to be a member.”

The change in management was followed by an adjustment in the status of land use. The manager leased land from the village government, thereby acquiring the right to manage the greenhouse while assuming all operating and maintenance costs and all production risk. The mechanism of decision making changed as well: technical decisions now rest with the manager, although implementation is still preceded by deliberation and coordination with members.

“I decide everything in the greenhouse: when to sow, when to plant, what to buy, and how the work is shared out. If there is a problem in the greenhouse we still talk it over first, and then I decide what step to take.”

The division of labour also became more specific and attached to particular people, no longer rotating as under group management.

“I do the sowing and the planting. The others do the spraying, carry the coir to be soaked, lift it out again afterwards, and clean and spray the greenhouse before planting. Then the coir is spread out to dry, put into polybags and levelled off. Some of my members water in the morning and the evening, and sometimes help wash the used polybags and refill them with coir.”

The account sets out a detailed work chain for preparing coir-based growing media, from carriage and soaking through drying, filling of polybags, and the washing and refilling of used ones. Individual management therefore does not mean working alone: it still rests on shared labour, but with fixed and defined roles. Table 2 compares management before and after revitalization.

Table 2. Change in the management of the melon greenhouse before and after revitalization

Aspect	Before the flood (collective)	After revitalization (individual)
Managing actor	Women Farmers Group together with the village government	One individual manager with a few active members
Source of capital	Village funds and group contributions	The managers own capital
Land status	Village asset held by the group	Land leased from the village government
Decision making	Group deliberation	Centred on the manager after technical consultation
Division of labour	Rotated by group agreement	Fixed roles matched to individual ability
Bearer of risk	Shared across the group	Borne entirely by the manager
Orientation of output	Village food security and group funds	Manager income and continuity of production

This change constitutes institutional adaptation to post-disaster conditions rather than a mere alteration of organisational form; within the framework of (Roberts, 2016) it belongs to the governance dimension that allows a revitalized asset to function sustainably. The withdrawal of most KWT members can be read as a poverty ratchet in the sense given by (Chambers, 1983), the loss of productive assets to a disaster that is difficult to reverse, whereas the manager, retaining a reserve of personal capital, was able to absorb the shock and continue. That difference in resilience explains why collective management collapsed while use of the asset persisted in individual form. Read through the sustainable livelihoods framework (Chambers, 1983), the shift represents the reconstruction of a livelihood strategy: the group's financial and social capital was exhausted, while cultivation experience and a marketing partnership remained, and the village institution then supplied access to physical capital through a lease. The finding complements studies that generally report a strengthening of collective management (Sari et al., 2025): where a group's capital has been destroyed, individualisation may instead be the mechanism that rescues the asset. The consequence deserves recording, namely that benefit once spread across the membership is now concentrated in a single manager, who also carries the production risk alone.

Continuity

After revitalization the greenhouse resumed the full cultivation cycle, from sowing and planting through maintenance to harvest. Produce continued to be sold to the supermarket that had been a partner since before the flood. That this partnership survived a period of no production is worth noting, since the certainty of a market is what made the manager willing to bear the cost of recovery herself.

“When the harvest is good one greenhouse can return a profit of about eight million rupiah. Usually there are three harvests a year, and if the weather is good it can reach four. We send the harvest to the supermarket we have worked with since before the greenhouse was flooded.”

These figures are the manager's estimates based on production before the flood and could not be verified as a full year of post-revitalization performance within the fieldwork period. Even so, the return of the complete cultivation cycle and the preservation of the marketing channel indicate that revitalization restored the economic function of the greenhouse as a source of livelihood. Continuity nevertheless faces technical constraints in the form of leaf fungus and whitefly that remain inadequately controlled.

“Lately there has been a lot of fungus on the leaves and whitefly, those little white ones, and I have not found a treatment that works. And once a plant has wilted it is usually hard to bring it back.”

The shift in the character of the challenge, from repairing facilities to sustaining productivity, confirms that continuity is an ongoing process demanding adaptive capacity. This is consistent with (Roberts, 2016) on lasting improvement and with the principle of self-reliance in empowerment (Mardikanto & Soebiato, 2017), visible in the manager's ability to sustain production, preserve the marketing partnership, and seek solutions unaided (Pratama, 2025). The absence of technical mentoring nevertheless remains a point of fragility, since mentoring has elsewhere proved important in sustaining greenhouse productivity (Nabila et al., 2025).

CONCLUSION

In answer to the first question, the post-flood revitalization of the melon greenhouse in Jingkang Village proceeded through five interlocking stages. Identification produced a map of the damage and five urgent needs ranked by priority. Planning set drainage repair as the first priority and adjusted the funding strategy when village support failed to materialise. Implementation proceeded through a division of labour based on capability and continued until the whole cultivation cycle was active again. The reorganization of management altered the institutional arrangement. Continuity was marked by the return of routine production and the survival of the marketing partnership. Every stage was carried out on the manager's own initiative and at her own expense, and began only eleven months after the flood.

In answer to the second question, management shifted from a collective system led by the Women Farmers Group to individual management under a village land lease, accompanied by a move from village funds to personal capital, the centralisation of decision making in the manager, and the replacement of rotating duties by fixed roles. The implications are twofold. On one hand the shift rescued a village asset from abandonment and restored its productive function. On the other, economic benefit once distributed across the membership is now concentrated in a single manager, who simultaneously bears the production risk and the risk of recurrent flooding.

The thread connecting the two findings lies in the relationship between shock, assets, and institutions. The flood did not merely damage a structure; it erased the group's financial and social capital, so that most members experienced a poverty ratchet, the loss of productive assets that cannot readily be recovered (Chambers, 1983). What remained was cultivation experience and a marketing partnership, both attached to individuals rather than to the group. When the village opened access to physical capital through a lease, individual management became the most feasible livelihood strategy. The staged framework therefore explains how recovery proceeded, while the composition of remaining assets explains why that recovery took an individual form. The success of post-disaster revitalization of a productive village asset thus depends more on community capacity, participation, and self-reliance than on the scale of external intervention, although the absence of such intervention carries a social cost in the narrowing of benefit.

The study recommends stronger technical mentoring, particularly in pest and disease control, together with reliable village support in facilities, access to capital, and flood mitigation, which remains unaddressed and leaves the risk of recurrence with a single household. A scheme allowing former members to re-engage also merits consideration so that the asset does not cease to deliver collective benefit. The study is confined to one case with few informants and is not intended for generalisation; further research might test comparable patterns elsewhere and measure the economic effects quantitatively.

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POST-FLOOD REVITALIZATION OF A MELON GREENHOUSE AS A COMMUNITY EMPOWERMENT STRATEGY IN RURAL BANYUMAS, INDONESIA

Rizal Ardi Maulana et al

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