Intergenerational Population–Environment Resilience: A Multilevel Conceptual Framework for Youth, Families and Sustainable Development in Malaysia

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ABSTRACT

Climate change and environmental degradation are population and social-development challenges because their effects are mediated by household resources, demographic inequalities, intergenerational relations and institutional decisions. This conceptual paper develops the Intergenerational Population–Environment Resilience (IPER) Framework through a theory-informed synthesis of social–ecological resilience, ecological systems theory, human agency, family resilience and environmental justice. The framework integrates four mutually connected domains: (1) environmental risk and structural conditions; (2) household and community adaptive resources; (3) youth agency and intergenerational learning; and (4) institutional enabling capacity and accountability. These domains interact through resource flows, participation, institutional response and feedback processes to shape preparedness and adaptive capacity, social inclusion and cohesion, and intergenerational continuity of well-being. The paper clarifies IPER's contribution in relation to established frameworks and proposes analytical dimensions and indicative measures without presenting them as a validated scale. It foregrounds environmental justice and demographic differentiation, including age, gender, ethnicity, disability, migration, income and place, and considers Malaysia's multi-ethnic, multi-level and geographically diverse setting. The framework is linked to Sustainable Development Goals (SDGs) 4, 10, 11, 13, 16 and 17. Five strengthened propositions and an implementation pathway are offered to guide empirical testing and policy application. IPER's central argument is that resilience is relational and unequally distributed: families and young people can contribute to adaptation, but cannot substitute for institutional responsibility to reduce risk, distribute resources fairly and enable meaningful participation.

Keywords: Population–Environment Resilience; Intergenerational Learning; Youth Agency; Family Resilience; Environmental Justice; Institutional Accountability; Sustainable Development; Malaysia

INTRODUCTION

Climate change and environmental degradation are increasingly consequential for the conditions in which people live, work, care for one another and plan for the future. Floods, heat, water stress, air pollution, ecosystem decline and other environmental pressures can affect health, livelihoods, housing, food security, mobility and the continuity of everyday care. These effects are not distributed evenly. They are mediated by income, location, age, social networks, public infrastructure and access to institutions. Environmental change is therefore also a population and social development issue. The relationship between population and environment is reciprocal. Human settlements, production, consumption and resource use influence ecological conditions, while ecological change affects the well-being, opportunities and vulnerabilities of populations. A population–environment perspective must consequently move beyond a narrow account of environmental awareness or individual behaviour. It must examine how environmental risks are experienced through households and communities, how adaptive resources are distributed, and how institutions shape the capacity to prepare for and respond to change.

Families occupy a significant position in this relationship. They organise care, share resources, transmit knowledge and make everyday decisions that may influence preparedness and environmental practices.

Communities extend these capacities through social networks, mutual assistance and local knowledge. Young people are also important participants: they experience environmental change in the present, will live with its long-term consequences, and can contribute to learning, communication and collective initiatives. However, youth participation is shaped by the opportunities and constraints created by families, schools, communities, public agencies and wider political-economic conditions.

This paper argues that the connection between youth, family and environmental resilience requires a multilevel conceptual approach. Social–ecological resilience scholarship highlights interdependence, adaptation, learning and transformation within linked human and ecological systems (Folke, 2006; Folke et al., 2010). Ecological systems perspectives draw attention to the nested settings that shape human development, from immediate family relationships to wider institutions and social structures (Bronfenbrenner, 1979). Agency-oriented perspectives further recognise that people can influence their circumstances, but do so within enabling and constraining environments (Bandura, 2001). These bodies of thought offer complementary insights, yet their integration into a population–environment framework centred on intergenerational relations warrants further conceptual development.

The purpose of this paper is to propose the Intergenerational Population-Environment Resilience (IPER) Framework. Rather than reporting new survey or interview findings, the paper is theoretical and conceptual. It develops an analytical model that connects environmental risk, household and community adaptive resources, youth agency, intergenerational learning and institutional responsibility. The central argument is that resilience is not an attribute held by an individual household or a young person; it is an emergent capacity produced through relationships across social and ecological systems.

The paper makes three contributions. First, it reframes population-environment resilience as an intergenerational and relational process rather than solely a technical capacity to withstand environmental hazards. Second, it identifies youth agency and intergenerational learning as connecting mechanisms between household experience, community action and institutional response. Third, it clarifies the role of institutional accountability, ensuring that calls for household and youth participation do not obscure the structural responsibilities of government and other powerful actors.

CONCEPTUAL APPROACH

This is a theory-informed conceptual paper. It uses a selective, problem-oriented synthesis of established scholarship on social–ecological resilience, ecological systems and human agency to develop a new integrative framework. It is not a systematic literature review, does not claim exhaustive coverage of the field, and does not report original human-participant research. The synthesis is organised around a conceptual problem: how can youth, families, communities and institutions be understood as interdependent contributors to population–environment resilience? The framework is developed through three analytical steps. First, key concepts are clarified to distinguish resilience, adaptive capacity, agency and intergenerational learning. Second, the concepts are brought into dialogue to identify the relationships that are often treated separately. Third, these relationships are organised into a multilevel framework and expressed as propositions that can guide subsequent empirical investigation. The framework is offered as a theoretical contribution requiring further contextualisation and empirical assessment, not as a validated measurement model. The synthesis is interpretive rather than systematic: sources are selected for their conceptual relevance to the paper's problem, and the paper does not claim database comprehensiveness or a reproducible systematic search. To make the reasoning transparent, the analysis proceeds by (a) identifying the explanatory focus and unit of analysis of each theoretical perspective; (b) comparing the concepts each perspective makes visible and the issues it leaves less developed; (c) identifying the relational mechanisms needed to connect population, environment, family, youth and institutions; and (d) translating the resulting domains into propositions and indicative analytical dimensions. This procedure is appropriate for theory building, but it does not establish causal effects, validate indicators or demonstrate the empirical performance of the framework.

Social-ecological resilience

Resilience thinking emerged partly as a challenge to assumptions that ecological systems move towards a

single stable equilibrium. It instead emphasises dynamic change, uncertainty, thresholds, learning and the interaction of processes across temporal and spatial scales (Folke, 2006). In social-ecological systems, people and ecosystems are interdependent: societies rely on ecological functions and resources, while human decisions influence the conditions and trajectories of ecosystems. Resilience is therefore not simply a return to a previous state after disturbance. It also concerns the capacity to reorganise, adapt and, where necessary, transform arrangements that reproduce vulnerability.

Folke et al. (2010) distinguish resilience, adaptability and transformability as related dimensions of social–ecological change. This distinction is useful for population–environment analysis. Resilience concerns the capacity to absorb disturbance while retaining essential functions; adaptability concerns adjustments that allow a system to continue developing; and transformability concerns the capacity to create a fundamentally different system when existing arrangements become untenable. A population–environment framework should consider all three, since preserving an unequal or unsafe status quo cannot be treated as a sufficient measure of success.

Vulnerability and adaptive capacity must also be understood relationally. Adger (2006) highlights the importance of social dimensions in shaping vulnerability and resilience. Households exposed to similar hazards may experience very different outcomes because they possess different financial resources, social networks, information, mobility and access to public services. Resilience is therefore not evenly distributed, nor can it be inferred from the presence of community solidarity alone. It depends partly on the wider distribution of resources, power and institutional support.

Ecological systems and the social contexts of development

Bronfenbrenner's ecological systems theory conceptualises human development through nested and interacting environmental systems, including immediate settings and wider institutional and sociocultural contexts (Bronfenbrenner, 1979). Applied cautiously to population–environment questions, this perspective helps explain why young people's environmental knowledge and participation cannot be understood only at the individual level. Family routines, peer relationships and educational settings interact with community organisations, local authorities, national policy and broader cultural and economic conditions. The relevance of this perspective is not to treat ecological systems theory as a complete theory of environmental resilience. Rather, it provides an account of the social contexts through which environmental risks and adaptive resources are encountered. The natural environment must remain visible in the analysis: ecological conditions are not merely another social setting but the biophysical systems on which social life depends. The IPER Framework therefore combines the nested social contexts of human development with the interdependence and dynamics emphasised in social–ecological resilience scholarship.

Human agency and intergenerational learning

Agency refers to the capacity to influence events and exercise some control over one's circumstances. Bandura (2001) emphasises human agency as intentional, forethoughtful, self-reactive and self-reflective, while recognising that agency is exercised within social structures and through relationships with others. In environmental contexts, agency may be individual, collective or exercised through institutions and representatives. Young people may contribute through everyday practices, peer learning, community initiatives, public deliberation or engagement with decision-makers.

Intergenerational learning provides a further connection between agency and resilience. Knowledge and experience move between generations, but this process should not be understood as one-directional transmission from older to younger people. Young people may introduce new information, digital communication practices and alternative perspectives, while older generations may contribute place-based experience, practical knowledge and established social networks. Reciprocal learning can strengthen preparedness and shared understanding, provided that differences in authority, resources and voice are acknowledged. The concept of agency also guards against an overly individualised account of environmental responsibility. A young person may be motivated to act but lack access to decision-making, transport, funding, information or institutional support. Similarly, households may recognise risks but lack the resources to

relocate, retrofit housing or secure reliable services. Agency is therefore best understood as relational and institutionally conditioned rather than as a personal quality that automatically produces action.

Comparative positioning and the distinct contribution of IPER

IPER is an integrative framework rather than a replacement for the theories from which it draws. Social–ecological resilience explains how linked human and ecological systems absorb disturbance, adapt and transform, but it does not by itself specify how family structures, youth voice and demographic inequalities shape access to adaptive capacity. Ecological systems theory maps nested developmental contexts, from family and school to wider institutions, but does not offer a full account of biophysical risk, ecological thresholds or the distribution of environmental burdens. Social cognitive theory explains intentional and collective agency, yet agency alone cannot explain why similarly motivated people have unequal access to resources and decision-making. Environmental justice scholarship makes visible the distribution of environmental burdens and benefits, recognition of diverse identities and knowledge, and fairness of decision-making processes (OECD, 2024; Schlosberg, 2004, 2007). Family resilience scholarship draws attention to shared belief systems, organisational patterns and communication processes through which families respond to adversity (Walsh, 2016).

IPER's originality lies in specifying the connections among these perspectives within a population–environment and intergenerational frame. First, it treats the family and community not merely as contextual settings but as sites where risk, care, knowledge and resources are negotiated across generations. Second, it positions youth agency as a relational mechanism that can connect household experience, community learning and institutional decision-making, while explicitly conditioning agency on access, recognition and response. Third, it places institutional accountability inside the framework rather than treating governance as an external enabling factor. Fourth, it evaluates resilience through linked outcomes of adaptive capacity, inclusion and intergenerational well-being, thereby making justice a criterion of resilience rather than an optional policy add-on. These are claims of conceptual integration and emphasis; empirical research is needed to determine whether the proposed relationships add explanatory value in specific settings.

TOWARDS AN INTERGENERATIONAL POPULATION–ENVIRONMENT RESILIENCE FRAMEWORK

Population-environment resilience

For the purposes of this paper, population–environment resilience is defined as the dynamic and unequally distributed capacity of individuals, households, communities and institutions to anticipate, absorb, adapt to and, where necessary, transform responses to environmental change while sustaining human well-being, social inclusion and the ecological conditions that support present and future generations. This definition has four implications. First, resilience is multilevel. It is shaped by individuals and households, but also by community networks, public institutions and wider policy and economic arrangements. Second, it is relational: capacities at one level affect and depend on capacities at other levels. Third, it is intergenerational: decisions and environmental conditions connect the well-being and opportunities of people across time. Fourth, resilience is normative as well as functional. It should be assessed not only by whether a system continues to operate, but also by whose well-being is protected, whose risks are prioritised and whether unequal vulnerabilities are reduced.

IPER Framework Domains

The proposed IPER Framework consists of four mutually connected domains. They are analytically distinguishable but should not be interpreted as a rigid sequence or a linear causal chain.

Domain 1: Environmental risk and structural conditions

The first domain concerns the environmental and structural conditions within which population groups live. It includes exposure to hazards, ecological change, settlement patterns, livelihood dependence, housing quality,

infrastructure, socio-economic inequality and access to essential services. These conditions shape the types of risks faced by households and communities and influence the resources available for response. The domain also recognises that environmental risks are produced and distributed through decisions about land use, development, resource management and public investment.

Domain 2: Household and community adaptive resources

The second domain concerns the resources through which people interpret risks, prepare for disruption and support one another. At household level, these may include environmental knowledge, care arrangements, savings, health, practical preparedness and the ability to access information and services. At community level, they may include trust, mutual assistance, local knowledge, voluntary organisations, communication networks and collective problem-solving. These resources can support resilience, but their availability is uneven. Social cohesion should not be romanticised: strong networks may coexist with exclusion, unequal influence or insufficient material resources.

Domain 3: Youth agency and intergenerational learning

The third domain positions young people as current contributors to resilience and as participants in intergenerational relationships. Youth agency may be expressed through learning, communication, peer mobilisation, civic participation, local initiatives and engagement with institutions. Intergenerational learning connects young people's knowledge and capacities with the experiences and resources of parents, grandparents, educators and community members. It can strengthen risk communication, preparedness and continuity of sustainable practices. However, meaningful agency depends on access to resources, recognition, decision-making opportunities and the freedom to question existing practices.

Domain 4: Institutional enabling capacity and accountability

The fourth domain concerns the capacity and responsibilities of institutions. Schools, universities, local authorities, government agencies, civil society organisations and businesses shape the conditions under which households and young people can act. Institutional enabling capacity includes accessible information, inclusive planning, education, public infrastructure, responsive services, transparent decision-making and mechanisms for public participation. Accountability requires institutions to address structural sources of risk and to respond to the needs and contributions of affected communities. It prevents the language of resilience from shifting responsibility onto individuals and families who may have limited power to change the conditions that expose them to harm.

Demographic differentiation and environmental justice

Demographic characteristics should be treated as intersecting conditions that shape exposure, resources, voice and outcomes, not as fixed labels that predict vulnerability on their own. Age matters because children, adolescents, working-age adults and older people may have different mobility, health, care and decision-making needs. Gender can influence unpaid care, livelihood security, safety during displacement and access to public participation. Ethnicity, indigeneity, language and cultural identity can shape the recognition of place-based knowledge and the accessibility of risk communication. Disability may affect evacuation, access to shelters, information formats and continuity of care. Migration status, citizenship and insecure tenure can influence eligibility for assistance and willingness or ability to approach public agencies. Income, occupation and location influence the ability to insure, relocate, retrofit housing or absorb income losses. These dimensions should be analysed intersectionally and contextually rather than assuming that any single category is internally homogeneous.

Environmental justice provides a normative test across all four IPER domains. Distributive justice asks who bears environmental harms and who receives protective infrastructure, services and adaptation benefits. Procedural justice asks who can access information, participate early, influence decisions and obtain explanations or remedies. Recognitional justice asks whose identities, experiences, languages and knowledge are respected in problem definition and programme design. These dimensions are interdependent: non-

recognition can exclude groups from decision-making, while exclusion can reproduce unequal allocation of resources (OECD, 2024; Schlosberg, 2004, 2007). IPER therefore treats justice as a cross-cutting assessment lens rather than a fifth domain. This preserves the four-domain architecture while requiring each domain and each outcome to be examined for unequal burdens, voice and benefit.

Family structure also requires explicit attention. Households may be nuclear, extended, multigenerational, single-parent, couple-only, grandparent-led, migrant or composed of non-kin members. Household size or the presence of multiple generations should not be used as a proxy for resilience. Extended families may offer care and resource-sharing, but may also face crowding, dependency burdens or unequal decision-making. Single-adult households may have fewer people available for evacuation and care, while maintaining strong external support networks. The relevant analytical question is how care responsibilities, authority, resources and communication are organised in a particular household, and whether public services recognise those arrangements. This approach avoids treating a single family form as the normative unit of adaptation.

Resilience outcomes

The interaction of the four domains is expected to shape three broad and interrelated outcomes. The first is preparedness and adaptive capacity: the ability to anticipate risks, access reliable information, organise support and adjust practices as conditions change. The second is social inclusion and cohesion: the extent to which different population groups can participate, access resources and influence decisions, including groups whose vulnerabilities may be overlooked. The third is intergenerational continuity of well-being: the protection of health, livelihoods, learning, care and ecological conditions for present and future generations. These outcomes should be evaluated together. A community may demonstrate strong short-term coping while remaining exposed to recurring structural risks; another may improve infrastructure while excluding residents from decisions. A comprehensive account of resilience must attend to both capacity and justice.

Domains interaction

The IPER Framework is best understood as a system of reciprocal relationships. Environmental and structural conditions influence the resources available to households and communities. Household and community experiences shape the knowledge and priorities that young people bring into civic and intergenerational spaces. Youth participation can, in turn, strengthen communication, identify unmet needs and contribute to community initiatives. Institutions influence each of these processes through policy, investment, services and opportunities for participation. Institutional responses may strengthen adaptive resources, or reproduce vulnerability when they are inaccessible or unresponsive.

Feedback is central to the framework. Learning from environmental events can change household preparedness and institutional planning. Community participation can improve the relevance of public programmes, while visible institutional responsiveness can strengthen trust and future participation. Conversely, repeated experiences of exclusion or ineffective consultation can weaken confidence and reduce engagement. These feedback processes mean that resilience should be understood as an evolving relationship rather than a fixed characteristic.

The framework also distinguishes participation from responsibility. Young people and families can contribute to resilience, but they cannot substitute for public infrastructure, regulation, environmental protection or equitable resource allocation. The more powerful the actor and the greater its control over the sources of environmental risk, the greater its institutional responsibility to prevent harm and enable adaptation. This principle is essential to avoid treating resilience as a demand that vulnerable populations simply become more self-reliant.

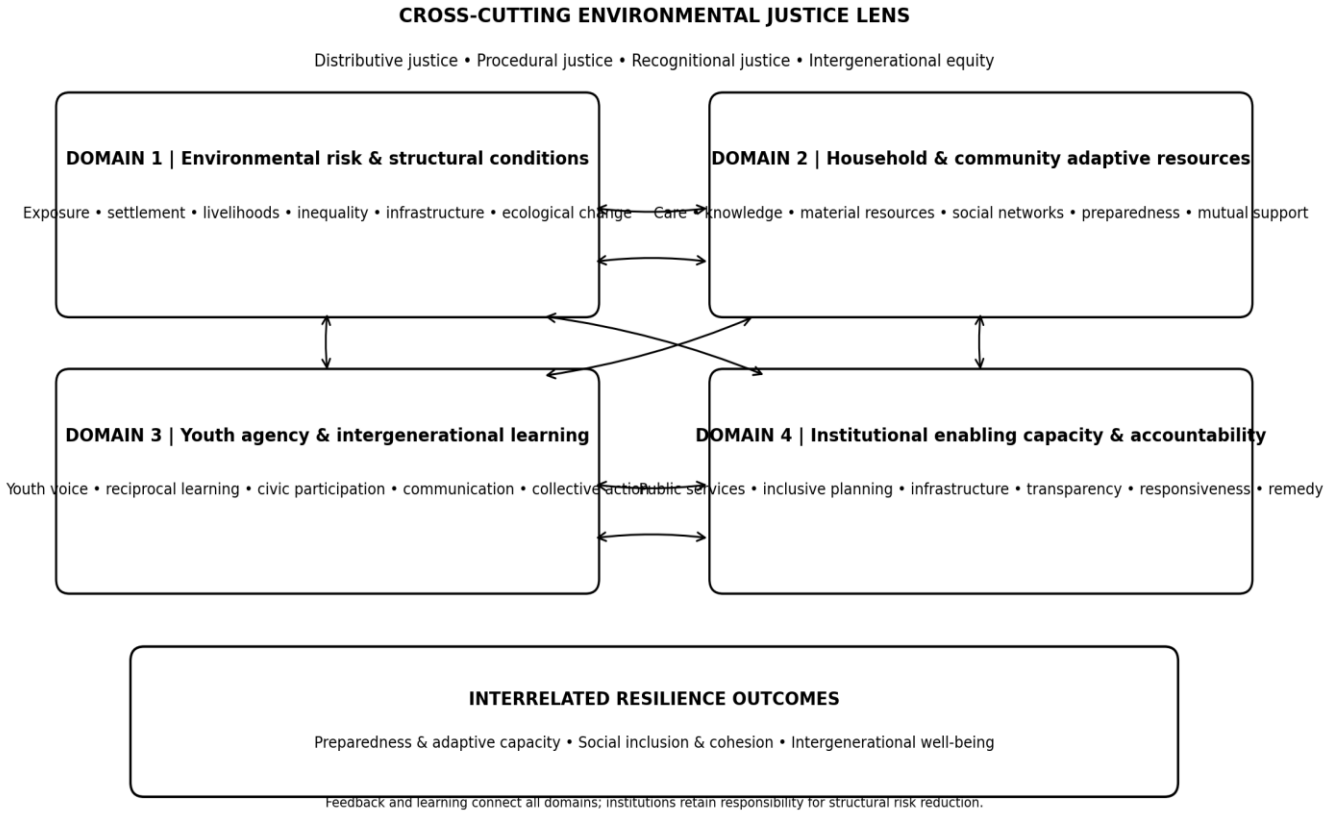
Operationalising the IPER Framework for empirical analysis

Operationalisation means translating the conceptual domains into observable questions and context-sensitive indicators; it does not mean assuming that the framework is already a psychometric scale. The proposed indicators below are illustrative and should be refined through consultation with affected communities, pilot

testing and validation for each research setting. Measures should be disaggregated, where ethically and statistically appropriate, by age, gender, ethnicity or Indigenous identity, disability, migration status, income, household type and location. Researchers should avoid collecting sensitive demographic data without a clear analytical purpose and appropriate safeguards.

The three outcomes should be assessed jointly. Preparedness and adaptive capacity may be examined through warning comprehension, household plans, service continuity and recovery time. Social inclusion and cohesion may be assessed through participation diversity, perceived procedural fairness, access to assistance and trust across groups. Intergenerational continuity of well-being may be examined through continuity of education and care, livelihood recovery, health protection, transfer of locally relevant knowledge and the maintenance or restoration of ecological functions. No single indicator is sufficient: for example, a high rate of household preparedness may coexist with inadequate public infrastructure or exclusion from decision-making. Mixed methods are therefore especially suitable for examining both measurable conditions and the meanings and power relations behind them.

Figure 1. The Intergenerational Population–Environment Resilience (IPER) Framework



Note. The four domains are analytically distinct but mutually constitutive. The environmental justice lens applies across all domains and outcomes. Arrows indicate reciprocal influence and feedback rather than a fixed causal sequence.

IPER domain	Illustrative dimensions / indicators	Possible evidence sources
1. Environmental risk and structural conditions	Hazard exposure and frequency; housing and settlement conditions; livelihood dependence; access to water, transport, health and communication infrastructure; environmental quality; spatial distribution of risk.	Hazard and land-use maps; local authority records; household surveys; environmental monitoring; community risk mapping.
2. Household and community adaptive resources	Emergency plans; savings and insurance access; care and evacuation arrangements; risk-information access; social support; trust; local knowledge;	Household surveys; interviews; focus groups; community organisation records;

	community organisation and mutual aid.	participatory mapping.
3. Youth agency and intergenerational learning	Youth access to decision-making; perceived influence; environmental literacy; youth-led initiatives; frequency and reciprocity of intergenerational exchange; feedback received from institutions.	Youth surveys; school and university records; interviews with multiple generations; observation of forums; project documentation.
4. Institutional enabling capacity and accountability	Accessibility of services and early warnings; inclusive planning procedures; budget and resource allocation; response time; publication of decisions; grievance mechanisms; follow-through on community recommendations.	Policy and budget analysis; administrative data; meeting records; public consultations; interviews with officials and community groups.

Table 1. Domains and analytical dimensions of the IPER Framework

Framework domain	Key analytical dimensions	Illustrative questions
1. Environmental risk and structural conditions	Hazard exposure; settlement and livelihood patterns; inequality; infrastructure; ecological change	How are risks produced and distributed? Which population groups face the greatest constraints?
2. Household and community adaptive resources	Knowledge; care; preparedness; material resources; trust; local knowledge; mutual support	What resources enable households and communities to anticipate, cope and adapt? Who lacks access?
3. Youth agency and intergenerational learning	Youth voice; civic participation; reciprocal learning; communication; peer initiatives	How do young people and older generations exchange knowledge and influence collective responses?
4. Institutional enabling capacity and accountability	Public services; education; inclusive planning; infrastructure; transparent decisions; institutional responsiveness	Do institutions enable meaningful participation and address structural sources of vulnerability?
Resilience outcomes	Preparedness and adaptive capacity; inclusion and cohesion; intergenerational well-being	Are capacities strengthened equitably and sustained across generations?

Conceptual propositions

The framework generates five propositions for future theoretical refinement and empirical investigation:

1. Proposition 1: The positive relationship between household and community adaptive resources and resilience outcomes is strengthened when institutions provide accessible services, equitable resources and enforceable accountability; community self-help alone will not offset persistent structural exposure.
2. Proposition 2: Youth agency is more likely to influence preparedness and institutional practice when participation is accessible, representative and consequential, and when young people receive transparent feedback on how their contributions affect decisions.
3. Proposition 3: Reciprocal intergenerational learning is positively associated with preparedness and continuity of adaptive practices when younger and older generations' knowledge is recognised, exchanged and translated into supported household or community action.
4. Proposition 4: The effects of environmental risk on resilience outcomes are conditioned by intersecting demographic and structural inequalities, including income, gender, age, disability, ethnicity, migration status, household composition and geographical location.
5. Proposition 5: Resilience initiatives are more likely to contribute to sustainable development when adaptive capacity is pursued together with distributive, procedural and recognitional justice, institutional accountability and protection of ecological conditions for future generations.

THE MALAYSIAN CONTEXT FRAMEWORK

The IPER Framework offers a way to organise analysis of population–environment relations in Malaysia without assuming that all communities experience environmental change in the same way. Malaysia's social,

economic and geographical diversity makes it important to consider differences between urban and rural settings, coastal and inland communities, and households with different levels of income, mobility and access to public services. The framework does not prescribe a single national profile of vulnerability. Instead, it provides questions for examining how environmental pressures interact with the conditions of particular populations and places.

At household and community levels, the framework directs attention to the practical resources that shape preparedness and adaptation. These include the accessibility and reliability of environmental information, the capacity to maintain care during disruption, the availability of social support and the ability to reach essential services. Family learning initiatives may help connect environmental information with everyday decisions, but programmes should recognise that households differ in time, income, housing conditions and access to technology.

For youth development and education, the framework suggests moving beyond awareness-raising as the principal measure of success. Educational institutions can support environmental literacy, critical inquiry, collaborative problem-solving and opportunities to engage with community concerns. Youth participation should be designed as a meaningful process rather than a symbolic activity. Students and young people should be able to understand how decisions are made, communicate local concerns and receive feedback from the organisations responsible for responding.

The multi-ethnic and multi-community context of Malaysia also makes inclusion an important analytical concern. Shared environmental challenges may create opportunities for cooperation, but common exposure should not be assumed to produce equal vulnerability or identical priorities. Inclusive resilience initiatives should recognise different forms of local knowledge, language, livelihood and access to decision-making. Social cohesion is strengthened not by overlooking difference but by creating fair opportunities for different groups to contribute and benefit.

At institutional level, the framework highlights the need for coordination across sectors and levels of governance. Environmental agencies, local authorities, education providers, social development institutions and community organisations may hold different responsibilities and resources. Resilience initiatives are more likely to be sustained when these responsibilities are clear, information is accessible and community participation is linked to decisions and resources. This approach also connects environmental planning with population well-being, family support and sustainable development.

Demographic and household diversity in Malaysia

In Malaysia, the framework should be applied with attention to variation across states, districts and settlement types rather than treating the national population as a single risk category. Urban residents may face heat exposure, flash flooding, drainage constraints and unequal access to green space; rural and agricultural communities may be more directly affected by changing rainfall, water availability, crop conditions and transport access; coastal communities may experience shoreline change, erosion and livelihood pressures. These are analytical examples, not claims that every household in a given location experiences the same risk. National policy and climate assessments identify floods, heat stress, sea-level rise, water security, agriculture, infrastructure and public health as material concerns for Malaysia (Ministry of Natural Resources and Environmental Sustainability [NRES], 2024; OECD, 2026; World Bank, 2026).

Malaysia's multi-ethnic and culturally diverse setting also requires recognition of differences in language, livelihood, local ecological knowledge and relationships with place. Indigenous communities, including Orang Asli and Indigenous peoples of Sabah and Sarawak, should not be treated as a homogeneous category; their knowledge, land relationships and participation rights require context-specific engagement. Migrant workers, refugees and people in informal or insecure housing may face barriers to warnings, assistance, healthcare or recovery support. The framework therefore asks researchers and institutions to identify who is missing from official data and consultation processes, and whether programme eligibility rules reproduce exclusion. These dimensions should be substantiated with locality-specific evidence in empirical applications.

Family arrangements are similarly diverse. In addition to nuclear households, Malaysian communities include extended and multigenerational families, single-parent households, older people living alone, households with migrant members and families whose members work or study across districts or states. Preparedness depends not simply on family size but on who provides care, who controls resources, who can receive and act on warnings, and how responsibilities are negotiated. Family-oriented interventions should therefore accommodate different household compositions, disability-related support needs, language preferences and access to digital communication.

Institutional accountability and multilevel implementation in Malaysia

Malaysia's National Climate Change Policy 2.0 provides an important national policy context for linking climate resilience, low-carbon development, governance and intergenerational responsibility (NRES, 2024). The policy context should not be confused with evidence that implementation is already equitable or effective. IPER directs attention to the translation of national commitments into state, local-authority, school, university and community-level action. Institutional accountability can be examined through clarity of mandates, coordination across agencies, transparency of risk information and budgets, the accessibility of public services, the responsiveness of complaint mechanisms and evidence that community input changes decisions. Recent national and international assessments also emphasise the importance of institutional capacity and coordinated implementation for Malaysia's climate response (OECD, 2026; World Bank, 2026).

A practical implementation pathway can proceed in five linked stages. First, conduct a participatory diagnosis of local hazards, population composition, household structures, service access and existing community resources. Second, map institutional mandates and identify gaps in information, infrastructure, finance, care provision and participation. Third, co-design interventions with young people, caregivers, community organisations and relevant agencies, ensuring representation of groups facing barriers. Fourth, implement integrated actions such as accessible early-warning communication, school and community preparedness, intergenerational learning, continuity-of-care planning and targeted infrastructure or service improvements. Fifth, monitor outcomes using disaggregated indicators, publish institutional responses and revise programmes through periodic community feedback. The stages are iterative rather than strictly sequential and should be adapted to the hazard, locality and available institutional capacity.

Linking IPER to the Sustainable Development Goals

The framework has its strongest conceptual alignment with six SDGs. SDG 4 (Quality Education), especially Target 4.7, is relevant to environmental literacy, education for sustainable development and youth capabilities. SDG 10 (Reduced Inequalities) is reflected in the analysis of unequal exposure, access to resources and participation. SDG 11 (Sustainable Cities and Communities) connects to inclusive settlement planning, disaster-risk reduction and resilient local infrastructure. SDG 13 (Climate Action) relates to adaptation, preparedness and climate-resilient development. SDG 16 (Peace, Justice and Strong Institutions) supports transparent, inclusive and accountable decision-making. SDG 17 (Partnerships for the Goals) highlights coordination among government, educational institutions, civil society, communities and the private sector (United Nations, 2015). These links are complementary rather than interchangeable: SDG alignment should be demonstrated through programme objectives, indicators, budgets and reporting, not merely by citing goal numbers.

The SDG mapping is intended as an analytical bridge between the IPER domains and development commitments. It does not imply that all six goals are equally central to every application; local diagnosis should identify the most relevant targets and indicators.

SDG	Connection to IPER	Illustrative implementation evidence
SDG 4 – Quality Education	Environmental literacy, youth capabilities and education for sustainable development.	Curriculum integration; youth environmental projects; equitable participation in learning.
SDG 10 – Reduced Inequalities	Differentiated exposure, adaptive resources and recognition of	Disaggregated access and outcome data; targeted support; participation audits.

	underserved groups.	
SDG 11 – Sustainable Cities and Communities	Resilient settlements, local preparedness and inclusive planning.	Local risk plans; accessible infrastructure; community involvement in resilience planning.
SDG 13 – Climate Action	Climate adaptation, preparedness and intergenerational responsibility.	Adaptation measures; early-warning reach; household and community preparedness.
SDG 16 – Peace, Justice and Strong Institutions	Transparency, responsiveness, participation and accountability.	Published decisions; grievance mechanisms; response tracking; budget transparency.
SDG 17 – Partnerships for the Goals	Coordination across agencies, universities, communities and civil society.	Formal partnerships; shared data; joint programmes; documented community feedback.

THEORETICAL CONTRIBUTIONS AND POLICY IMPLICATIONS

The first contribution of the IPER Framework is to extend the analysis of social–ecological resilience by making intergenerational relationships explicit. Resilience scholarship already recognises social learning, networks, leadership and adaptive governance as important processes (Folke, 2006; Folke et al., 2010). The present framework draws attention to the ways in which these processes are sustained through family and community relationships and through exchanges between generations. Intergenerational learning is not an additional outcome placed at the edge of resilience; it is one of the processes through which knowledge, preparedness and collective capacity may be reproduced or transformed.

The second contribution is to conceptualise youth agency as a mechanism connecting social levels. Young people are not only recipients of environmental education or a population group at risk. They can interpret information, communicate concerns, connect peers and families, and participate in local and institutional processes. Yet agency is relational: it depends on recognition, resources, opportunities and institutional response. This formulation avoids both extremes of treating youth as powerless victims and assigning them disproportionate responsibility for solving structural environmental problems.

The third contribution is to place institutional accountability within the same conceptual model as household and community capacity. Resilience initiatives may become inequitable when they emphasise self-help without addressing unequal exposure, inadequate infrastructure or limited access to services. By including institutional enabling capacity as a core domain, the framework makes clear that responsibility must be differentiated according to power, mandate and control over risk-producing decisions. Resilience should be assessed by whether it reduces vulnerability and expands fair participation, not merely by whether communities can endure repeated disruption.

Educational policy and practice can use the framework to connect environmental learning with civic participation and community problem-solving. Learning activities may involve local risk mapping, intergenerational dialogue, community-based projects and structured engagement with relevant agencies. Such activities should be inclusive and appropriately supported. Evaluation should consider whether young people develop the knowledge and confidence to participate, whether they can access decision-making spaces and whether institutions respond to their contributions.

Family-oriented programmes can integrate environmental preparedness with wider concerns about health, care, housing and community well-being. Intergenerational activities may encourage households to discuss risks, identify available support and share practical knowledge. Community organisations can provide spaces for mutual learning and coordination. However, programmes should avoid implying that household-level behaviour alone can address environmental problems shaped by land-use decisions, infrastructure deficits or wider economic processes.

Public institutions can apply the framework by identifying how their policies affect each domain. This includes ensuring that risk information is accessible, public services are responsive, local participation is meaningful

and resources reach groups facing greater constraints. Cross-sector coordination is particularly important where environmental risks affect health, education, housing, livelihoods and social protection simultaneously. Institutional accountability also requires transparent communication about the limits of available resources and the actions being taken to address identified concerns.

LIMITATIONS AND FUTURE RESEARCH

The operational dimensions and indicators proposed here are sensitising devices for empirical inquiry, not validated scales or a claim that all domains can be reduced to a single composite score. Their reliability, cultural and linguistic appropriateness, and predictive or explanatory value must be tested in different Malaysian populations and settings.

As a conceptual paper, this article does not test the relationships proposed in the IPER Framework. The framework is a theoretically informed synthesis and should be treated as a set of analytical propositions rather than an empirically validated model. Its domains may require refinement when applied to particular environmental hazards, population groups or institutional settings. The paper also does not claim to provide a systematic review of all scholarship on resilience, youth participation or family adaptation.

Future research could examine how the four domains interact in specific Malaysian contexts, including urban neighbourhoods, rural settlements and communities exposed to different environmental pressures. Comparative studies could explore how household resources, community networks and institutional arrangements shape differences in preparedness and adaptive capacity. Research involving young people and older family members could investigate reciprocal learning, youth participation and the conditions under which knowledge is translated into collective action.

Longitudinal research would be particularly valuable for examining whether intergenerational learning and youth participation contribute to sustained changes in preparedness and institutional practice. Mixed-methods studies could combine household-level measures with interviews, community mapping and analysis of policy processes. Researchers should also develop context-sensitive indicators that distinguish coping, adaptation and transformation, and assess whether resilience initiatives reduce or reproduce inequalities.

Further conceptual work should examine how the framework relates to environmental justice, gender, disability, migration, livelihood security and the distribution of care responsibilities. These dimensions may influence who is able to participate, whose knowledge is recognised and who bears the costs of environmental change. Such work would help ensure that population–environment resilience remains attentive to power and social difference.

CONCLUSION

This paper has proposed the Intergenerational Population-Environment Resilience (IPER) Framework as a multilevel conceptual approach to understanding the relationships between environmental change, population well-being, youth agency, family and community capacities, and institutional responsibility. Drawing on social–ecological resilience, ecological systems perspectives and human agency scholarship, it argues that resilience is not an individual attribute or a simple return to normality after disruption. It is a dynamic and unequally distributed capacity produced through interactions among ecological conditions, social resources, intergenerational relationships and institutions. The framework identifies four connected domains: environmental risk and structural conditions; household and community adaptive resources; youth agency and intergenerational learning; and institutional enabling capacity and accountability. Their interaction shapes preparedness and adaptive capacity, social inclusion and cohesion, and the continuity of well-being across generations. By placing youth and families within a wider institutional and ecological system, the framework recognises their contributions without transferring to them responsibilities that properly belong to public and other powerful institutions. For Malaysia, the IPER Framework offers a conceptual basis for connecting environmental sustainability with youth development, family well-being, community resilience and inclusive governance. Its central proposition is that sustainable population–environment resilience requires more than

awareness or individual commitment. It depends on reciprocal learning, equitable access to adaptive resources, meaningful participation and institutions that are accountable for enabling and protecting the conditions of present and future well-being.

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ETHICAL CONSIDERATIONS

This is a theoretical and conceptual paper based on published literature and does not report original research involving human participants. Accordingly, no human-participant ethics approval or informed-consent procedure applies to the work presented in this manuscript.

DATA AVAILABILITY

No original dataset was generated or analysed for this conceptual paper.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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