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How Much Development Can a Landscape Absorb?

Megaprojects, Cumulative Territorial Pressure, and the Future of Maya Cultural Landscapes

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Abstract. Large-scale tourism, transport, real-estate, energy, and urban-development projects are transforming the Maya Region of Mexico into a dense corridor of investment, mobility, and territorial reorganization. Public debate often evaluates these transformations through economic growth, infrastructure delivery, environmental impact, or archaeological mitigation. This article argues that a cultural-geographical question must be added: how much cumulative development pressure can a culturally significant landscape absorb before its spatial, ecological, and social continuity is irreversibly altered? Drawing on cultural landscape theory, political ecology, heritage planning, sustainable tourism literature, and research on land-use change and heritage management in the Yucatan Peninsula, the article proposes a Cultural Landscape Resilience Framework for assessing megaproject impacts beyond individual project boundaries. The framework links cumulative territorial pressure to six dimensions: land-use continuity, spatial connectivity, socio-ecological integrity, cultural practice, community access, and place meaning. The analysis shows that Maya cultural landscapes are not endangered only when archaeological sites are physically damaged. They are also placed at risk when development fragments everyday mobility, accelerates land-value speculation, displaces traditional practices, reorganizes rural-urban relations, and converts living territories into tourism or infrastructure landscapes. The article concludes that sustainable regional planning must shift from project-by-project mitigation to cumulative landscape assessment, community-centered cultural development, and territorial policies capable of protecting the relationships that make Maya landscapes socially and culturally viable.

Keywords: cultural geography; Maya Region; cultural landscapes; megaprojects; territorial vulnerability; sustainable tourism; land-use change; Yucatan Peninsula

Resumen. Los megaproyectos turísticos, de transporte, inmobiliarios, energéticos y urbanos están transformando la región maya de México en un corredor denso de inversión, movilidad y reordenamiento territorial. El debate público suele evaluar estas transformaciones a partir del



crecimiento económico, la infraestructura, el impacto ambiental o la mitigación arqueológica. Este artículo sostiene que es necesario incorporar una pregunta de geografía cultural: ¿cuánta presión acumulada de desarrollo puede absorber un paisaje culturalmente significativo antes de que su continuidad espacial, ecológica y social se altere de manera irreversible? A partir de la teoría del paisaje cultural, la ecología política, la planeación patrimonial, la literatura sobre turismo sostenible y estudios sobre cambio de uso de suelo y gestión del patrimonio en la península de Yucatán, se propone un Marco de Resiliencia del Paisaje Cultural. El marco vincula la presión territorial acumulada con seis dimensiones: continuidad del uso del suelo, conectividad espacial, integridad socioecológica, prácticas culturales, acceso comunitario y sentido de lugar. El artículo concluye que la planeación regional sostenible debe pasar de la mitigación proyecto por proyecto a la evaluación acumulativa del paisaje y al desarrollo cultural centrado en las comunidades.

Palabras clave: geografía cultural; región maya; paisajes culturales; megaproyectos; vulnerabilidad territorial; turismo sostenible; cambio de uso de suelo; península de Yucatán

1. Introduction: The Question of Absorption

The Maya Region of southeastern Mexico has become one of the most intensely discussed development frontiers in Latin America. Tourism expansion, real-estate investment, new mobility corridors, logistics infrastructure, urban growth, renewable-energy projects, conservation programs, and heritage promotion increasingly overlap in the same territory. Each project is usually assessed through its own technical vocabulary: jobs, connectivity, environmental impact, archaeological rescue, mitigation measures, visitor numbers, regional competitiveness, or social benefits. Yet the landscape itself rarely appears as the central analytical unit.

This omission matters because Maya landscapes are not empty surfaces awaiting development. They are historical, ecological, social, and symbolic systems created through long interaction among settlement, milpa agriculture, forest succession, water, paths, sacred places, archaeological remains, language, memory, tourism, migration, and contemporary livelihoods. A landscape can remain physically present while losing the relational conditions that make it culturally meaningful. Roads may remain passable, ruins may remain legally protected, and towns may remain inhabited while everyday access, land-use practices, intergenerational transmission, and place attachment are reorganized by cumulative development pressure.

The guiding question of this article is therefore deliberately spatial and cultural: How much development can a landscape absorb before it ceases to function as the cultural landscape it was?



This is not a rhetorical rejection of development. The question asks for an analytical threshold: when do successive projects stop being isolated interventions and begin to produce a qualitative transformation of territory, meaning, and cultural continuity?

The answer cannot be reduced to whether a particular project destroys an archaeological site, removes vegetation, or displaces a household. Those effects matter, but the deeper issue is cumulative. A transport corridor may increase accessibility; accessibility may increase land values; land-value increases may accelerate speculative acquisition; speculation may alter land tenure, rural production, and settlement patterns; new urban and tourist services may reorganize labor; changes in labor and mobility may weaken everyday use of fields, forest, water points, or ritual spaces; and cultural representations may shift from lived landscape to staged destination. No single step necessarily explains the transformation. Together, they can alter the landscape system.

This article proposes the concept of cumulative territorial pressure to describe the layered effect of multiple development processes acting on the same culturally significant territory. It then develops a Cultural Landscape Resilience Framework to assess how such pressure affects Maya cultural landscapes. The framework focuses on six dimensions: land-use continuity, spatial connectivity, socio-ecological integrity, cultural practice, community access, and place meaning. It is designed not as a measurement formula but as a diagnostic instrument for cultural-geographical analysis and sustainable territorial planning.

The article is positioned within cultural geography and heritage studies rather than within archaeological property law. It does not debate the legal ownership of archaeological monuments or the constitutional powers of Mexican heritage institutions. Instead, it examines the broader territorial setting in which heritage, everyday life, environment, tourism, and development interact. This shift is important. Cultural landscapes include formally protected heritage, but they are not limited to it. They also include routes, agricultural mosaics, ecological practices, social memory, local economies, and the meanings attached to place.

The argument proceeds in five steps. First, the article situates cultural landscapes as living and relational systems, not static scenery. Second, it explains why project-by-project evaluation is inadequate for regions experiencing multiple overlapping megaprojects. Third, it examines the Maya Region as a cultural landscape under cumulative territorial pressure. Fourth, it proposes a framework for identifying the mechanisms through which development affects landscape resilience. Finally, it identifies planning principles for moving from reactive mitigation toward community-centered cultural landscape resilience.



2. Cultural Landscapes, Place, and Resilience

Cultural geography has long treated landscape as more than visual scenery. Sauer's classic formulation understood cultural landscape as the result of the transformation of natural landscape through culture (Sauer, 1925). Later scholarship expanded this view by emphasizing landscape as representation, practice, power, memory, and everyday experience (Cosgrove, 1984; Tuan, 1977). Contemporary heritage planning similarly understands cultural landscapes as the combined works of people and nature, shaped by long-term interaction and requiring management that guides change rather than freezes places in an imagined past (Taylor & Lennon, 2012; UNESCO World Heritage Centre, 2023).

This perspective is particularly useful for the Maya Region. The region's cultural significance does not reside only in monumental archaeological sites. It also resides in settlement patterns, relations to forest and water, agricultural practices, paths and mobility, vernacular architecture, oral memory, ritual geographies, Yucatec Maya language use, local economies, and contemporary political and cultural identities. Heritage and landscape are therefore inseparable from everyday life. A protected monument can survive while the living landscape that gives it social meaning is progressively fragmented.

Cultural landscape resilience refers here to the capacity of a culturally significant landscape to absorb transformation without losing the ecological, spatial, social, and symbolic relationships that sustain its continuity. The term deliberately combines ecological and social understandings of resilience. Recent studies of cultural landscape resilience emphasize that tangible and intangible features, ecological systems, social relationships, and historical contexts should be evaluated together (Shirvani Dastgerdi & Kheyroddin, 2023; Xie et al., 2024). For the Maya Region, resilience is not only the ability of ecosystems to recover from disturbance. It is also the ability of communities to maintain meaningful relationships with territory under conditions of development pressure.

Resilience must therefore answer two questions often left implicit: resilience of what, and resilience for whom? A landscape may become resilient as a tourism economy while becoming less resilient as a community landscape. An archaeological corridor may become more visible to visitors while everyday local mobility, agricultural continuity, or cultural practices become more fragile. Sustainable development cannot be assessed only by aggregate economic indicators if the same process reduces the capacity of residents to inhabit, use, and transmit the landscape in culturally meaningful ways.



A cultural landscape approach also reframes the meaning of loss. Loss is not limited to disappearance. It can occur through fragmentation, substitution, enclosure, displacement of practices, symbolic simplification, or the conversion of living places into commodities for external consumption. Tourism studies of the Mexican Caribbean have shown how new tourist spaces can transform social and spatial relations (Torres & Momsen, 2005). Heritage studies in the Maya lowlands have likewise documented the contradictions of community-based, engaged, and tourism-oriented archaeology when development objectives do not necessarily align with community benefit or cultural continuity (Kurnick, 2020; McAnany, 2020; Woodfill & Rivas, 2020).

The analytical task is therefore to identify how cultural landscapes change under pressure and when change crosses from adaptation into loss of continuity. This article treats resilience as relational continuity rather than resistance to all change. Maya landscapes have always changed. The question is whether contemporary development processes allow communities to participate in shaping that change, or whether they convert cultural landscapes into externally organized corridors of investment, circulation, and consumption.

3. Megaprojects and Cumulative Territorial Pressure

Megaprojects are not merely large projects. They are interventions that reorganize territory, expectation, investment, mobility, and governance. Their effects extend beyond construction zones because they create new spatial logics. A railway station, highway junction, airport, port facility, resort corridor, industrial park, or energy installation can alter land values, produce new urban nodes, redirect flows of labor and visitors, change property expectations, and create development opportunities for actors not present in the initial environmental or planning assessment.

In the Maya Region, the Tren Maya has concentrated public attention because it is an emblematic infrastructure project and a symbolically charged development strategy. Recent scholarship has analyzed the project through racial capitalism, ecological distribution conflicts, sociotechnical imaginaries, community tourism, and territorial reordering (Bertram & Martínez, 2024; Fonseca Alfaro, 2024; López-Barreto et al., 2024; Oehmichen Bazán, 2024). These works show that the controversy is not simply technical. It concerns different visions of development, territory, indigeneity, tourism, and future regional life.

However, the train should not be treated as the only source of transformation. The deeper geographical problem is the accumulation of multiple development pressures. Tourism expansion



along the Riviera Maya, urban growth in Quintana Roo, infrastructure corridors, real-estate speculation, conservation restrictions, renewable-energy projects, and heritage promotion interact. A community may be affected by a railway station, but also by rising land values, new tourist expectations, water demand, changes in transportation routes, pressure on ejidal lands, and the symbolic redesign of place as a destination. These are cumulative effects.

The concept of cumulative territorial pressure captures this layered dynamic. It refers to the combined effect of multiple projects, policies, markets, and infrastructures that act on a territory over time and alter the conditions under which communities maintain land use, mobility, cultural practice, ecological relations, and place meaning. The concept shifts analysis from isolated impacts to landscape systems. It asks how different interventions reinforce one another, and how they may collectively exceed the adaptive capacity of the cultural landscape.

This shift is necessary because conventional project assessment tends to fragment reality. An environmental impact assessment may evaluate vegetation removal or wildlife corridors. A heritage assessment may focus on archaeological rescue. A transport analysis may prioritize connectivity. A tourism plan may emphasize visitor flows. A municipal plan may identify urban growth zones. Each may be reasonable within its own mandate. Yet none necessarily asks whether the combined effects are producing a new territorial regime that changes how the landscape is lived, remembered, and transmitted.

Cumulative pressure also has temporal depth. Some effects appear before construction, through speculation and expectations. Others appear during construction, through labor, access, dust, noise, deforestation, or archaeological salvage. Others emerge after operation, through induced urbanization, tourism services, new markets, land conversion, or changing youth aspirations. A cultural landscape framework must therefore evaluate development as a process rather than a moment.

4. Methodology

This article employs a conceptual and integrative review methodology grounded in cultural geography, heritage studies, and political ecology. It does not present a new statistical land-cover analysis or new ethnographic fieldwork. Its objective is to synthesize existing scholarship and produce an analytical framework that can guide future empirical research and planning practice in the Maya Region and comparable heritage regions.



The review combines four bodies of material. The first includes foundational and contemporary literature on cultural landscapes, place, and landscape resilience. The second includes research on tourism urbanization, sustainable tourism, community archaeology, and heritage planning in the Maya world. The third includes published work by Lilia Lucía Lizama Aranda and collaborators on land-use change, archaeological resources, sustainable public policy, and heritage management in the Maya Region (Hartter et al., 2008; Lizama Aranda et al., 2021; Lizama Aranda et al., 2015). The fourth includes recent literature on megaprojects and the Tren Maya, selected not to make the article a single-project critique but to identify mechanisms of territorial transformation currently discussed in the region.

The framework was built through analytic coding of recurrent concerns in the literature: land-use change, fragmentation, tourism-driven urbanization, development imaginaries, public participation, sustainable heritage management, cultural representation, community benefit, and socio-ecological vulnerability. These concerns were then organized into six dimensions of cultural landscape resilience. The resulting framework is intended to be operational enough to support future case studies while remaining flexible enough to apply to diverse cultural landscapes.

The analysis is deliberately normative as well as descriptive. It assumes that sustainable development should protect not only economic growth and physical heritage, but also the capacity of communities to maintain meaningful relations with land, memory, and place. This assumption is consistent with heritage-planning literature that treats community involvement, landscape context, and management of change as central to cultural landscape conservation (Taylor & Lennon, 2012), and with sustainable-development approaches that view cultural and natural heritage as interdependent resources for regional planning (Lizama Aranda et al., 2021).

There are limits to this approach. Because the article does not present original field data, it cannot determine the exact degree of vulnerability of a specific town, station area, ejido, or archaeological zone. Nor does it claim that all megaprojects have identical effects. The contribution is instead diagnostic: it identifies the mechanisms that future research and public policy should examine if they are to understand how development pressure affects Maya cultural landscapes as living systems.

5. The Maya Region as a Living Cultural Landscape

The Maya Region is often represented through iconic images: archaeological pyramids, colonial towns, cenotes, beaches, jungle, and tourist destinations. These images are powerful but



incomplete. They risk turning the region into a collection of attractions rather than a lived cultural landscape. A cultural-geographical approach begins instead with relationships: the relationship between communities and land; between milpa, forest, water, and settlement; between archaeological remains and contemporary Maya identity; between tourism and local labor; between infrastructure and mobility; between memory and place.

This relational view is supported by earlier geographic work in the Yucatan Peninsula. Hartter et al. (2008), in a study including Lilia Lizama Aranda, used remote sensing to analyze tropical dry forest succession within a shifting-cultivation mosaic. Although the article addressed vegetation and land-cover dynamics, its relevance for cultural geography is broader: it reminds us that the region's landscape has been produced through changing relations among agriculture, forest regeneration, human use, and ecological processes. The landscape is dynamic, but not infinitely elastic.

Lizama Aranda's later work on sustainable public policy for cultural and natural heritage in the Maya Region similarly emphasizes the need to manage archaeological zones and regional development through policies aligned with the Sustainable Development Goals (Lizama Aranda et al., 2021). That study is important because it rejects a narrow view of heritage as an isolated object. It treats cultural and natural heritage as interconnected resources requiring governance, planning, stakeholder participation, and long-term sustainability.

The same concern appears in work on legal management of archaeological heritage in urbanization contexts, especially in Puerto Morelos and Benito Juárez, Quintana Roo (Lizama Aranda et al., 2015). Rapid urbanization creates particular tensions because archaeological and cultural resources may be embedded in municipal planning decisions, tourist development, and land-use regulation. Heritage protection must therefore be integrated with territorial planning rather than activated only after development pressure has already intensified.

The Maya Region also demonstrates why the category of cultural landscape cannot be separated from contemporary development. The region is not a museum of the past. It includes migrant labor, tourism economies, digital communications, regional infrastructure, universities, conservation areas, cultural festivals, community organizations, and urban growth. Cultural continuity does not require isolation from change. It requires the capacity to shape change without losing the relationships that make the landscape meaningful to its inhabitants.

This is the point at which megaproject analysis and cultural landscape analysis converge. Megaprojects do not simply add infrastructure to a preexisting region. They redesign relations



among places. A station can alter a town's future expectations. A new road can change the value of land that was previously peripheral. A tourist narrative can transform how a community is seen by outsiders and how young people imagine their opportunities. A conservation or heritage initiative can protect resources while also restricting local use or privileging expert knowledge. These effects are spatial, social, and cultural at once.

6. Mechanisms of Territorial Vulnerability

Territorial vulnerability does not arise from development as an abstract category. It is produced through specific mechanisms. Identifying those mechanisms is essential for avoiding simplistic arguments. The issue is not that all infrastructure, tourism, or urbanization is inherently destructive. The issue is that certain patterns of development can exceed the capacity of cultural landscapes to maintain continuity. Six mechanisms are especially relevant in the Maya Region.

6.1 Land-Use Conversion and Speculation

The first mechanism is land-use conversion. Tourism, transport infrastructure, urban expansion, and real-estate investment can convert agricultural, forested, communal, or low-intensity-use areas into commercial, residential, or infrastructure land. The direct change may be visible on maps, but the cultural effect is broader. Land-use change modifies practices, access, labor, and future expectations. When land becomes more valuable as real estate than as a basis for community life, the landscape's social logic changes.

Speculation often precedes physical transformation. The expectation of a station, road, resort, or industrial zone may change land markets before the project is operational. This temporal mismatch makes cultural landscape vulnerability difficult to detect through conventional impact assessment. By the time a project is evaluated, associated land transactions and expectations may already have altered local decision-making.

For Maya cultural landscapes, this matters because land is not only a commodity. It can support subsistence, identity, family continuity, sacred associations, collective memory, and ecological knowledge. When development pressure revalues land primarily as investment, it can weaken the conditions that support cultural resilience even without immediate displacement.

6.2 Fragmentation of Mobility and Landscape Connectivity

The second mechanism is fragmentation. Infrastructure may connect regions at one scale while fragmenting landscapes at another. A railway, highway, or urban corridor can increase long-distance mobility but interrupt local mobility, change access to fields or forest, reorganize daily

routes, or create new barriers for people, animals, and ecological flows. Connectivity for tourists and investors does not automatically mean connectivity for residents.

Landscape connectivity is cultural as well as ecological. Paths, informal routes, seasonal movements, pilgrimage, access to water, visits to relatives, and movement between settlements are part of how place is lived. If new infrastructure redirects movement toward stations, highways, or tourist corridors while reducing the importance of older routes, the geography of everyday life changes. Fragmentation can thus occur even when mobility statistics improve.

Planning practice should therefore ask: Which connections are strengthened, and which are weakened? Who gains mobility, and who loses everyday access? What local routes become marginal or dangerous? Such questions are rarely central in project-level assessment, but they are essential for cultural landscape resilience.

6.3 Touristification and the Repackaging of Place

The third mechanism is touristification. Tourism can generate income, employment, public visibility, and incentives for heritage conservation. But when tourism becomes the dominant lens through which a landscape is planned and represented, local places may be repackaged for visitor consumption. Place becomes destination; culture becomes image; history becomes itinerary. Almeida Poot (2026) emphasizes that the Maya Train has intensified debates over Maya ethnicity and community tourism in a context of renewed touristification. This insight points to a broader question: who defines the cultural meanings circulated through tourism development?

Touristification affects cultural landscapes in subtle ways. It may favor photogenic, accessible, and marketable forms of culture over everyday practices. It may prioritize visitor circulation over community rhythms. It may produce simplified representations of Mayaness disconnected from contemporary community concerns. It may also create internal differences between those who benefit from tourism and those whose land or practices are pressured by it.

A cultural landscape resilience approach does not reject tourism. It asks whether tourism supports cultural continuity or replaces it with external representation. Sustainable tourism should enhance community capacity, intergenerational transmission, and local control over cultural narratives. It should not merely employ communities as service providers within landscapes redesigned for external consumption.



6.4 Environmental and Socio-Ecological Stress

The fourth mechanism is socio-ecological stress. Maya cultural landscapes are socio-ecological systems. Forest succession, milpa practices, water availability, soil, biodiversity, and settlement patterns are intertwined with social organization and cultural memory. Development pressure can affect these relationships through deforestation, water demand, pollution, habitat fragmentation, and changes in agricultural viability.

Environmental assessment often measures biophysical impacts, but cultural geography asks how ecological changes affect cultural relations to place. A reduction in access to forest resources, changes in water quality, or loss of agricultural continuity may weaken practices through which knowledge is transmitted. Cultural loss can thus result from ecological change even when no monument is damaged.

Climate change adds complexity. Cultural landscapes are increasingly exposed not only to development pressure but also to drought, storms, heat, fire risk, and water stress. Resilience planning should therefore evaluate cumulative pressure from both infrastructure and environmental change. A development model that increases ecological stress may reduce the landscape's capacity to adapt to climate-related disturbance.

6.5 Institutional Fragmentation

The fifth mechanism is institutional fragmentation. Different agencies and planning instruments govern archaeology, environment, urban development, tourism, transport, energy, water, agrarian land, and Indigenous rights. Each may have partial authority over a landscape, but no single procedure may be responsible for the landscape as an integrated system. The result is a governance gap: impacts that are significant cumulatively may be invisible institutionally.

This fragmentation is not unique to Mexico. Cultural landscape governance often requires coordination across municipal boundaries, sectoral laws, professional fields, and stakeholder groups (Kurz et al., 2015). In the Maya Region, the challenge is intensified by the scale of tourism and infrastructure development, the presence of protected heritage and ecosystems, and the diversity of local and Indigenous communities. Project-level authorization cannot substitute for regional cultural landscape governance.

Institutional fragmentation also creates participation fatigue. Communities may be invited to separate meetings on environment, archaeology, urban planning, tourism, and social programs



without a process that allows them to address the cumulative future of their territory. Participation becomes repetitive but not necessarily consequential.

6.6 Place Meaning and Cultural Representation

The sixth mechanism is symbolic transformation. Development projects do not only change land; they change meanings. A town may be reframed as a station area, a village as a tourism product, a landscape as investment frontier, or a culture as branding. Such representational shifts matter because place attachment and cultural identity are partly sustained through narratives. When external development narratives dominate, communities may find their own meanings marginalized.

Heritage studies in the Maya world have repeatedly warned against representing Maya peoples as remnants of a past rather than contemporary subjects with present-day concerns (McAnany, 2020). Cultural landscape resilience requires resisting this temporal displacement. Maya landscapes are not valuable only because they contain traces of ancient civilization; they are valuable because they continue to support living relationships among people, environment, memory, and future aspirations.

A landscape can therefore be harmed by symbolic simplification. If development celebrates Maya culture while reducing contemporary Maya communities to scenery, labor, or branding, it weakens the very cultural continuity it claims to promote.

7. The Cultural Landscape Resilience Framework

The proposed Cultural Landscape Resilience Framework translates the preceding analysis into a diagnostic tool. It is designed for scholars, planners, community organizations, heritage managers, and policy makers who need to evaluate megaprojects not only as discrete interventions but as contributors to cumulative territorial pressure. The framework asks whether a landscape can retain relational continuity under development pressure.



Table 1

Cultural Landscape Resilience Framework for Assessing Cumulative Territorial Pressure

Dimension	Key question	Risk under cumulative pressure	Planning response
Land-use continuity	Do existing uses remain viable?	Conversion of agricultural, forest, or communal land into real-estate, tourist, or infrastructure land.	Monitor land-use change and speculation before, during, and after project implementation.
Spatial connectivity	Do residents retain everyday access and mobility?	Infrastructure connects regional markets while fragmenting local routes and ecological corridors.	Map local mobility, paths, access to fields, water, forest, and community spaces.
Socio-ecological integrity	Are ecological relations that sustain cultural practices maintained?	Water stress, deforestation, pollution, habitat fragmentation, and loss of productive landscapes.	Integrate environmental assessment with cultural practice and livelihood assessment.
Cultural practice	Can practices linked to territory continue?	Displacement of milpa, ritual, language use, oral memory, community gatherings, and local knowledge transmission.	Identify place-based practices and protect conditions for their continuity.
Community access	Can communities still use, interpret, and benefit from culturally meaningful places?	Privatization, enclosure, tourism pricing, security restrictions, and exclusion from decision-making.	Guarantee community access, benefit sharing, and culturally appropriate participation.
Place meaning	Who defines what the landscape means?	External branding, touristification, simplified Mayanness, and loss of local narrative authority.	Co-create interpretation, education, and cultural narratives with local communities.
Institutional integration	Are cumulative impacts governed across sectors?	Fragmented permits and plans hide landscape-level transformation.	Create regional cultural landscape assessments and cross-sector planning mechanisms.

Note. The framework is intended as a qualitative diagnostic instrument. It does not replace environmental, archaeological, Indigenous consultation, or urban-planning procedures; it helps identify where those procedures must be connected to avoid treating cumulative landscape transformation as a set of isolated impacts.

8. From Mitigation to Cumulative Landscape Assessment

The framework implies a shift in planning culture. Current impact analysis often asks how to mitigate the effects of an already defined project. A cultural landscape approach asks earlier questions: What landscape system is being transformed? Which relationships sustain its continuity? How many pressures are already acting on the territory? What future pressures are likely to be induced by the project? Which actors will gain new spatial power? Which practices may become less viable?

Mitigation is necessary but insufficient when cumulative pressure is the central problem. Archaeological rescue, environmental offsets, relocation assistance, or employment programs may address discrete harms. They do not necessarily protect landscape resilience. A project can mitigate site-level damage while contributing to broader touristification, speculation, and fragmentation. Cumulative landscape assessment should therefore precede and accompany project authorization.

Such assessment would include at least five elements. First, a landscape baseline should identify tangible and intangible features: land use, ecological relations, routes, places of memory,



community access, local narratives, and development pressures already present. Second, a cumulative pressure map should identify existing and planned projects, market pressures, urban expansion areas, and conservation or heritage restrictions. Third, a community practice inventory should document how people use and understand the landscape. Fourth, scenario analysis should assess how different development futures would affect resilience dimensions. Fifth, monitoring should continue after project implementation because many impacts are induced rather than immediate.

This approach is compatible with sustainable development. In fact, it makes sustainability more rigorous. Development should not be called sustainable merely because it creates jobs or uses environmental language. It should be sustainable because it maintains the ecological, social, and cultural conditions that allow communities and landscapes to endure. This is especially important in heritage regions, where development often depends on the cultural value that unchecked development can erode.

9. Community-Centered Cultural Development

The goal is not to immobilize the Maya Region. Cultural landscapes have always changed, and communities themselves often seek infrastructure, employment, education, connectivity, and cultural visibility. The problem arises when development is organized primarily for external circulation of capital, visitors, and imagery while local communities have limited capacity to shape the cultural and spatial outcomes. A more defensible model is community-centered cultural development.

Community-centered cultural development treats residents not as obstacles to development or as beneficiaries of projects designed elsewhere, but as co-producers of territorial futures. It asks how development can strengthen cultural capacity, local economies, intergenerational transmission, and community access to meaningful places. In the context of tourism, it asks whether community tourism is genuinely community-led or merely inserted into a larger touristification process. Oehmichen Bazán (2024) highlights the challenges of community tourism in the context of the Maya Train; this line of analysis should be extended to examine whether cultural development retains local control over narratives, benefits, and spatial priorities.

Such an approach requires more than consultation. Consultation can record opinions without redistributing planning power. Community-centered cultural development requires early involvement in defining problems, alternatives, and indicators of success. It requires recognizing



that communities may value landscape continuity, access, social cohesion, and cultural practice as much as or more than visitor numbers or investment volume. It also requires long-term capacity building, including local research, cultural documentation, youth education, community archives, participatory mapping, and cultural entrepreneurship under community-defined terms.

Digital tools can support this model if governed carefully. Participatory GIS, community mapping, digital storytelling, and open educational resources can make landscape values visible in planning processes. But digitalization can also extract knowledge if communities lose control over data and representation. Cultural landscape resilience therefore requires ethical protocols for documentation, consent, and circulation of local knowledge. The question is not simply whether a landscape is mapped, but who maps it, for what purpose, and who benefits from the resulting information.

10. Discussion: Development Without Spatial Assimilation

The central risk identified in this article is not development itself but spatial assimilation. Spatial assimilation occurs when culturally distinctive landscapes are reorganized to fit external models of mobility, tourism, investment, land value, and heritage consumption. The landscape may retain Maya imagery while losing the relationships that make it Maya as a lived place. This risk is especially acute when multiple projects operate together, each claiming limited impact while collectively producing territorial transformation.

The concept of absorption helps make this risk visible. A cultural landscape can absorb certain levels of change through adaptation, negotiation, and innovation. Roads, schools, digital networks, tourism initiatives, conservation projects, and heritage interpretation can all strengthen communities under certain conditions. But absorption has limits. When development pressures accumulate faster than communities and institutions can adapt, resilience declines. Land becomes harder to access, practices become harder to maintain, narratives become externally produced, and future options narrow.

This analysis suggests that public debate should move beyond polarized binaries. The question is not simply development versus no development, train versus no train, tourism versus isolation, or heritage conservation versus economic growth. The better question is: what forms of development maintain the relational continuity of the landscape, and which forms reorganize the region in ways that make such continuity less viable?



The answer will vary by place. A project may strengthen one community and pressure another. A tourism initiative may support cultural transmission in one setting and commodify culture in another. A road may improve access to services while producing speculation. This complexity is why cumulative landscape assessment is necessary. It allows planners to see how different effects interact across time and space.

For INFINIA's broader intellectual agenda, the argument contributes to a recurring theme: knowledge and development must be evaluated from the perspective of those who live the consequences of policy. In the Maya Region, cultural geography provides tools for making those consequences spatially visible. It connects infrastructure to place, tourism to representation, land use to memory, and development to cultural continuity.

11. Conclusions

This article asked how much development a cultural landscape can absorb before its continuity is irreversibly altered. The answer is not a fixed number of projects, kilometers, hotels, visitors, or hectares. It depends on cumulative territorial pressure and on the resilience of the relationships that sustain the landscape. A Maya cultural landscape is threatened not only when a monument is damaged or a forest is cleared, but also when mobility, land use, cultural practice, access, ecological relations, and place meaning are progressively reorganized by overlapping development processes.

The article proposed two concepts to support future research and planning. Cumulative territorial pressure describes the layered effect of multiple projects, markets, policies, and infrastructures acting on the same territory over time. Cultural landscape resilience describes the capacity of a landscape to maintain relational continuity under transformation. Together, these concepts shift analysis from isolated impact to landscape systems.

The Cultural Landscape Resilience Framework identifies six core dimensions: land-use continuity, spatial connectivity, socio-ecological integrity, cultural practice, community access, and place meaning, with institutional integration as a necessary governance condition. The framework can be applied to the Maya Region and to other heritage regions experiencing rapid tourism, infrastructure, and urban-development pressure.

The policy implication is clear. Sustainable development in heritage regions requires more than project-level mitigation. It requires cumulative landscape assessment, community-centered cultural development, cross-sector planning, ethical data governance, and monitoring of induced

effects. It also requires recognizing that communities are not only stakeholders in development; they are producers of place, memory, and cultural futures.

The Maya Region will continue to change. The challenge is whether that change will deepen cultural landscape resilience or convert living territories into corridors of investment and consumption. A development model worthy of the name must protect not only the past preserved in stones, but the landscapes through which communities continue to inhabit, interpret, and transmit their worlds.

12. Declarations

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