

Tourism as a Structural Force: Economic Accumulation, Environmental Pressure, and Threshold Dynamics in Kashmir

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ABSTRACT:

This study investigates whether tourism serves as a marginal economic activity or as a structural force that reshapes long-term development trajectories. Using a balanced panel data of six destinations in Kashmir observed over the period 2006–2025, the current study analyzes how tourism intensity influences income generation, employment absorption, firm entry, infrastructure formation, and environmental pressure. Employing two-way fixed effects, dynamic specifications, and nonlinear models, the current study demonstrates that tourism-induced changes are persistent, path-dependent, and governed by threshold dynamics. Economic benefits accumulate through durable capital formation, specialization, and firm persistence, while environmental costs compound through waste accumulation and declining water quality. Importantly, marginal responses to tourism are similar across destinations, yet long-run outcomes diverge sharply due to differences in accumulated structure rather than differences in short-run productivity. Nonlinear estimates reveal minimum scale effects for income generation and congestion-driven ecological deterioration beyond critical thresholds. Together, these results depict tourism not as a transitory flow, but as a stock-building process that reorganizes economic and ecological systems over time. The findings underscore the need to govern tourism as a long-run structural transformation rather than as a short-run revenue source, particularly in ecologically sensitive and capacity-constrained regions such as Kashmir.

Keywords: Tourism-led development; Structural change; Environmental pressure; Threshold dynamics; Path dependence; Kashmir

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1. Introduction

Tourism is generally defined as a practise. Tourists come, make purchases, use the services, and go away. In this sense, its implications seem short-lived, reversible and mostly short-run. The number of tourists will increase incomes,

employment, and investment, and cause congestion, pollution, and strain on local resources (Tang and Tan, 2018; Ahmad et al., 2019; Balsalobre-Lorente et al., 2020).

Tourism does not traverse a region as soon as it is large enough. It changes the labour market to

favour services, and companies specialize in visitor demand. At the same time, infrastructure is remodelled, land use is altered, public budgets are shifted, and loads of environmental impacts are accrued. What will come out is not a disturbance that will be momentary but a new order.

The paper is constructed around a relatively unsophisticated yet understudied concept; tourism can go structural. When it passes to some scales, it is more than an activity; it is an organizing force, that is, it determines the way a region grows, what it results in, and what it can continue to support. The bulk of the current literature considers tourism as a peripheral factor: that which pushes the results down the line or up the line. Growth is quantified, effects are calculated, and environmental implications are recorded. Such a peripheral view is, however, lacking in a more profound transformation. The forces of structure do not trip on levels but, on the contrary, they are trajectory-changing. They create persistence, lock-in and thresholds above which systems act differently (Abhik, 2021; Garau et al., 2022; Skiniti et al., 2024).

This is a non-semantic difference. In case tourism is peripheral, its impacts ought to be linear, reversible, and correctable. When tourism is structural, then it ought to have cumulative impacts which are path-dependent and hard to reverse. These are two radically different systems. However, empirical literature seldom posed the question of which of these descriptions is better suited to characterise tourism-led development (Lind and Mehlum, 2010; Haans et al., 2016; Brida et al., 2016; Rosenbloom et al., 2019; Hanger-Kopp et al., 2022; Alcalá-Ordoña et al., 2024).

One of them is that structural effects can be hard to detect in large and diversified economies. On the contrary, in spatially restricted, ecologically sensitive and highly tourist-reliant areas, such dynamics are readable. Within these contexts, tourism does not conceal itself behind aggregates; it leaves its marks on almost all spheres of economic and

environmental life (Zekan et al., 2022; Skiniti et al., 2024).

The following paper examines one of such systems. Instead of showing the region as a case, the current study treats it as a revealing environment, a place where the long-run dynamics of tourism may be seen in a remarkable way. This is not to find out whether tourism is good or bad. It is about studying what sort of system tourism produces when it becomes hegemonic.

With this backdrop, this study tries to know the long-lasting effects of tourism as economic benefits and the environmental pressures as enablers of an identical process (Ehigiamusoe, 2020; Raza et al., 2021; Lv and Xu, 2023).

The discussion is formed by three empirical assumptions.

One, tourism needs to have structural impacts, which implies that they need to last. The short-lived shocks do not last; permanent ones do. There is a permanent trace left by infrastructure, networks of firms, and division of labour, and environmental pressures build up. The past should matter.

Second, when tourism is scale-sensitive, it is not supposed to have proportional impacts. Tourism can be quite fragmented within certain ranges and loosely integrated. In addition to them, the agglomeration forces, network effects, and institutional reorganisation are to appear, and therefore thresholds should exist.

Third, the economic and environmental impacts of tourism cannot be decoupled in the case of reorganisation of the systems. They should co-evolve. The presence of growth and stress is not a parallel story because it is a product of a common structural process. They are not hypothetical assertions. They are propositions that are empirical.

A balanced panel of six destinations observed across 20 years is analyzed to study them. The destinations are selected strategically to cover a continuum of tourism intensity- high, medium and low. This design will enable us to decide between two options, namely, whether tourism

is different across regimes or whether the same underlying mechanism exists everywhere but at varying levels of accumulated structure.

The empirical strategy is not, however, constructed on the basis of one model, but on a diagnostic question: does tourism act like a flow or like a structure? In response, the present study uses two-way fixed effects to deal with unobserved heterogeneity, dynamic specifications to deal with persistence, and nonlinear functional forms to deal with scale activation (Wooldridge, 2010; Baltagi, 2008; Nickell, 1981; Arellano and Bond, 1998; Lind and Mehlum, 2010; Haans et al., 2016).

The findings indicate that the tourism activity cannot be termed as a marginal activity. Its effects persist. It is scale-activated, and its advantages are realized. Its pressures accumulate and its reactions within an institution are slow. Its created system is not linear, reversible and neutral.

2. Review of Literature

Most research on tourism is organized around a deceptively simple question: Does tourism promote development? This framing has generated a large empirical literature examining how tourist inflows correlate with income, employment, investment, or growth (Gökovali & Bahar, 2006; Sequeira & Campos, 2007; Sequeira & Maças Nunes, 2008; Narayan et al., 2010; Dritsakis, 2012; Chou, 2013; Tang & Tan, 2018; Mitra, 2019; ; Brida et al., 2020; Pérez-Rodríguez et al., 2022; Lin et al., 2019; Zuo & Huang, 2018; Naseem, 2021; Öztürk et al., 2018). Implicit in much of this work is the assumption that tourism is like any other normal sector; it grows and shrinks without being altered in its fundamental structure. In this perspective, tourism is considered a flow. Contemporaneous responses model outcomes, assuming the effects are proportional and environmental impacts are often added as afterthoughts rather than being considered part of the system (Brida et al., 2016; Alcalá-Ordovaz et al., 2024).

Much of the literature ignores the fact that tourism may become organizing as they

concentrate on marginal changes. In addition, tourism no longer remains another activity, but it starts influencing the organization of labour markets, the specialization of firms, the construction of infrastructures, and the allocation of public resources. These variations are not lost as the number of tourists varies. They continue to exist (Garau et al., 2022; Zekan et al., 2022; Skiniti et al., 2024; Ekins and Zenghelis, 2021).

As soon as tourism takes root in this manner, short-run reactions cease to be the correct object of study. The question which arises is not whether tourism has impacts but rather which paths it creates. Such restrictions are typical of most of the environmental literature. It is reported that tourism is connected with pollution, overcrowding, trash formation, and ecological pressure in a large number of studies (Ahmad et al., 2019; Azam et al., 2018; Balsalobre-Lorente et al., 2020; Koçak et al., 2020; Liu et al., 2022; Teng et al., 2021; Mikayilov et al., 2019; Ghosh, 2020; Qin and But these are the relationships that are modelled as additive and immediate. The degradation of the environment is generally looked at as a modern cost as opposed to a process that accrues over time and is influenced by structural change.

This frame is also incomplete. The ecological systems can hardly react to the pressure in continuous, linear ways. They exhibit thresholds, saturation points, and delayed reactions. Once degraded, they often do not recover quickly (Abhik, 2021; Bella, 2018; Ehigiamusoe, 2020; Raza et al., 2021; Lv & Xu, 2023; Sharma et al., 2025). If tourism reorganizes land use, water consumption, and waste streams, then environmental pressure should be understood as a stock that builds over time, not as a flow that resets each year.

A further limitation of existing work is its tendency to analyze tourism as a collection of isolated effects rather than as a system. Economic outcomes are studied separately from environmental outcomes, and institutional responses are often ignored altogether. Yet real

places do not experience these dimensions independently. They evolve together (Ekins & Zenghelis, 2021; Rosenbloom et al., 2019; Hanger-Kopp et al., 2022).

There is also a strong reliance on static or short-horizon variation. Cross-sectional comparisons and short panels are useful for detecting correlations, but they are poorly suited for studying persistence, lock-in, and regime change. If tourism restructures economies, its most important consequences will not be visible in year-to-year fluctuations. They will appear instead in how systems drift, stabilize, or become trapped over time (Nickell, 1981; Rosenbloom et al., 2019; Hanger-Kopp et al., 2022).

Finally, much of the literature implicitly assumes that tourism operates similarly across contexts, treating heterogeneity as noise rather than as a feature. Yet it is precisely in constrained systems—where space is limited, ecosystems are fragile, and economic alternatives are narrow that structural dynamics become most visible. In highly elastic systems, these dynamics can be absorbed, diffused, or masked (Abhik, 2021; Skiniti et al., 2024; Zekan et al., 2022).

The present paper follows a different approach. Instead of posing the question of whether tourism matters, it poses the question of how tourism acts once it comes to matter structurally. Instead of dividing the nature of growth and degradation, it explores the mutual development of the two. Instead of being proportional, it involves threshold testing. Instead of making time a control variable, it considers it as a middle dimension of analysis (Lind and Mehlum, 2010; Haans et al., 2016).

Nonlinearities are regime shifts at which the system starts operating in a new way. It is not environmental pressure that is a by-product of growth, but rather, an endogenous result of the same structural changes that produce economic accumulation. The system comprises public responses, which include budgets, mitigation, and governance rather than external correctives. In case the responses cannot keep pace with the pressures, then it is not only the failure of policy,

but a structural mismatch between the pace of economic change and the pace of institutional change (Ekins and Zenghelis, 2021; Rosenbloom et al., 2019).

Despite multiple literatures there is a lack of a single vision (Brida et al., 2016; Alcalá-Ordoño et al., 2024) and this study brings about that unification. It poses the question not as to whether tourism has impacts, but as to whether tourism is shaping an alternative form of regional economy or not.

3. Data, Variables, and Structural Empirical Design

The question put forth in this paper is whether tourism is a marginal or structural activity. To answer this question, it is necessary to have data that do not just reflect short-run changes, but also cumulative change, persistence, and regime behaviour over time. Analysis of the empirical data is hence founded on the equalized panel of six destinations experienced in a year between 2006 and 2025.

The six destinations, in their entirety, make more than 95 percent of all the tourist arrivals in Kashmir during the study period. These destinations are not supposed to be used as a symbol of all the potential tourist sites in the region. Instead, they characterise the successful system of tourism in Kashmir. Whereas most of the other destinations are periodically described as tourist destinations, they are subject to occasional inflows and are not enduringly invested in tourism, nor are they sufficiently large to rearrange local economic and environmental systems through tourism. Adding these locations would add cross-sectional breadth at the cost of diluting the dynamics of interest and biased estimating to zero and blurring the thresholding and accumulation dynamics of interest in this study. The destinations selected here are precisely those in which tourism has become persistent, cumulative, and system-shaping. In this sense, the sample defines the system rather than approximating a population, consistent with a path-dependence perspective on regional

development (Rosenbloom et al., 2019; Hanger-Kopp et al., 2022).

The dataset was constructed from official administrative and departmental records. Tourism flows, income contribution, employment contribution, and the number of registered establishments were compiled from publications of the Directorate of Economics and Statistics, the Ministry of Statistics and Programme Implementation, the Economic Survey of Jammu and Kashmir, and the J&K Planning Department. Location-specific tourism indicators were obtained from the Jammu and Kashmir Tourism Department and the respective destination-level development authorities.

Environmental variables were drawn from agencies responsible for ecological monitoring and regulation. Solid waste generation data were compiled from municipal and urban local body records. Water quality indicators were obtained from routine monitoring reports maintained by the Lakes and Waterways Development Authority and related agencies. Forest loss was measured using land-use and forest management records maintained by the Forest Department of Jammu and Kashmir. Budgetary allocations and realized expenditures for sanitation and environmental maintenance were obtained from official financial statements of the relevant departments.

All series were cleaned and harmonized to ensure consistency across destinations and over time. Where reporting formats differed, conservative standardization procedures were applied so that observed variation reflects real changes rather than administrative artefacts.

The six destinations were selected to represent distinct tourism-intensity regimes within a shared institutional, geographic, and policy context. Two locations operate under persistently high tourist inflows (Gulmarg and Srinagar), two under medium intensity (Kokernag and Sonamarg), and two under low intensity (Aharbal and Yusmarg). This structure allows the analysis to distinguish between two competing explanations of spatial divergence.

Differences across destinations may arise because tourism behaves differently at different scales, or because the same mechanism operates everywhere but with varying degrees of accumulated depth. A regime-based design makes it possible to test these alternatives directly. If tourism functions as a structural force, then cross-destination differences should reflect path dependence and accumulated capacity rather than fundamentally different marginal responses, as suggested by the broader literature on cumulative development processes and regional lock-in (Rosenbloom et al., 2019; Hanger-Kopp et al., 2022).

Tourist arrivals are used as the primary measure of tourism intensity. This variable captures not only demand, but also the scale of external pressure that local systems must absorb. The income contribution, employment contribution, and the number of registered establishments are used to measure the economic outcomes. These variables are not seen as short-term performance measures. In their place, they are taken to mean indicators of structural integration: the extent to which tourism has been incorporated into local production, division of labour, and ecology of firms.

Infrastructure investment represents long-run capital commitments instead of modern-day adjustments. After infrastructure has been constructed, it recreates future opportunities and limitations. It is thus path dependent as opposed to short-run reaction, in line with findings that infrastructure growth can forever change land use and ecological progressions (Habibullah et al., 2019; Baehr et al., 2021; Nguyen et al., 2023).

Total solid waste production (broken down into biodegradable and non-biodegradable), a composite water quality index built on the main physical and biological parameters, and forest loss in hectares are all used as environmental pressure. These variables measure different but interacting aspects of ecological load - accumulation, degradation, and land-use conversion - that are common across the empirical tourism environment literature (Azam et al., 2018; Ahmad et al., 2019; Mikayilov et al.,

2019; Balsalobre-Lorente et al., 2020; Liu et al., 2022; Kocak and Cavusoglu, 2024).

Two other variables are institutional response: the budget of cleanliness that is allotted to each destination, and actual spending on sanitation and environmental management. These are not symptomatic of environmental quality. Rather, they capture the speed, scale, and responsiveness of governance under mounting pressure, consistent with the view that public responses are part of the same adaptive system rather than external correctives (Rosenbloom et al., 2019; Ekins & Zenghelis, 2021).

If tourism were merely a marginal influence, its effects should be immediate, proportional, and reversible. Structural forces, by contrast, generate persistence, thresholds, and irreversibility. The empirical strategy is therefore built explicitly to detect these features.

Two-way fixed effects control for time-invariant destination characteristics—such as geography, historical specialization, and baseline infrastructure—as well as for common shocks that affect all locations simultaneously. Identification thus comes from within-destination change rather than from static cross-sectional differences, following standard panel data practice (Baltagi, 2008; Wooldridge, 2010).

Dynamic specifications include lagged dependent variables. These models test whether current outcomes depend strongly on past states. Persistence is not treated as a statistical complication but as a defining feature of structural embedding, in the spirit of the dynamic panel literature on state dependence and path dependence (Nickell, 1981; Arellano & Bond, 1998). Nonlinear specifications are used to test for scale activation. If tourism reorganizes systems only beyond certain thresholds, linear models will systematically misrepresent its behaviour. Interaction models and nonlinear forms allow marginal effects to vary across tourism-intensity regimes, enabling a distinction between regime-specific mechanisms and uniform mechanisms operating at different depths of accumulation, consistent with the econometric literature on thresholds and regime

change (Lind & Mehlum, 2010; Haans et al., 2016).

Standard errors are computed using robust and clustered procedures to account for serial correlation and heteroskedasticity within destinations (Cameron & Miller, 2015). The purpose of this empirical design is not to maximize the number of statistically significant coefficients. It is to diagnose the type of system tourism creates.

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4. Results and Discussion

This section presents the empirical results on the relationship between tourism intensity and economic performance, environmental stress, and public mitigation responses across destinations. The analysis is based on a balanced panel of six destinations observed annually over the period 2006–2025, yielding 120 observations. The panel design can be used to detect within-destination time variation and regulate the failure to observe time-invariant heterogeneity and shared time shock. In all these, there is a focus on economic magnitude, persistence and functional form instead of statistical significance. In order to encourage the regime-based classification and to demonstrate the continuation of the tourism intensity across the destinations, Figure 1 presents annual tourist arrivals in each of the six destinations in the entire sample period.

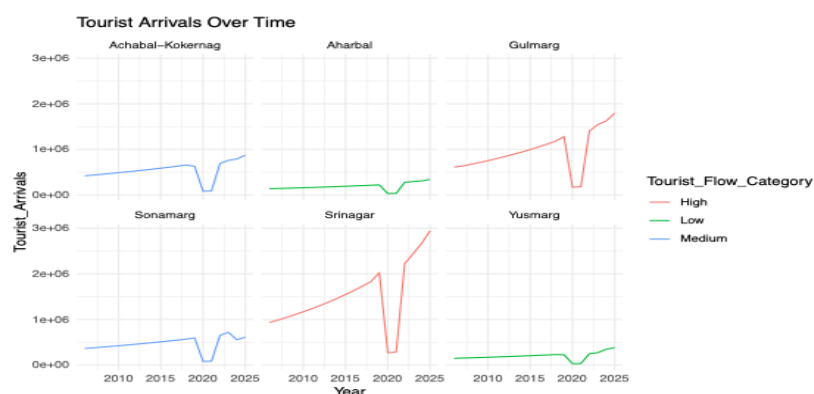


Figure 1. Tourist arrivals by destination, 2006–2025

Note: The figure plots annual tourist arrivals for the six study destinations over the period 2006–2025. Panels are faceted by location. The trajectories reveal persistent differences in tourism intensity, motivating the classification into high-intensity (Gulmarg, Srinagar), medium-intensity (Ahabal–Kokernag, Sonamarg), and low-intensity (Aharbal, Yusmarg) regimes.

The figure shows steady and distinct tourism intensity regimes instead of a common reversal in ranks and convergence trends. The high-flow destinations do not change to the low-flow destination, and the medium-flow destination

hardly crosses the regime boundaries during the sample period. This stability shows that tourism exposure is not a temporary situation or positional attribute. Such persistence is important as it means that tourism is not a process of periodical shocks but a long-run structuring process that determines developmental paths.

The organization of the data and the descriptive gradients that drive the econometric design have to be documented before resorting to regression analysis. The summary statistics are reported in Table 1 according to the tourism intensity regime.

Table 1. Descriptive statistics by tourism intensity regime

Flow categ	Avg. arrivals	SD arrival	Avg. inco	Avg. employ	Avg. establish	Avg. infrastru	Avg . g.	Av g.	Av g.	Avg. cleanli	Avg. cleanlin
High	1,235,4 59.4	641,3 16.5	2,066 .48	1.44	984.43	6.24	15.3 4	74. 37	0.5 02	4.57	0.315
Medi um	502,71 6.4	181,7 00.9	565.1 3	0.75	126.88	1.78	7.13	83. 64	0.4 81	2.44	0.052
Low	193,29 1.3	80,00 1.7	243.3 8	0.37	34.83	1.00	4.75	80. 75	0.4 66	1.12	0.015

Notes: Regimes are defined as high-intensity (Gulmarg, Srinagar), medium-intensity (Ahabal–Kokernag, Sonamarg), and low-intensity (Aharbal, Yusmarg). All values are regime-wise averages over 2006–2025.

The descriptive trends show drastic structural gradients within destinations. Destinations with high flow have over six times the number of tourists compared to low flow destinations. The difference is reflected in the fact that the contribution income is over eight times greater, employment shares are almost four times greater, and the number of establishments is close to thirty times higher. The magnitude of infrastructure investment is directly proportional to the level of tourism, implying that the pressure of visitors is systematically reflected in the decision-making processes of the long-term capital investments and not as a short-term outlier.

The same is true of environmental indicators, which vary in a systematic manner. The daily waste production in high flow destinations is more than three times higher than that in low flow destinations. Water quality is the lowest in

the high-flow destinations, where the average WQI is 74.37 as compared to 83.64 in medium and low-flow destinations. The differentiation of forest loss is lower among regimes, which indicates that land-use change can work over longer time frames or be limited by control and institutional structures. The level of tourism intensity is proportional to the level of public mitigation responses. Although high-flow destinations spend a greater budget on cleanliness, the growth in the realised expenditure is small compared to that in the amount of waste, which portends the emergence of adjustment gaps.

These trends already indicate that tourism not only provides dynamism, but it is restructuring the scale of the economy, environmental burden and capacity of response of the people. Nevertheless, these uncooked disparities can be attributable to intractable location-based traits as

opposed to causal impacts of the tourism itself. In order to separate within-destination time variations, all the following regressions use two-way fixed effects.

In order to make sure that estimated relationships are within-destination rather than due to cross-sectional differences, all further regressions use two-way fixed effects. It is a specification that regulates destination-specific time-invariant geography, historical specialisation and common temporal shocks, which occur in all destinations.

This estimator is empirically justifiable. When a Hausman test is conducted comparing two-way fixed effects estimator with a random effects counterpart, the chi-square test results are 3.94 ($p = 0.047$) and the null hypothesis that the random effects estimator is identical to the fixed effects counterpart is rejected. It means that

unobserved destination-specific heterogeneity correlates with tourism intensity and, therefore, fixed effects are necessary.

Additional tests of diagnosis depict the existence of serial correlation and heteroskedasticity. The Breusch Godfrey/Wooldridge test of serial correlation gives a chi-square value of 62.27 ($p < 0.001$) and Breush Pagan test rejects homoskedasticity ($BP = 27.55$, $p < 0.001$). Based on these results, any standard errors that are reported are concentrated at the destination level, and it is free to have arbitrary within-destination serial correlation and heteroskedasticity.

Table 2 presents the fixed effects baseline estimates between tourist arrivals and the entire category of economic and environmental outcomes.

Table 2. Baseline two-way fixed effects estimates

Dependent variable	Coefficient on tourist arrivals	Clustered SE	t-statistic	p-value
Income contribution (₹ crore)	0.002478	0.000314	7.890	<0.001
Employment contribution (share)	7.058e-07	5.770e-08	12.232	<0.001
Establishments (count)	2.702e-04	6.868e-05	3.934	<0.001
Infrastructure (₹ crore)	3.391e-06	2.220e-07	15.278	<0.001
Waste total (TPD)	4.390e-07	1.152e-07	3.810	<0.001
Water Quality Index	-7.010e-06	2.978e-06	-2.354	0.021
Forest loss (ha)	1.699e-07	1.412e-07	1.204	0.232

Notes: All models include destination and year fixed effects. $N = 120$. Standard errors clustered at the destination level.

The baseline estimates reveal that tourism intensity exerts a strong and precisely estimated influence on all core economic outcomes. The coefficient of 0.002478 in the income regression implies that an increase of 100,000 tourists is associated with an increase of approximately ₹247.8 crore in income contribution, holding constant unobserved destination characteristics and common time shocks. Relative to the mean income contribution of ₹243 crore in low-flow destinations, this magnitude is economically

large. Tourism, therefore, appears not as a marginal supplement but as a dominant revenue-generating force.

Employment effects are similarly strong. The coefficient of 7.058e-07 implies that an increase of one million tourists is associated with a rise of approximately 0.71 percentage points in the tourism-linked employment share. Given that the average employment share in low-flow destinations is only 0.37 percent, this magnitude implies a near doubling of the tourism-related

employment base over relatively modest increases in visitor volume. This implies that tourism is not a passive receiver of excess labour, but rather it transforms local labour markets. An increase in the local production base is also brought about by the arrival of tourists. The establishment's coefficient suggests that with every 100,000 tourists, about 27 other firms in the tourism-related industry are registered. This trend shows that tourism demand is not merely covered with current capacity but initiates entry, diversification and creation of new service networks. The response to infrastructure investment is more vigorous. The coefficient of $3.391e-06$ means that every one million tourists is connected to an extra allocation of infrastructure in the form of 3.39 crores. This estimate is large and accurate; pointing to the fact that tourism pressure is systematically reflected in the decision-making process on the public or quasi-public level, instead of the ability of these investments to be regarded as a temporary shock. There is a significant difference in the environmental reaction to indicators. The levels of waste augment considerably with the arrival of the tourists. The approximated coefficient suggests that the daily solid waste increases each time there is an increment in the number of tourists by one million. On a small scale, this is small but scales exponentially, especially in high-flow destinations where the waste volumes at baseline are already over 15 tonnes per day. This cumulative process means that the pressure exerted upon the environment increases as the volume of tourism increases, and not just at extreme levels. Tourism intensity reduces the quality of water considerably. The coefficient is $-7.010e-06$, which means that an increase in the

number of tourists by one million decreases the Water Quality Index by around seven points. Since the index was limited to 0 to 100, this level carries with it a significant meaning. Notably, the high-flow tourist destinations already have reduced baseline WQI values, indicating that the future tourist pressure can lead to increased chances of pushing systems to the edge of ecological sustainability. In comparison, the coefficient of forest loss is meanwhile positive, but statistically insignificant. This means that short-run changes in the inflow of tourists to destinations are not reflected in the shift in forest cover. This does not mean that tourism is neutral as far as land use is concerned. Instead, it indicates that forest performance may change over longer periods of time, respond to discrete infrastructure extensions and not marginal flows of tourists or be limited by zoning and regulatory frameworks. This coefficient is thus significantly informative: it is not all environmental channels that react contemporaneously to tourism intensity. Although these baseline estimates record high within-destination effects, they fail to inform about whether the effects are persistent, whether they are regime-heterogeneous or whether they work along nonlinear adjustment paths. The following group of findings deals with these dimensions. To test the hypothesis that the effects reflected above are long-term and not short-term, Table 3 presents dynamic specifications by having a one-period lag of the dependent variable. These models can be gradual, inertial and dependent on path, which are likely to be typical of tourism-driven processes that involve enduring capital, institutional learning and the ecological systems that take a long time to adapt.

Table 3. Dynamic two-way fixed effects estimates

Dependent variable	Lagged dependent variable	Clustered SE	Tourist arrivals	Clustered SE	p-value (arrivals)
Income contribution (₹ crore)	0.5104***	0.0527	0.001647***	0.000286	<0.001
Employment	0.4554***	0.0355	5.214e-07***	4.867e-08	<0.001

contribution (share)					
Establishments (count)	1.0159***	0.00734	1.705e-05**	6.345e-06	0.009
Infrastructure (₹ crore)	0.7418***	0.0417	1.854e-06***	2.030e-07	<0.001
Waste total (TPD)	0.8970***	0.0818	3.165e-07*	1.272e-07	0.015
Water Quality Index	0.8855***	0.0547	-1.179e-06*	5.259e-07	0.027

Notes: All models include destination and year fixed effects. N = 114 due to lag structure. Standard errors clustered at the destination level. *** p < 0.001, ** p < 0.01, * p < 0.05.

The dynamic estimates depict a high level of persistence of all the outcomes. The lag coefficient of income can be seen to be 0.51, which means that the contribution of income in the previous year is transferred into the current year in the ratio of 50 percent. The existence of long-term contracts, cumulative destination branding, and durable capital is in line with this level of inertia. Notably, the tourist arrivals are positive and very important even when this persistence is considered. The modern coefficient of 0.001647 means that an increment of 100,000 tourists could increase revenue, in the short run, by about 0.1647 crore, with additional references working through the persistence channel.

This is also the case with employment. The coefficient of 0.46 on the lag implies that employment gains incurred through tourism are not short-lived but carry into the employment structure in the long run. The modern impact of tourist flows is still high and accurately calculated, which means that the inflows of new tourism are still able to produce new working places instead of stabilizing the current ones.

The behaviour of establishments is almost unit-root, and the lag coefficient is greater than one. This is how the entry by the firm is quasi-irreversible: once businesses that are involved in tourism are in place, they are likely to linger. Tourist arrivals, even with such high inertia, are statistically significant in the formation of new firms, which means that the production base is still growing in accordance with demand.

The inertia in infrastructure investment is also very high, and the lag coefficient is 0.74. This is in line with the multi-year planning and implementation cycles of capital projects. The current coefficient on tourist arrivals is extremely important and indicates that the tourism pressure has a systematic effect not only on the long-run infrastructure stocks but also on short-run investment flows.

The indicators of the environment exhibit the same high persistence. The lag coefficient of waste generation is 0.90, which means that the pressure of the environment does not reduce annually, but grows over time. The same can be said of water quality; its lag coefficient of 0.89 relates to the fact that the ecological system is memory-based of the past shocks. In spite of this, contemporary effects of tourist arrivals remain statistically significant: they raise the amount of waste and lower the quality of water. Such compensation between persistence and marginal sensitivity suggests that the tourism pressure results in a long-term environmental stress, even in the event of the stabilization of the inflows. These results establish that tourism-induced changes are not ephemeral. They embed themselves into the system. The economy remembers. The environment remembers.

The next question is whether the marginal effects of tourism differ systematically across destinations that operate at different baseline intensities. Table 4, therefore, introduces interaction terms between tourist arrivals and tourism regime categories, using high-flow destinations as the reference group.

Table 4. Heterogeneity by tourism regime (Income contribution)

Variable	Coefficient	Clustered SE	t-statistic	p-value
Tourist arrivals (High-flow reference)	0.003050	0.000824	3.703	0.014
Tourist arrivals $\times$ Low-flow	0.004626	0.004983	0.928	0.396
Tourist arrivals $\times$ Medium-flow	0.001388	0.001661	0.836	0.441

Notes: Two-way fixed effects included. Standard errors clustered at the destination level. Dependent variable is income contribution (₹ crore).

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The coefficient on tourist arrivals captures the marginal income response in high-flow destinations. This effect is positive and statistically significant, indicating that even in already-saturated tourism environments, additional tourist inflows continue to generate incremental income gains. The interaction terms for low-flow and medium-flow destinations are positive but statistically insignificant. This implies that, once time-invariant destination characteristics are controlled for, the marginal income response to tourism does not differ significantly across regimes. This result is substantively important. The sharp differences in income levels observed in the descriptive statistics do not arise because tourists are inherently more productive in high-flow destinations, but because these destinations possess higher baseline capacity, accumulated infrastructure, and deeper specialization. That is, the difference in cross-destinations is structural and not marginal. Tourism functions in a familiar mechanism with varying accumulating levels of depth. The second step is to consider whether the relationships that have been recorded up to now are linear or have threshold behaviour. Nonlinear responses are realistic in cases where congestion effects, capacity constraints or coordination failures are binding. The quadratic specifications are in Table 5 about income, waste, and water quality.

Table 5. Nonlinear effects of tourism

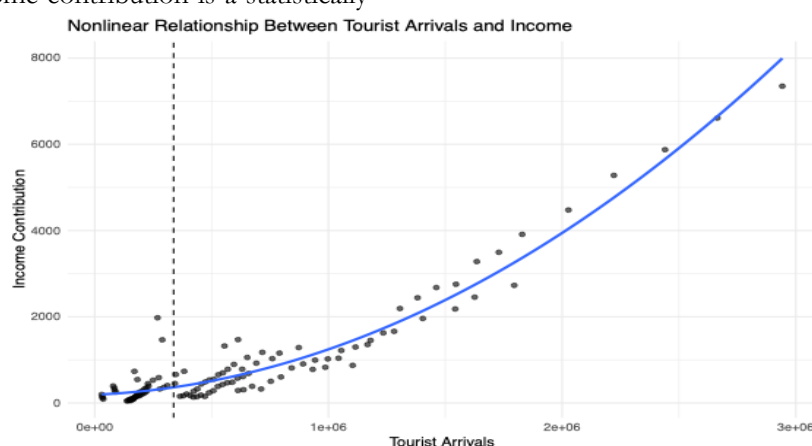
Dependent variable	intensity and estimated thresholds					
	Tourist arrivals (β_1)	Clustered SE	Tourist arrivals ² (β_2)	Clustered SE	Turning point (arrivals)	95% confidence interval
Income contribution	-6.0547e-04**	1.8288e-04	8.9722e-10***	4.0725e-11	337,417	[163,596 , 511,238]
Waste total	-1.6889e-07	4.6765e-07	1.7688e-13	1.3961e-13	—	—
Water Quality Index	1.8261e-05***	2.6797e-06	-7.3529e-12***	8.9292e-13	1,241,758	[1,148,643 , 1,334,873]

Notes: All models include destination and year fixed effects. Standard errors are clustered at the destination level. Turning points are computed using the delta method and reported only when both linear and quadratic terms are statistically significant. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 5 tabulates quadratic specifications that test the hypothesis of threshold behaviour as opposed to linear response of the effects of tourism intensity. The findings show that the existence of nonlinearities is outcome-based and that the processes of adjustment on the economic and environmental aspects are fundamentally different.

Concerning income, the quadratic specification shows that the relationship between tourist arrivals and income contribution is a statistically

significant U-shaped relationship. It is estimated that the turning point is 337,417 tourists per year with a confidence interval of [163,594, 511,238] that is 95 percent. This mark is below the threshold where marginal income increases brought by tourism are weak or even negative. This trend is in line with the existence of fixed costs, underutilization of capacity, and coordination friction that cannot create value at low levels of tourism activities. After this minimum scale is attained, marginal income gain becomes steep, and it indicates the agglomeration economies, specialisation, and network effects are activated. This means that growth in tourism is not straight and steady, but it needs a critical mass after which it can start bearing significant luxurious returns. This relationship can be visualised in figure 2.

**Figure 2. Nonlinear relationship between tourist arrivals and income contribution**

Notes: The figure plots observed income contributions against tourist arrivals, along with the fitted quadratic relationship from the fixed-effects model. The dashed vertical line indicates

the estimated turning point at approximately 337,415 arrivals, beyond which marginal income gains increase.

Generation of wastes, on the other hand, lack statistically significant nonlinearities. The linear and squared terms are both not significant meaning that the accumulation of waste grows roughly linearly with the volume of tourists in the range. It implies that environmental pressure in terms of materials will increase gradually instead of a sudden change of regime. Waste, in contrast to income and water quality, shows no threshold behaviour, meaning that there is no process of transition but rather continuous accumulation.

The pattern of water quality is qualitatively different. Both the positive linear and negative quadratic terms are significant showing the existence of an inverted- U relationship. The quality of water also increases with the intensity of tourism, which is likely to be the investments in sanitation networks, treatment capacities, and environmental control. Nevertheless, there is a critical level at which a tourism reduction, which is about 1.24 million tourist arrivals per annum with a 95 percent interval of [1.15 million, 1.33

million], the additional rises in tourism result in an accelerated decline in the water quality. This trend has been in line with the ecological resilience concepts where the system is able to take pressure to a certain threshold before shifting to the degradation regimes.

These nonlinearities are taken and uncover a structurally asymmetric system. Tourism economic benefits are only positive on a large scale and ecological damage is only accelerated when a high level of capacity is surpassed. Meanwhile, the amount of waste increases without a visible change of regime. Such an arrangement opens a broad middle ground where tourism will seem profitable and environmental at the same time. Nevertheless, when ecological limits are exceeded, degradation increases faster even when tourist expansion is at par. Such a combination of a late start in an economy and a late start in environmental destruction suggests that systems of tourism may seem to be sustainable over extended durations before falling into acceleration phases.

Table 6. Dynamic and lagged effects of tourism on forest loss

Dependent variable: Forest loss (ha)

Specification	Tourist arrivals (t)	Lag 1 arrivals	Lag 3 arrivals	Lag 5 arrivals	Cumulative 5-year arrivals	Lagged forest loss	N
(1) Baseline FE	1.699e-07 (0.232)	—	—	—	—	—	120
(2) Distributed lag	9.625e-08** (0.016)	1.259e-07** (0.042)	1.712e-07 (0.194)	2.171e-07 (0.300)	—	—	114
(3) Cumulative exposure	—	—	—	—	1.106e-07* (0.062)	—	90
(4) Dynamic persistence	1.111e-07* (0.091)	—	—	—	—	0.3199** (0.020)	114

Notes: All models include destination and year fixed effects. Standard errors are clustered at the destination level. P-values in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels.

Table 6 adds further sensitivity to the baseline environmental analysis in that it tests explicitly whether the loss of forests is in subject to tourism with accumulation, temporal delay and persistence. This is inspired by the reason that deforestation and conversion to land is a structural process that is slow in nature and may

not react immediately to annual tourist variations.

Three specifications are complementary and are reported. To begin with, a distributed-lag model is a model that incorporates contemporaneous tourist arrivals with one, three, and five-year lag. Second, a cumulative exposure model is associated with the rolling 5-year total tourist arrival product of loss of forests. Third, a dynamic specification has lagged forest loss as an ecological persistence component.

The distributed-lag estimates indicate that the loss of forests does not react instantly but needs time. Although the current impact of tourism is good and significant, the lag effect of one year is also good and significant, showing that the conversion of land, the growth of infrastructure, and the informal encroachment do not actually take place in the same year. Conversely the three and five year lags are positive but not significant implying that the primary adjustment happens within a fairly narrow horizon. Such a trend is in line with slow development processes whereby pressure builds and then converts into the loss of forests.

This interpretative is supported in the cumulative exposure model. The coefficient of

the five-year rolling sum of tourist arrivals is positive and slightly significant which shows that forest degradation is more sensitive to sustained pressure than short-term spikes. This finding justifies the concept that deforestation is more of cumulative stress than shock.

Lastly, there is a high level of persistence in the loss of forests as illustrated by the dynamic model. The dependent variable which is lagged is positive and it is statistically significant meaning that once deforestation has started, it is likely to persist. This confirms that the loss of forests is path dependent: the land that has been cleared can hardly be restored, and the fragmentation caused by infrastructure has long-term ecological effects. Once started, degradation becomes self-perpetuating.

A combination of these findings indicates that forest loss is more of a slow moving stock and not a flow. Tourism does not merely augment deforestation in the present moment, it starts a course that proceeds to develop at a certain moment and subsequently continues. That is why even in cases when long-run impacts are very high, short-run regressions can fail to identify them.

Table 7. Functional form robustness

Specification	Coefficient	Clustered SE	t-statistic	p-value
Log income ~ Log arrivals	-3.241e-16	5.849e-16	-0.554	0.581
Income ~ Log arrivals	4,070.7	2,367.3	1.720	0.089

The elasticity of the loglog model is not statistically significant indicating that proportional responses are not constant throughout the range of tourism intensity observed. The log-specification specifies results into a weakly significant value at level 10 percent. These findings suggest that the effects of tourism are more appropriately defined in terms of levels and not elasticities as there are fixed costs, indivisibilities and threshold effects which have been reported in the quadratic models.

Combined, the findings provide rational empirical trend. The intensity of tourism is a

potent source of income, absorption of employment, entry of firms and development of infrastructure. Its effects are long-term, cumulative and not limited within a particular regime. Simultaneously, tourism causes cumulative environmental stress, especially in terms of waste accumulation and deterioration of the water quality. These are also long-term and nonlinear environmental impacts. The simultaneity of high economic gains and increasing environmental stress implies that tourism does not apply linear adjustment, but accumulation-related congestion.

5. Interpreting the System: Scale, Persistence, and Environmental Pressure in a Capacity-Constrained Tourism Economy

The findings in Section 4 characterise a system and not a set of independent relationships. The intensity of tourism in the examined destinations does not merely depend on the increased income, job establishment, and investment in infrastructure, but it also restructures the local economic models, creates continuity, and causes a cumulative environmental load. This section is not aimed at reiterating said findings, but rather at interpreting what sort of system it reveals, why this system should behave partly as it does, and why such dynamics are strongly felt in the context under consideration in particular, as per recent system-oriented views on tourism and sustainability (Abhik, 2021; Ekins and Zenghelis, 2021; Garau et al., 2022; Zekan et al., 2022).

Persistence is a characteristic of this system. Economic results like earnings, work, firm density, and investment in infrastructure show high inertia as indicated by big and statistically significant lagged coefficients. This means that the changes caused by tourism are not re-established at each period. Instead, they accumulate. The increase in income will be partially preserved. Once the income increases, once the firms enter, they will stay longer; once the infrastructure is developed, it transforms the possibilities of tomorrow. Accommodation, therefore, makes tourism a flow variable, but it is built as a stock. It does not simply create activity but also creates lasting capacity, which is in line with the rest of the literature on path dependence, lock-in and cumulative development (Rosenbloom et al., 2019; Hanger-Kopp et al., 2022).

This relationship can be used to justify the presence of large cross-destination differences due to similar marginal effects. The heterogeneity test reveals that there is no significant difference in the marginal income response to tourism across regimes, including the presence of fixed effects. There is no necessarily better productivity of the tourists in Gulmarg or Srinagar compared to Aharbal or

Yusmarg. The difference is in the level of accrued structure. High-flow destinations do not become wealthier since individual tourists create greater value, but due to years of operation of tourism at a greater magnitude and enhanced reinforcement. It turns out that growth is path dependent, which is also typical of cumulative causation and persistence effects that have been extensively observed in dynamic regional and sectoral systems (Rosenbloom et al., 2019; Hanger-Kopp et al., 2022).

This difference between the marginal productivity and accumulated structure becomes explicit after nonlinearities are taken into account. The income level that is estimated in Section 4 suggests that at an annual arrival level of less than about 337,000, marginal revenue gains are feeble or negative. There is preeminence of fixed costs, coordination failure and latent scale economies. At this stage, returns increase exponentially. This is not a statistical bend, and it indicates a change in the structure of production. Tourism is deeply integrated and not added on. The destination is no longer an amorphous set of non-linking, non-connective activities but is instead an economy of tourism. This meaning is in line with the literature of threshold effects, nonlinearities, and regime shifts in tourism-led development (Lind and Mehlum, 2010; Haans et al., 2016; Ehigiamusoe, 2020; Lv and Xu, 2023).

It is also through this mechanism that tourism tends to seem transformative in certain locations and insignificant in other locations. It does not happen that tourism is different in different places. It is that the system needs to attain a certain scale before its structural properties become operational. Beneath that level, tourism is considered peripheral; beyond it, it restructures the local economy, which has been a consistent trend in the comparative tourism-growth literature (Brida et al., 2016; Tang and Tan, 2018; Mitra, 2019; Perez-Rodriguez et al., 2022).

Environmental dynamics adhere to parallel and asymmetrical logic. Environmental indicators are persistent just as in the case of economic

variables, but there are no reinforcing benefits as is the case with income or employment. It builds up without inherent correction, one of the core issues of the tourism-environment literature (Mikayilov et al., 2019; Balsalobre-Lorente et al., 2020; Liu et al., 2022).

The amount of waste produced is proportional to the number of tourists. This would mean that there is an increment in material pressure with continued tourism. The number of endogenous saturation mechanisms does not exist: every new visitor contributes to an already increasing level of waste. Even the fact that there are no nonlinearities here is informative. The waste build-up is similar to a sluggish stocking and not a regime-switching variable. Long-run pressure is not caused by dramatic short-run shocks, but by the quiet and continuous accumulation, as it is also implied in empirical analyses of tourism intensity to continuously increasing waste and pollution loads (Balsalobre-Lorente et al., 2020).

The behaviour of forest loss is different. According to the lagged, cumulative, and dynamic models, deforestation is slow responding and highly persistent. Modern tourist arrivals are not only important, but lag effects are also important, which means that land conversion, informal encroachment, and infrastructure spillovers are realized over time. After the loss of the forest starts, it is likely to be repeated. This proves the path dependence of ecological degradation, that once land has been cleared, it is seldom reclaimed again, and fragmenting land creates permanent structural change. The loss of forests is not a flow effect, but rather a slow stock process, fully compatible with the empirical evidence of the relationship between infrastructure development, tourism development, and long-run deforestation dynamics (Baehr et al., 2021; Nguyen et al., 2023; Kocak and Cavusoglu, 2024).

Water quality, on the other hand, is characterized by a clearly defined threshold structure. Quality can also increase at low or middle tourism levels, and this is possibly an indicator of the investment in sanitation facilities, treatment capacity and environmental

monitoring. After about 1.24 million per year of arrivals, the rate of degradation increases at an alarming rate. This trend is also related to ecological resilience and environmental Kuznets type, where systems are able to absorb stress until a threshold is reached, and they transition into collapse regimes (Bella, 2018; Ghosh, 2020; Ehigiamusoe, 2020; Qin and Li, 2021; Raza et al., 2021; Sharma et al., 2025).

The fact that an income takeoff threshold exists on a relatively low scale and an ecological degradation threshold exists on a much larger scale produces a structurally significant asymmetry. It is necessary that economic advantages have a minimum level before they come into view, whereas ecological costs are dormant until a significantly broader scale is achieved. In the gap between these two aspects is a broad area in which tourism seems profitable and manageable in terms of its effect on the environment. This is some false balance. Expanding does not seem to be evil, and hoarding does not seem to be problematic. However, it is observed that exceeding the ecological threshold leads to increased degradation despite a stagnant growth in tourists, which is consistent with the wider body of literature on ecological limits and carrying capacity in tourism systems (Abhik, 2021; Zekan et al., 2022; Garau et al., 2022; Skiniti et al., 2024).

Mitigation response by the public seems to be reactive and not proactive. Cleanliness expenses and expenditures increase with the intensity of tourism, but not proportionately. Tourism flows may grow quickly, whereas institutional capacity may be modified at a slow pace. This correspondence of persistence is the same as found elsewhere. Physical pressure is increasing at a higher rate than institutional adaptation and regulation, which is coherent with the existing evidence on the topic of policy lag, institutional inertia, and transitions to sustainability (Rosenbloom et al., 2019; Ekins and Zenghelis, 2021).

Combined, these dynamics can be said to define a capacity-constrained accumulation system.

Tourism creates lasting economic systems and at the same time saturated ecology systems with unending pressure. Both processes are path-dependent and cumulative, but only one of them is productive, which is exactly the point of tension that is highlighted in the modern literature on sustainability and ecological limits (Ekins and Zenghelis, 2021).

The interpretation is especially applicable to Kashmir. The ecological environment, the spatial concentration of a tourism economy in the region and the lack of infrastructure make the sector vulnerable. These characteristics enhance the processes under this identification. The thresholds are achieved at a quicker rate, congestion impacts tie up earlier, and persistence is sturdier since various options to leave are constrained. There is slow ecological recovery in that regeneration capacity is weak. Tourism in these conditions can be seen not only as the engine of opportunity and a source of strain but also exactly as the carrying capacity and fragile-destination literature suggest (Skiniti et al., 2024).

The key policy issue is not to stimulate tourism, but the impact of its structural consequences. Having become embedded, tourism alters the labour markets, land use, governmental revenues, ecological sustainability, and sets of future options. These are short-run changes that cannot be reversed.

The implication of the most significant implication is the implication of time. The actions of today determine the course of action in several decades. Minor incremental alterations take place. Limits are surpassed without commotion. The status quo obstructs change. In these systems, governance does not focus on how to optimise flows; it focuses on stocks (Hanger-Kopp et al., 2022).

6. Conclusion

This paper aimed at looking into the issue of whether tourism is an activity of marginal economic activity or a structural force that transforms the local systems with time. Based on a balance of six destinations monitored over 20 years, the analysis reveals that the intensities of

tourism are not just linked to current developments in income, employment, or environmental measures. Rather, it reconfigures paths, creates some persistence, elicits nonlinear reactions, and creates cumulative forces that lack self-dissipation.

The system presented by the data has three characteristics. To begin with, changes brought about by tourism are long-term. There are the economic benefits, entry of firms, growth of infrastructure and environmental stress that all show high inertia. This continuity means that tourism is not merely the addition of activity annually; it creates stocks of capital, specialization and waste and ecological load which predetermine the future. The economy remembers. The environment remembers.

Second, the process of tourism is not smoothly adjusted but is based on thresholds. Income benefits only grow faster after reaching some minimum level, whereas the water quality declines drastically after passing some thresholds of congestion. The implication of these nonlinearities is that at different magnitudes, early-stage tourism and mature tourism are different phenomena; they are different regimes. This difference is key to the explanation, in that it relates to the differences between tourism seeming transformative in certain settings and dulled in others.

Third, economic agglomeration and environmental overcrowding are developed in an unequal way. There is a self-reinforcing benefit (caused by accumulation) and non-correctional costs in the stock accumulation of environmental costs that depend on economic benefits. There are pressure-dependent but lagging mitigation responses by the population. This time incompatibility is not a policy failure in the strict sense; it is an organizational feature of capacity-limiting systems.

These dynamics are very much seen in Kashmir, not because it is a special place but because it is exposing threshold effects and persistence are enhanced by spatial concentration, ecological sensitivity and low infrastructural redundancy. These findings are relevant to the policy of

tourism in the conceptualization. Tourism is commonly regarded as a flow that should be maximized. The discussions herein indicate that it should rather be viewed as a process of building stocks whose structural impacts in the long-run are more important than the short-term profits. The issue with tourism management is not how to manage the volatility, but how to control the accumulation.

There are a number of implications of this perspective. To begin with, the initial destinations that are at the early stages need to have their coordination and not necessarily promotion. At the threshold scale of less than 1, tourism does not necessarily entail good economic returns. Second, the maturity of destinations needs congestion control and not expansion incentives. When nonlinearities become effective, further growth produces decreasing or negative marginal returns to the environmental quality. Third, mitigation systems should be proactive but not reactive since damage is more often than institutions can adapt. Significantly, the paper does not oppose tourism. It criticizes the view of considering tourism as neutral. Tourism reorganizes. This realization can be used to govern more realistically by recognizing the irreversibility, path dependence, and the cost of late intervention.

7. Limitations and Directions for Future Research

Although this paper presents arguments that tourism is a structural agent that influences economic and environmental long-run pathways, there are a number of weaknesses that the researcher should admit. These constraints do not undermine the main arguments made in this case. Instead, they clear up the extent of inference and indicate likely avenues of future studies.

First, it is analysed using a relatively small number of destinations. The panel is long and balanced, but the cross-sectional dimension is poor. This is an indication of the design of the study being depth-oriented and not unrepresentative. This is not aimed at estimating

universal tourism impact elasticity, but rather discovering system-level phenomena like persistence, threshold behaviour and accumulation-congestion tradeoffs. Future studies would be able to test the generality of these mechanisms on larger and more heterogeneous samples across regions or countries. It would be possible to distinguish better between place-specific dynamics and a wider structural regularity with such extensions.

Second, the research is based on aggregate destination-based indicators. This degree of aggregation is suitable to represent structural change, although it is bound to obscure distributional processes in destinations. Growth brought by tourism can be geographical, imbalanced in the sector or stratified socially. There can be an unequal distribution of groups benefiting and groups incurring a greater amount of congestion, displacement or environmental costs. Future studies may combine household-level, worker-level, or firm-level data in order to investigate the ways in which the identified patterns of the system-level here are translated into micro-level inequalities.

Third, the dynamic specifications have the feature that they describe persistence, but do not explicitly describe expectations, forward-looking behaviour, or anticipatory policy responses. A response to realized tourist inflows, as well as to projections of future demand, may also be seen in the infrastructure investment. On a similar note, the environmental mitigation can be influenced by the congestion expected instead of the experienced pressure. These mechanisms might be investigated in a more explicit manner by structural or forward-looking modelling techniques and a distinction made between reactive and anticipatory types of adjustment.

Fourth, the environmental indicators used in this case are bound to be simplified versions of complex ecological processes. Generation of wastes and water quality are relevant dimensions of environmental pressure yet they do not exhaust the loss of biodiversity, soil erosion, division of habitat, and resistance in ecosystems. A combination of ecological field research,

remote sensing data, and biological indicators with economic panel techniques would enable future studies to follow the relationship between tourism and natural systems in a more detailed way.

Lastly, this paper does not seek to advocate for the use of quasi-experimental designs. The fixed-effects approach isolates heterogeneity which is time-invariant, but it is not based on exogenous sources of tourism variation. It is focused then on characterization of the systems and not on causal attribution. The future work might take policy reform, expansion of transport, change in regulations or natural

experiments to give policies a better understanding of causality and separation between supply and demand forces.

These shortcomings are not to be interpreted as weaknesses. They echo the overall aim of the paper of conceptualizing tourism as a system and not a treatment. This school of thought is not substitutive of micro-causal approaches. Before one can inquire into the performance of individual interventions in the economic and ecological structures, it is important to understand how tourism transforms conditions of these structures.

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