Resilience and the Afterlives of Events: Archaeological Theory for Heritage Practice

Dimitrij Mlekuž Vrhovnik *

Posted Date: 23 December 2025

doi: 10.20944/preprints202512.2038.v1

Keywords: resilience; assemblage theory; event; archaeology; heritage practice; materiality; transformation; collapse

 doi:10.20944/preprints202512.2038.v1

Article

Resilience and the Afterlives of Events: Archaeological Theory for Heritage Practice

Dimitrij Mlekuž Vrhovnik

University of Ljubljana, Slovenia; dimitrij.mlekuz@ff.uni-lj.si; Tel.: +386-1-241-15-44

Abstract

Resilience is often treated as a property of coherent systems. Drawing on assemblage theory and the concept of the event, this article reinterprets resilience archaeologically as a material effect of relations among people, things, and landscapes. Rather than measuring the stability of pre-given entities, we read resilience in the archaeological record through reconfigurations, continuities, ruptures, and redistributions that leave durable traces. This theoretical move clarifies how "collapse," reorganization, and emergence appear materially and why not all disturbances become events. We then pivot from theory to practice: heritage is framed as the afterlife of events, an assemblage that stabilizes the aftermath of rupture through conservation, commemoration, and care. Heritage's endurance is both fragile and generative: it depends on ongoing work while enabling communities to orient themselves amid uncertainty. The article thus positions archaeological theory to illuminate heritage practice, offering a material, relational account of how endurance is made and maintained. We close by outlining the ethical and political limits of "resilience" and proposing a reflexive, assemblage-based approach to heritage as reorganization.

Keywords: resilience; assemblage theory; event; archaeology; heritage practice; materiality; transformation; collapse

1. Introduction

Resilience -- the capacity to endure or reorganise amid disturbance -- has become a dominant concept in contemporary discussions of change, crisis, and adaptation. It pervades ecological theory, urbanism, psychology, and increasingly archaeology and heritage studies. The term now shapes not only how we understand transformation but also the political and ideological frameworks through which crises are managed.

In archaeology, resilience has gained traction as a way to think about long-term human-environment interactions. Archaeology is uniquely positioned to observe how communities adapt, persist, and transform across centuries or millennia. The archaeological record reveals diverse trajectories: some societies endured through sustainable strategies, others collapsed or reorganised radically. Such examples show that persistence is never simple endurance; it often depends on transformation, on reconfiguring the relations that hold societies together.

The challenge, then, is to conceptualise resilience not as an abstract property of systems or communities, but as a material effect: the outcome of practices, mobilities, economies, architectures, and social relations that emerge through dynamic engagement with changing conditions. Archaeological evidence consists of these material traces, bodies, landscapes, and objects through which endurance becomes visible. Resilience must therefore be understood materially, as the capacity of configurations of people and things to persist or recompose through time.

This material dimension also grounds what we call heritage. Heritage, in a broad sense, is what endures, yet this endurance is neither self-evident nor guaranteed. Heritage is not merely what survives the past, but what is continually reassembled and cared for in the present. It is the outcome of material and symbolic work that stabilises change, translating the persistence of traces into new forms of meaning and belonging.

 doi:10.20944/preprints202512.2038.v1

Thinking resilience through archaeology thus opens a path toward rethinking heritage. Heritage itself can be seen as a form of resilience, not the passive survival of monuments or sites, but an active capacity to absorb change and reorganise significance. Understanding heritage materially helps us see how endurance is made and maintained: through the inertia of walls and roads, through the persistence of landscapes, through acts of conservation and commemoration that bind fragments into continuity [1].

This paper follows one line of argument. It traces the concept of resilience from its origins in systems theory and cybernetics, where it described the behaviour of complex adaptive systems, and translates it into the material language of archaeology; into the realm of things, relations, and events. This translation entails two shifts: first, from systems theory to assemblage theory, which allows us to think resilience from the fragment rather than from the whole; and second, toward the concept of the event, those moments when resilience is tested, fractured, or reconstituted, and where the archaeological record registers transformation. Our aim here is to use archaeological theory to illuminate heritage practice. The argument proceeds from systems to assemblages and events, and then specifies how this theoretical lens reframes heritage as material reorganisation after rupture.

Through these shifts, resilience becomes less a systemic property than a material process, as something enacted through relations, reconfigurations, and care. At the same time, this move brings heritage back into focus. If resilience concerns how configurations persist through change, heritage is its lived counterpart: the social and material practice through which endurance is continually rearticulated.

To think resilience materially, then, is to think heritage reflexively. Both are about how worlds hold together -- or fall apart -- and how the past remains active in the present through the reorganisation of its traces. Archaeological theory, in this sense, can illuminate heritage practice: not by offering management models, but by revealing the material and relational conditions through which endurance, loss, and renewal become possible.

2. From Systems to Relations: An Archaeological Recasting of Resilience

The concept of resilience denotes the capacity of a system to maintain its core function and internal coherence despite dramatic changes in circumstances. It emerged from postwar developments in cybernetics and General Systems Theory, which sought to explain how organised wholes persist through the interaction of interdependent parts. Systems thinking made it possible to analyse complex phenomena across scales, from organisms and ecosystems to societies and global markets, emphasising that the whole cannot be reduced to the sum of its components. Such systems are characterised by internal coherence, stability, and the capacity for self-regulation through feedback loops. Early systems theories, particularly in cybernetics and ecological modelling, focused on deterministic processes and the role of negative feedback in maintaining stability. System behaviour was understood primarily as a tendency toward homeostasis, an internal equilibrium sustained despite external disturbances [2,690]. Yet this view captured only part of the complexity of real-world dynamics, describing stability more readily than transformation.

To overcome these limitations, Complex Adaptive Systems (CAS) theory emerged, emphasising nonlinearity, emergence, and self-organisation [3]. Complex systems operate far from equilibrium, under conditions of continuous change and adaptation. Their structure and function arise internally through interactions among elements, phenomena generated by adaptation, iteration, and evolution [4]. Within this framework, resilience becomes more than survival or stability: it denotes the capacity for transformation and the creation of new forms of order despite disruption. Whether conservative or transformative, resilience signifies the persistence of coherence through change, survival through reorganisation.

This conceptual shift, from homeostatic stability to nonlinear dynamics, has had major implications for archaeology. The framework of complex adaptive systems has reshaped how long-term human–environment relations are understood. Earlier applications of systems theory emphasised adaptation and balance [5,6,19–25], whereas recent archaeological approaches employ

 doi:10.20944/preprints202512.2038.v1

resilience to explore how societies responded to crises, environmental change, and social upheaval [7,8]. Contemporary archaeology often draws on the concept of Coupled Human–Environment Systems, in which social practices, environmental processes, and material infrastructures form interwoven wholes [9]. Societies are not separate from their environments but immersed within them, co-producing them through ongoing interaction. Environmental change is thus not an external disturbance but an internal dynamic of the system itself. Resilience, in this light, denotes the capacity to sustain and renew relations among people, materials, and landscapes through time.

The behaviour of complex systems is often modelled through adaptive cycles, a key analytical tool for understanding dynamic change [10]. The cycle traces system behaviour along three dimensions: the potential for change (the accumulated resources, knowledge, and social capital defining possible trajectories), the degree of connectedness among internal variables (reflecting rigidity and control), and resilience, which measures vulnerability to disturbance. It begins with a phase of exploitation (r), rapid growth, innovation, and resource use and is followed by conservation (K), characterised by stability and efficiency but also increasing rigidity and inertia. The Ω (omega) phase marks release: collapse or breakdown of established relations, while the α (alpha) phase represents reorganisation and renewal, when new configurations and ideas emerge, sometimes continuous with the past, sometimes radically new. The cycle rarely follows a single linear path but unfolds through overlapping or skipping phases, alternating between the poles of productivity and innovation [11,63–66]. Resilience is not a fixed attribute but a shifting quality; stabilising during conservation, transformative during reorganisation.

Systems are rarely singular. They consist of multiple interconnected adaptive cycles, a hierarchical arrangement termed panarchy [12,32]. Panarchy transcends static notions of equilibrium by describing how change at one level influences others. Larger, slower cycles provide stability and memory, enabling smaller, faster ones to pass through collapse and renewal without disintegrating the whole. Conversely, local breakdowns can cascade upward, destabilising broader structures, while macro-level constraints shape opportunities for innovation below. This interweaving of scales allows for a dynamic understanding of crisis and renewal, persistence sustained not by equilibrium but by the continual negotiation between stability and transformation. Slow processes set the framework for faster ones, yet rapid changes can, in turn, redirect long-term trajectories, as visible in the archaeological record through shifts in subsistence strategies, demographic patterns, social organisation, and technological innovation [13].

In archaeology, resilience theory provides a powerful framework for understanding long-term interactions between human communities and environmental systems. It directs attention to how human activities, especially resource use and land management, affect ecosystems conceived as complex entanglements of ecological and social processes. Environmental degradation, demographic decline, or social collapse thus appear not as isolated crises but as parts of broader and temporally extended reorganisations. Archaeology's long-term perspective makes it uniquely suited to tracing these processes, revealing both their immediate triggers and their deep structural causes.

A classic example is the study of the Classic Maya collapse [14], which uses resilience to explain the heterogeneous responses of the Maya Lowlands to prolonged droughts and environmental degradation. The collapse, they show, was neither uniform nor sudden: in some regions cities were abandoned and political systems disintegrated, while in others communities persisted or reorganised into new forms of settlement and land use. Infrastructure, irrigation systems, agricultural organisation, and access to resources emerged as key factors of resilience. In this light, resilience describes not the preservation of a fixed order but the capacity of certain communities to absorb disturbance and reorganise without losing continuity in their material and social practices.

In the context of Anthropocene archaeology, resilience theory points to regenerative agroecological practices such as terra preta in Amazonia, exceptionally fertile anthropogenic soils created in pre-Columbian times by depositing organic refuse, charcoal (biochar), bone fragments, and pottery sherds. These long-term relations between people, soils, and environments exemplify a form of resilience that arises from material and biological co-creativity, not from systemic stability [15].

 doi:10.20944/preprints202512.2038.v1

Archaeological examples thus reveal diverse histories of catastrophe, collapse, persistence, and transformation. They show multiple pathways of long-term resilience and offer a way for archaeology, through concrete empirical studies, to explore how human communities have responded to environmental and social change across millennia. However, these examples also raise crucial questions. What exactly do we mean by "resilient"? What is the unit of analysis that persists or reorganises: a community, a political system, a region, a mode of dwelling, a technology? How do we define the boundaries of the entity to which we ascribe resilience? And where do we draw the line between collapse and transformation? Such questions point toward deeper epistemological issues, not only concerning the use of the concept of resilience but also the basic assumptions about what we observe, compare, and interpret in the archaeological record.

The first issue is methodological: how can models grounded in abstraction be applied in archaeological practice? A system is an epistemological construct, a way of thinking about relations, interactions, and effects among components that are themselves often conceptual abstractions (e.g., "economic system," "social structure"). Archaeology, however, begins from the concrete, from material traces and their spatial and temporal relations. The step from these fragments to a coherent system is anything but self-evident. It involves retroactive modelling, where a cluster of material remains is endowed with a logic that may never have existed in advance.

What, then, does "system" actually mean in archaeology? Can we meaningfully think of the Roman Empire as a system? Is it coherent enough to be treated as a unified entity? And what defines its identity, political organisation (which changed dramatically over time), language, urban networks, infrastructure, or symbolic order? Which of these components determines its resilience?

If the Roman Empire can still reasonably be approached as a system (since it conceived of itself as an entity), the problem becomes sharper for entities that are purely archaeological constructs, such as the "Vinča culture." Here, the construct refers to shared ceramic styles, settlement networks, or certain technological and symbolic patterns, but these do not necessarily constitute a functionally coherent system [cf. 16]. To ask about the resilience of such an entity may be a wrongly posed question, insofar as it presupposes the existence of a stable whole that may never have existed.

When we describe an archaeological phenomenon as being in a phase of conservation or reorganisation, we already presuppose that we are dealing with an integrated whole functioning as a system, with internal connectedness, functionality, and historical dynamics modelled on the adaptive cycle. To call something "resilient" is to define it as a system possessing internal coherence and the capacity to respond. Yet the archaeological record rarely confirms this on its own. It consists only of material traces of various configurations of things, landscapes, practices, and bodies, elements that may have coexisted but were not necessarily connected into a coherent system.

Resilience in this context is not an analytical finding but a retrospective interpretation of persistence. Before speaking of resilience, we must first undertake the analytical work of identifying, in the material record, the relationships, entanglements, and continuities that can be described as resilient. Only through this work, without assuming systemic coherence in advance, can we begin to ask how certain configurations survived, transformed, or re-emerged. In this sense, heritage can also be understood as a similar operation; the reconstruction of coherence from remains, an interpretive act that attributes persistence and connectedness to what was once fragmented. In what follows, therefore, we propose a shift from systems to assemblages: an approach that offers a more material, open, and relational conceptual tool for understanding archaeological configurations and their resilience.

3. From Systems to Assemblages

Complex adaptive systems and panarchy illuminate how patterns of adaptation and transformation unfold across scales, yet at the same time expose the limits of systemic thinking in archaeology, which remains bound to abstract models rather than to the material textures of change. Even when grounded in empirical data, they presuppose coherence and functionality that the archaeological record rarely confirms. What the record gives us are fragments, relations among

 doi:10.20944/preprints202512.2038.v1

things, not self-regulating wholes. To think with these fragments, rather than against them, requires a different conceptual language. Assemblage theory offers such a framework: it begins not from totalities but from partial, contingent configurations of materials, practices, landscapes, and bodies [17].

Assemblages provide a framework for thinking about reality that does not rely on totalising entities but on temporary configurations of heterogeneous elements. They bring together human and non-human entities: objects, bodies, materials, spatial forms, and discourses, not through internal coherence but through relations that are historical, contextual, and contingent. In this light, heritage itself can be seen as an assemblage: an ongoing composition of people, things, places, and meanings that are continually reassembled and reinterpreted. What we call "heritage" is not the endurance of a fixed form, but the persistence of relations through which fragments are held together, reconfigured, and given new life.

There are many similarities between assemblages and systems. Both address questions of organisation, stability, change, multi-scalar relationships, and emergent properties that arise from complex interactions among elements. Both complex adaptive systems and assemblages are not static wholes but dynamic configurations that form and dissolve over time. Both employ a relational logic that begins from relations among parts rather than from the properties of isolated elements. In both, openness to the environment, nonlinearity of change, and embeddedness of structures are crucial.

Yet despite these conceptual parallels, assemblage theory introduces a crucial shift. Instead of assuming functional coherence and cyclical dynamics, it focuses on heterogeneity, partiality, contingency, and incompleteness. Assemblages are not understood as integrated systems but as temporary, open, and incomplete configurations of material things, people, animals, landscapes, and practices. Whereas systems presuppose stability and the reproduction of identity through cycles, assemblages begin from the possibility of disintegration, unbinding, and recomposition. This opens different understandings of resilience; not as the preservation of a system's identity, but as the capacity for relations, even after previous connections have collapsed, to be rearticulated in new and unexpected forms.

In the work of Gilles Deleuze and Félix Guattari [18,88], assemblage or agencement does not denote a static configuration or state of affairs, but a process of arranging, ordering, and connecting heterogeneous bodies and things that "act upon each other" [19,45]. Assemblages are open and continually in the process of becoming, composed of heterogeneous elements that temporarily coalesce and are constantly reassembled and undone. They emphasise relations and interactions rather than stability or pre-given functions, allowing archaeologists to approach resilience as an emergent property arising from the entanglement of the material, ecological, and social [20].

By focusing on the interactions among elements within an assemblage, we can discern how new properties and capacities emerge from their relations. Resilience, in this sense, is not the endurance of a bounded system but an emergent effect of flexible and adaptive linkages among materials, landscapes, infrastructures, and practices [21]. It describes not resistance but responsiveness, the capacity of relations themselves to reconfigure under changing conditions. From this perspective, archaeology can begin to trace resilience empirically: in the ways material configurations enable continuity, absorb disturbance, or open possibilities for transformation.

Moreover, this perspective opens an epistemological shift. Resilience need not be understood as an intrinsic property of a system within an adaptive cycle, but rather as its ability to maintain function or reorganise after disturbance. Such a reductionist view collapses resilience into a functional attribute of cyclic dynamics oriented toward maintaining systemic integrity. In contrast, assemblage theory raises different questions: how resilience arises without stable identity, how it operates under conditions of partiality, heterogeneity, and contingency. Resilience thus becomes an empirical question, something that materialises within specific relations, compositions, and practices. Rather than being pre-given, it must be discerned from concrete traces: how it was established, when it fractured, what enabled or constrained it.

 doi:10.20944/preprints202512.2038.v1

Unlike systems, assemblages have no intrinsic balance; they do not strive for stability but exist in a tension between their processes of unbinding (deterritorialisation) and reassembling (reterritorialisation). Their resilience is not a function of the whole but an effect of specific relations, the capacity for relations to persist or to be recomposed despite shifts in composition. Resilience in assemblages unfolds between the persistence of material dispositions and the inventiveness of available elements that can be recombined differently [10,11,17].

Human societies are composed of many different things: human and animal bodies, objects, tools, places, and landscapes. These entities can simultaneously belong to different formations and participate in multiple assemblages. Assemblage theory flattens these elements onto a single ontological plane, a flat ontology [22], meaning that within an assemblage, there is no predetermined hierarchy or privileged element. The effects of an assemblage cannot be reduced to the sum of its components. Assemblages are relational constellations in which the collective is not defined by a centre but by the pattern of relations among its parts. If complex adaptive systems conceive the world modularly, as a network of interconnected subsystems (social, environmental, material) linked through flows of energy, matter, and information, assemblage theory dissolves the notion of a unified whole. The world becomes a flat field of relations among ontologically equivalent entities: people, materials, organisms, and landscapes. These relations not only connect them but constitute them, shaping their identities and existence in the process.

Assemblages are productive; they generate new organisations, behaviours, and expressions [23,29]. The introduction of a new element into an existing assemblage can trigger a reorganisation of the entire society around it. The introduction of sheep into indigenous Mesolithic forager communities, for instance, gave rise to a new pastoral society with profound landscape effects. This transformation was not planned but emerged spontaneously from the insertion of a new element into an existing configuration [24]. The effect or agency of an assemblage is therefore an emergent property, a kind of distributed agency [22,25].

For assemblages to exist, they must contain real, material entities, things and substances capable of entering into relations. The components of an assemblage are not inert objects but entities capable of interaction; they can affect or be affected, transmit information, perceive, or respond. They play an expressive role: transmitting, sensing, or reacting. An assemblage is therefore not a collection of inert things but a network of active relations [17,20–40]. For example, a dry-stone wall in the landscape is not merely a physical barrier to animal movement, it also marks boundaries, ownership, and possession; it alters the behavior of humans and animals alike, contributing to the emergence of a new landscape organisation- Assemblages may include components that stabilise (territorialise) as well as those that unbind (deterritorialise), reshaping their internal coherence.

A baboon society, for example, functions as an assemblage whose primary components are baboon bodies. They are skilled social actors, but they maintain social relations only through their bodies, intelligence, and the history of interactions. They perform society through face-to-face encounters, reconstructing it daily. The assemblage dissolves if the animals disperse. Such a society is soft, yet extraordinarily resilient, because it rests on skill and continuous performance [26]. A more stable society emerges only when additional resources, beyond bodies and skills, are incorporated into assemblages: material objects and signs. The material, by definition, endures. Humans can delegate certain social functions to things, enabling order to persist even in the absence of actors [27]. Material resources and symbols transform the complexity of social life into a sequence of simpler operations [26,210]. Materials shape behaviour, movement, and patterns of interaction, thus increasing the durability of the assemblage.

In this way, assemblages become less reversible: materiality acts as inertia, resisting change, buffering disturbance, and enabling continuity. The difference between humans and animals lies not in the presence or absence of social organisation, both have it, but in how that organisation is stabilised, anchored, and materialised. The resilience of human society rests on its configuration of material things: these sustain specific social forms, enabling the absorption of events and change. Yet

 doi:10.20944/preprints202512.2038.v1

that very configuration also contains the potential for breakdown. Materiality endures, but it can also decay. What enables resilience can also become the point of rupture.

Assemblage theory emphasises the diversity and partial autonomy of components: humans, animals, objects, infrastructures, and landscapes. Resilience, in this view, does not arise from the stability of a system but from the configuration of relations that allow persistence or reorganisation despite change. Assemblages can be analysed through processes of deterritorialisation and reterritorialisation: in the unbinding and recomposing of relations, we can trace moments of innovation, collapse, or adaptation. Resilience here is not the result of coordinating different levels but the effect of localised entanglements among components that operate in parallel rather than hierarchically.

Assemblage theory thus foregrounds diversity and partial autonomy. Material resources and their modes of connection are key to the resilience of assemblages. Archaeology can study resilience by analysing how specific configurations of people, animals, objects, infrastructures, and built environments have, over time, either strengthened or undermined social endurance. Heritage can be similarly conceptualised as an assemblage; it similarly operates as a distributed phenomenon: no single object or monument carries meaning on its own. Its identity lies in the web of relations among materials, people, institutions, and memories that sustain it over time.

Resilience is therefore always partial and contingent. There is no single cause, no stable core, only constellations of material conditions that allow something to persist, transform, or re-emerge. Assemblages open space for a different conception of resilience: resilience without a stable core, without the need for internal coherence or the reproduction of identity. It is no longer the system's capacity to persist through functional stability, but the capacity of material relations to recompose themselves amid breakdown, loss, and redistribution, even in altered and temporary forms. Resilience here is not an expression of inner strength but of openness, the potential for continuation without any guarantee of continuity, for living amid uncertainty and loosened order. Not all elements in an assemblage are tightly integrated; some retain degrees of independence, which may become crucial in moments of rupture. Techniques, traditions, or spatial features that reappear in new contexts can significantly contribute to the adaptive capacity of assemblages.

Heritage exemplifies this relational logic. It operates as a distributed assemblage: no single monument or object carries meaning on its own. Its resilience lies in the web of relations among materials, people, institutions, and memories that sustain it over time. The same material inertia that stabilises relations also anchors vulnerability. Heritage endures because it resists, but it can also become brittle, a residue of obsolete relations that once gave it coherence.

Archaeology does not observe resilience directly but reconstructs it from the configurations of material things, from the distributions, traces, and spatial relations through which past practices, infrastructures, and relations are expressed. These are not fixed forms but dynamic relations, established, unbound, and recomposed over time. Resilience thus manifests in the persistence of certain connections, in recurring patterns of spatial use, and in the stabilisation of material dispositions that enable duration despite change. In this sense, archaeology explores how relations are formed, transformed, and sometimes consolidated into relatively stable configurations.

Assemblages recognise unpredictability and nonlinear causation in processes of change and reconfiguration. Relatively minor events, such as a few sheep entering a foraging community, can trigger waves of transformation that reshape both social and ecological resilience. Assemblage theory does not offer a single model of resilience but a mode of thinking that situates resilience within material and historical conditions, as an effect of relations that may break, transform, or re-emerge. Yet within this open field, a crucial question returns: what produces rupture? How do we understand the moments of destabilisation when relations lose cohesion and something radically new comes into being?

 doi:10.20944/preprints202512.2038.v1

4. Change, Reorganization, Event

Resilience is always resilience to something, to a rupture, disturbance, crisis, or transformation that threatens existing relations among elements. In this sense, the event becomes central to understanding resilience: it is the moment when a configuration may change, when a relation unravels or is re-established anew. Yet we should not understand events simply as "disturbances," because disturbance presupposes a normal state, stability, and equilibrium. An event is not a deviation from order but the moment in which new relations are instituted; a moment of configurational possibility, with no guarantee that the new will in fact come to be, or what it will be.

Within the adaptive cycle, the omega (Ω) phase marks the breakdown and loss of an existing organisation, the point at which rigidities accumulated during conservation dissolve. Here, resilience reaches its minimum; the system can no longer persist in its current configuration [3–22,28]. Although the omega phase need not be catastrophic, it often coincides with sudden ruptures, ecological crises, social breakdowns, or political collapses, that destabilise existing relations and trigger the need for reorganisation. At such moments, resilience is revealed not as a capacity to return to a prior state but as the capacity to establish a new order, a new coherence that does not arise from continuity but emerges from the dissolution of the old.

Collapse is often presented as the binary opposite of resilience: societies either withstand disturbances and persist (resilience) or fail and disintegrate (collapse). Inability to adapt to shifting environmental, social, or economic conditions heightens vulnerability to collapse [7,8,29]. This implicit opposition pervades many discussions: a society either survives or it fails. Jared Diamond's Collapse: How Societies Choose to Fail or Succeed [30] offers precisely such a scheme, where collapse signals systemic failure, often due to resource depletion, poor decisions, or elite inaction. Though Diamond acknowledges multiple causal layers, his approach presupposes a functional whole that either maintains its integrity or irreversibly loses it. That model aligns well with the classic image of the omega phase as release, breakdown, or loss of organisation.

Framing collapse as the binary opposite of resilience overlooks the complex ways societies respond to disturbance [8]. Archaeology can illuminate alternative pathways, transformation, survival, regeneration, that are not a return to a former state but the establishment of something different [31]. In this context, collapse need not be a symptom of failure; it can act as an event of reordering, a rupture that triggers reorganisation without the need, or the possibility, of returning to a previous configuration.

With its emphasis on heterogeneity, contingency, and relationality, assemblage theory allows us to read dramatic changes in the archaeological record not as collapse in a binary sense but as events that unbind existing relations and open possibilities for new configurations. Such events, either slow or sudden, function as catalysts for processes of deterritorialisation and reterritorialisation that reshape relations within an assemblage. An event is not necessarily a sign of collapse; it can indicate reorganisation, the emergence of new coherence, or transformation at the level of material dispositions. These transformations take shape through interwoven factors operating across spatial and temporal scales but always concretise in singular material constellations.

The adaptive-cycle model sees change as passage through phases of growth, stability, release, and reorganisation, with relations continually reconfigured. Assemblage theory thinks this process differently: not as a cycle but as the continuous emergence of new relations among people, landscapes, and practices. Both seek coherence in an unstable world, but assemblage theory emphasises that coherence is not a goal; it is the way the world momentarily recomposes and shows its plasticity.

Events, then, are not necessarily catastrophes. Societies may respond with migrations, adjustments, and new forms of life rather than simply disintegrating [32]. Resilience and collapse are not mutually exclusive. A society may be resilient in certain respects, preserving religious beliefs or social structures. While experiencing political collapse [8]. Resilience may postpone or soften the effects of an event without preventing a future collapse; conversely, collapse can create conditions for future resilience by breaking down old systems, prompting innovation and adaptation, and

 doi:10.20944/preprints202512.2038.v1

enabling the emergence of more robust configurations [8]. This may lead to transformative resilience, a thorough reconfiguration that better fits new realities [7].

Events are crucial for understanding resilience because they function as disturbances that test a system's capacity to respond and adapt [8]. They may be sudden shocks or protracted tensions and conflicts, and their impacts vary across individuals, institutions, and societies [33]. Events activate resilience mechanisms intended to preserve function, structure, and identity [8,33]. Archaeology, with its long-term perspective, can retrospectively identify such events and analyse their effects [7].

Events may include so-called "natural" phenomena (earthquakes, volcanic eruptions) as well as "social" ones (wars, revolutions, technological shifts, migrations) [2,34,35]. Identifying events is key to understanding past resilience. Yet not all changes are perceived as events: for example, climatic fluctuations, though evident in paleoclimate curves, may leave no archaeological trace if societies absorb them or fail to register them as significant [36]. An event is not objective but relational and perceptual. A sharp cooling associated with the 8.2 ka paleoclimatic episode [37] is not, in itself, an event for Early Neolithic communities in Europe. It becomes an event only when it enters a configuration of relations and triggers their reorganisation. If no response can be identified, no perceptible break or reconfiguration, then we are not dealing with an event but a non-event, a change without rupture (arguably the case for the "8.2 ka event" in Europe, which might be better read as a deviation from trend).

There are, however, opposite moments, events in the radical sense, that are not merely changes within an existing world but changes of the world. They arise not because someone recognises them but because they are inescapable. They are not the product of accumulated causes but of interruption, intrusion, excess. Slavoj Žižek defines the "event" as a transformative, disruptive occurrence that radically alters our grasp of reality and of ourselves [38]. An event is an effect that exceeds its cause; its space opens in the gap between cause and consequence.

An event is not simply a major occurrence within an existing frame, but something that cuts into, destabilises, or decomposes that frame. It is not a change within order, but a shift of the order. The event reveals what was repressed, unarticulated, or unsayable by the order, forcing a radical reconsideration of what the order means. In this sense, the Žižekian event is not merely a test of resilience; it strikes at its core, at the presumption that survival can be achieved without transformation. The response to an event is not management but an acknowledgement that something has irreversibly changed, sometimes reorganisation, sometimes disintegration, but in all cases an irreversible leap. The event is an irruption of the Real, which resists symbolic integration, and it exposes the system's contradictions and fissures that resilience may have veiled.

An event, therefore, always carries a political dimension, not as an ordinary political occurrence, but as a moment when the Real pierces the symbolic order, exposing cracks in the existing arrangement and opening the possibility of radical transformation. Revolutions, the French Revolution, the fall of the Berlin Wall, the collapse of the Late Bronze Age: these matter not merely because they are historical, but because they reshape what counts as historical, instituting a new field of possibility.

An event is a Žižkean event only if it triggers radical change. If we understand it as an irruption of the Real, what exceeds and tears through the symbolic order, then it cannot be predicted, only recognised retroactively by its effects. Without a reconfiguration of the world as we know it, an "event" remains a disturbance. Thus, environmental collapse, say, climate crisis, becomes a Žižekian event only if it forces a fundamental redefinition of the human–nature relation, a reworking of identity, meaning, or social order. Otherwise, the event remains unfulfilled; its real potential for change stays repressed.

Resilience is therefore not immunity to events but the capacity to reorganise after them. A resilient configuration may not return to its prior state; it may transform into a new, sometimes radically different, arrangement. Events can expose latent contradictions previously masked by "resilience": what looked like persistence may, in fact, have been rigidity, path dependence, or false stability.

 doi:10.20944/preprints202512.2038.v1

Heritage, in this sense, can be understood as the cultural attempt to domesticate the event, to re-inscribe the excess of the Real into symbolic and material forms. Through conservation, commemoration, and narrative, heritage translates rupture into order, transforming the unassimilable into structures of meaning. Yet this translation is never complete: what we call heritage always carries within it the residue of the event, the trace of what resists integration. In some of its forms, especially in the heritage of trauma, ruins, and memory, heritage can function as a work of containment, a way of stabilising what cannot be fully resolved. It materialises the effort to give form to loss, to render bearable what defies symbolisation, even as it preserves the disquiet of the event itself. At the same time, heritage also operates within the space of reorganisation that follows rupture: it arises not before but after the event, as an assemblage of what remains, reconstituted into new configurations of meaning and continuity. Heritage is thus the material and symbolic practice through which societies stabilise the aftermath of transformation, converting loss into structure, discontinuity into relation, and absence into the possibility of renewal.

In this sense, the Žižekian event marks an epistemological limit for resilience discourse. If resilience theory treats every response to disturbance as resilience, it loses the ability to distinguish between transformation within a system and an event that calls the system itself into question. The event is not merely disruptive change within an existing order; it is a rupture that reveals the order's contingency, produces an irruption of the Real, and demands a reconfiguration of the symbolic coordinates themselves. If resilience usually means reconfiguration without loss of identity, the event exposes the limits of that notion. The theory of complex adaptive systems can respond to such an event in only two ways: either it fails to conceptualise it, or it assimilates it as "reorganisation," thereby neutralising its radicality. In both cases, resilience, as currently conceived, is not equipped to confront events that reshape the very conditions of possibility for resilience. In that sense, the Žižekian event is also an event for the concept of resilience itself.

5. The Material Life of Events

To think of resilience in archaeology as more than simple persistence, we must think of it through the event, through the disturbance that unravels an existing configuration, and through the new configuration that arises after change. The event is not merely a test of stability but the moment that loosens relations within an assemblage and triggers processes of deterritorialisation, the loss of internal coherence, and potential reterritorialisation, the establishment of new relations.

An event entails the disintegration or recombination of relations that sustain material stability. In the archaeological record, it cannot be perceived directly but only as an effect. The record can be understood as the sedimented effects of events [39,61], not as direct residues of action, but as the material transformations events have produced, persisting for different durations. It is not individual things that testify to events, but entire configurations of material relations - assemblages- that preserve traces of reorganisation, breakdown, and renewal. Archaeology reads these as the aftereffects of past events [39]. In this sense, heritage may be understood as the living continuation of these effects, the ongoing reworking of material traces through which past events remain active in the present.

Events become visible archaeologically only when they produce sufficiently deep reconfigurations of assemblages; of relations among things. Crucial here is the balance between reversibility and irreversibility in material configurations. The more structured and materially anchored an assemblage, the more indelible the trace left by the event that tears it apart. Where relations are not stabilised by material anchors, the changes triggered by an event are usually reversible. Events that cause only brief or easily restored reconfigurations remain archaeologically almost invisible. In baboon societies, where the material organisation of assemblages is weakly articulated, an event, say, a conflict between two males, though socially significant, leaves almost no archaeological trace (perhaps a tooth mark on a bone). By contrast, conflicts in human societies generate extensive material records: layers of ruins, horizons of burning, mass graves, and the new configurations established afterwards.

 doi:10.20944/preprints202512.2038.v1

An event does not merely replace one set of things with another but transforms the relations they form. It can dissolve existing links within assemblages or establish new configurations. These transformations are constrained by material and social inertia: the more stable and entrenched a configuration, the greater the intensity of the event required to disrupt it. Such rupture often demands deterritorialisation, the dissolution of an assemblage's internal coherence, before allowing new relations to be rearticulated and inscribed in the archaeological record [39,63,64].

Reversibility and irreversibility are not merely technical features of events in relation to assemblages; they are also fundamental analytical criteria for understanding resilience. When assemblages reorganise after an event without losing their function or structure, we can speak of high resilience; when disintegration occurs without regeneration, resilience is low. Yet for archaeology, another aspect is crucial: events become archaeologically perceptible only when reorganisation passes the threshold of irreversibility, when the new configuration is not simply the restoration of the old but its transformation. It is precisely this rupture, this irreversible change in material relations, that creates a trace archaeology can detect.

Assemblage thinking allows resilience to be conceived from materiality itself, without recourse to stable systems or inner coherence. Resilience here is not a property of a system but an effect of relations.

Events, as known from history or sociology, happen constantly, but the events visible to archaeology are a special kind: those that produced irreversible transformations in material configurations [39]. The more things involved, the more their relations are anchored by material supports, the greater the likelihood that the event will leave a durable trace. This inertia contributes to resilience; it dampens change, stabilises systems, and mitigates chaos, but excessive inertia reduces adaptability: an overly rigid system may fail to adjust and collapse.

Assemblages offer archaeology not just a new tool but a new optic. Resilience and collapse are not opposites but effects of events that reconfigure relations among concrete material things. The archaeological record thus becomes the trace of change, the record of events that dissolved old relations and composed new ones. In this shift, resilience is no longer a property of systems but a material process, enacted through continuities, ruptures, and redistributions, through the ways relations are made, unmade, and reassembled in the material world. Heritage, too, is such an effect: not simply what endures, but what is continuously reconstituted from the residues of events, from the material reconfigurations that bind past ruptures to present meaning.

6. Discussion

Resilience in archaeology is, first and foremost, an epistemological question. It is not about whether a community survived or collapsed, but about how and when we can recognise rupture, disturbance, or reorganisation in the archaeological record and how such transformations can be interpreted as manifestations of resilience, if at all. The archaeological record does not capture ideas, intentions, or strategies directly; it records the material traces of events that have reconfigured relations among things. The concept of resilience is abstract; the archaeological record is fragmentary. The relationship between the two is neither direct nor self-evident. If resilience means the capacity of a system to maintain or transform itself in the face of disturbance, then the question arises: how can such a process be recognised when all we have are sediments, distributions, voids, and remains?

The notion of resilience often presupposes the existence of a clear, internally coherent entity that either persists, transforms, or disintegrates. Yet in archaeology, we rarely encounter such coherent entities. What we have are fragmentary, spatially and temporally dispersed traces, which do not combine into integrated systems but form heterogeneous and partial assemblages without necessary internal coherence. Entities such as "culture," "community," or "society" are not always directly accessible from the archaeological record; they are often the result of interpretive abstraction, a conceptual form derived from material traces. But this does not mean that all archaeological entities are mere constructs. Some assemblages of material relations are sufficiently coherent, stable, and persistent to be understood as actual forms of social organisation in the past.

 doi:10.20944/preprints202512.2038.v1

Resilience, then, does not refer to the stability of a pre-given entity, but to relations within assemblages that can maintain or reconfigure their coherence despite events. Assemblage theory allows us to think from the ground up: resilience is no longer an attribute of a whole but an effect of configuration.

Resilience manifests differently at different spatial and temporal scales. The collapse of a community does not necessarily imply the disappearance of its population; a change in settlement pattern does not automatically mean the collapse of social organisation. Yet macro-perspectives can blur the human scale of tragedy. A society may be resilient; it may survive events, but that survival can entail profound disruptions for individuals, sometimes even death. Archaeological analysis, therefore, must not remain abstract; we must always ask: who is resilient, at what level, in what time, and at what cost? Without these questions, resilience risks measure the survival of systems even when that survival depends on the disintegration of their parts. The system may endure at the cost of your death if that is the price it is willing to accept.

Even analytical models such as panarchy, while useful, often blur the boundary between system and environment, between core and periphery, between persistence and decay. If everything is resilience, then it is no longer possible to think about difference, rupture, wounds, or loss. Resilience is not a fixed concept but a flexible idea -- or even a metaphor -- that can mean different things in different contexts. When treated as a neutral, universal concept, it risks obscuring, or even misusing, its deep political implications. Resilience can act as a form of neoliberal governance, shifting responsibility for survival onto individuals and vulnerable communities while depriving them of the political power to create change amid perpetual crisis. In this way, resilience can sustain a status quo that benefits only a few [40]. When it becomes a universal explanation, it stifles political imagination and, with it, the possibility of resistance.

If we interpret every reorganisation as resilience, then collapse is no longer defeat but merely a phase of development, or even an "opportunity." Such neutralisation of suffering can legitimise loss as progress. Naomi Klein, with her concept of the shock doctrine [41], reminds us that crises are often orchestrated precisely to enable restructuring in favour of the privileged. Resilience can thus become an ideological tool, concealing power relations and questions of justice. We must therefore continually ask: whose resilience? Who pays for it? Archaeology, as a discipline of relations and remains, must rethink these questions anew. Resilience can be emancipatory, but never self-evident.

And finally, archaeological research itself is an assemblage. It emerges from relations among people, tools, technologies, landscapes, and the very materials we study. Archaeology is not an external observer measuring the resilience of the world; it is the way in which that resilience can become visible at all. When we measure, map, or excavate, we do not uncover pre-existing stability; we create the conditions under which stability can be perceived. Resilience does not reside in things themselves; it arises in the encounter: in the way the world allows us to touch it, and in how we respond. Archaeological knowledge is therefore always part of the same material landscape it seeks to understand. It does not merely trace the past but co-produces the possibility for the world to become legible; to show where and how it can persist, transform, or reorganise.

Archaeological theory clarifies what heritage actually does: it composes endurance from relations, after events. In this sense, heritage extends the work of archaeology beyond the excavation of the past into the continual rearticulation of its remains. It occupies the same space of relation, between matter and meaning, endurance and transformation, through which resilience itself becomes perceptible. Heritage is not what simply endures, but what is made to endure: the practice of reassembling fragments into coherence, of transforming the traces of events into stories, places, and forms of belonging. It is both generative and fragile because it depends on ongoing work to maintain its coherence, and it is generative because it offers the conditions through which communities can imagine and construct new futures [42–44]. To think heritage materially is therefore to think resilience reflexively: not as a property of systems or societies, but as a practice of care, reconfiguration, and response that binds us to the changing world we inhabit.

 doi:10.20944/preprints202512.2038.v1

Funding: The article was prepared with the support of the research program Archaeology (P6-0247, ARIS) and the project MATRES (Material Resilience in Times of Environmental and Social Change, University of Ljubljana.

Data Availability Statement: This article is based on theoretical and interpretative work; no new empirical data were created or analyzed.

Acknowledgments: The author thanks colleagues at the Department of Archaeology, University of Ljubljana, for their discussions and support during the development of this article.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

1. Lowenthal, D. 1985, The Past Is a Foreign Country. – Cambridge, Cambridge University Press.
2. Smith-Nonini, S. 2017, Making Complexity Your Friend: Reframing Social Theory for the Anthropocene. – Weather, Climate, and Society 9(4), 687–699.
3. Holland, J. H. 1992, Complex adaptive systems. – Daedalus 121/1, 17–30.
4. Westley, F., S. R. Carpenter, W. A. Brock, C. S. Holling, L. H. Gunderson 2002, Why systems of people and nature are not just social and ecological systems. – In: Gunderson, L. H., C. S. Holling (eds.), Panarchy: Understanding Transformations in Human and Natural Systems. – Washington, Island Press, 103–119.
5. Flannery, K. V. 1968, Archaeological systems theory and early Mesoamerica. – In: Meggers, B. J. (ed.), Anthropological Archaeology in the Americas. – Washington, Anthropological Society of Washington, 67–87.
6. Clarke, D. L. 1968, Analytical Archaeology. – London, Methuen.
7. Redman, C. L. 2005, Resilience theory in archaeology. – American Anthropologist 107/1, 70–77.
8. Løvschal, M. 2022, Resilience and transformation in socioecological systems: Archaeological perspectives. – Annual Review of Anthropology 51 (1), 195–211.
9. Liu, J., T. Dietz, S. R. Carpenter idr. 2007, Complexity of coupled human and natural systems. – Science 317/5844, 1513–1516.
10. Holling, C. S. 2002, Understanding the complexity of economic, ecological, and social systems. – In: Gunderson, L. H., C. S. Holling (eds.), Panarchy: Understanding Transformations in Human and Natural Systems. – Washington, Island Press, 390–405.
11. Holling, C. S., L. H. Gunderson, G. D. Peterson 2002, Sustainability and panarchies. – In: Gunderson, L. H., C. S. Holling (eds.), Panarchy: Understanding Transformations in Human and Natural Systems. – Washington, Island Press, 63–102.
12. Holling, C. S. 2001, Understanding the complexity of economic, ecological, and social systems. – Ecosystems 4 (5), 390–405.
13. Bradtmöller, M., S. Grimm, J. Riel-Salvatore 2017, Resilience theory in archaeological practice – An annotated review. – Quaternary International 446, 3–16.
14. Dunning, N. P., T. P. Beach, S. Luzzadder-Beach 2012, Kax and kol: Collapse and resilience in lowland Maya civilization. – Proceedings of the National Academy of Sciences 109/10, 3652–3657.
15. Boivin, N., A. Crowther 2021, Mobilizing the past to shape a better Anthropocene. – Nature Ecology & Evolution 5/3, 273–284.
16. Chapman, J. 2020, The Vinča Group – (Almost) 40 years on. – Quaternary International 560–561, 5–19.
17. DeLanda, M. 2006, A New Philosophy of Society: Assemblage Theory and Social Complexity. – London, Continuum.
18. Deleuze, G., F. Guattari 1987, A Thousand Plateaus: Capitalism and Schizophrenia. – Minneapolis, University of Minnesota Press.
19. Kennedy, R., J. Zapasnik, H. McCann idr. 2013, All those little machines: Assemblage as transformative theory. – Australian Humanities Review 55, 45–66.
20. Hamilakis, Y., A. Jones 2017, Archaeology and assemblage. – Cambridge Archaeological Journal 27/1, 77–84.

 doi:10.20944/preprints202512.2038.v1

21. Robinson, M. 2010, Making Adaptive Resilience Real. – London, Arts Council England.
22. Conneller, C. 2017, Commentary: Materializing assemblages. – Cambridge Archaeological Journal 27/1, 183–185.
23. Müller, M. 2015, Assemblages and actor-networks: Rethinking socio-material power, politics and space. – Geography Compass 9/1, 27–41.
24. Mlekuž, D. 2005, The ethnography of the Cyclops: Neolithic pastoralists in the eastern Adriatic. – Documenta Praehistorica 32, 15–51.
25. Bennett, J. 2010, Vibrant Matter: A Political Ecology of Things. – Durham, Duke University Press.
26. Strum, S. C., B. Latour 1999, Redefining the social link: From baboons to humans. – V: Strum, S. C., L. M. Fedigan (ur.), Primate Encounters: Models of Science, Gender, and Society. – Chicago, University of Chicago Press, 210–250.
27. Latour, B. 1994, On technical mediation—Philosophy, sociology, genealogy. – Common Knowledge 3/2, 29–64.
28. Holling, C. S., L. H. Gunderson, G. D. Peterson 2002, Sustainability and panarchies. – In: Gunderson, L. H., C. S. Holling (eds.), Panarchy: Understanding Transformations in Human and Natural Systems. – Washington, Island Press, 390–405
29. Jacobson, M. J. 2022, Archaeological evidence for community resilience and sustainability: A bibliometric and quantitative review. – Sustainability 14/24, 16591.
30. Diamond, J. 2005, Collapse: How Societies Choose to Fail or Succeed. – New York, Viking.
31. Faulseit, R. K. (ur.) 2015, Beyond Collapse: Archaeological Perspectives on Resilience, Revitalization, and Transformation in Complex Societies. – Carbondale, Southern Illinois University Press.
32. McAnany, P. A., N. Yoffee 2020, Questioning Collapse: Human Resilience, Ecological Vulnerability, and the Aftermath of Empire. – Cambridge, Cambridge University Press.
33. Folke, C., S. R. Carpenter, B. Walker, M. Scheffer, T. Chapin, J. Rockström 2010, Resilience thinking: Integrating resilience, adaptability and transformability. – Ecology and Society 15/4, 20.
34. Ulloa, R., C. Kacperski, F. Sancho 2016, Institutions and cultural diversity: Effects of democratic and propaganda processes on local convergence and global diversity. – PLOS ONE 11/4, e0153334.
35. Ulloa, R., K. Kacperski 2020, Collapse and reorganization of complex human societies. – arXiv preprint arXiv:2003.05322.
36. Berglund, B. E. 2003, Human impact and climate changes: synchronous events and causal links?. – Quaternary International 105/1, 7–12.
37. Parker, S. E., S. P. Harrison 2022, The timing, duration and magnitude of the 8.2 ka event in global speleothem records. – Scientific Reports 12, 10542.
38. Žižek, S. 2015, Event: A Philosophical Exploration. – Cambridge, Polity Press.
39. Lucas, G. 2008, Time and the archaeological event. – Cambridge Archaeological Journal 18/1, 59–65.
40. Beauchamp, E., J. Abdella, S. Fisher, J. McPeak, H. Patnaik, P. Koulibaly, D. Cissé, M. Touré, A. Bocoum, M. Ndao, Y. Deme, B. Gueye 2019, Resilience from the ground up: How are local resilience perceptions and global frameworks aligned?. – Disasters 43/2, 235–256.
41. Smith, L. 2006, The Uses of Heritage. – London, Routledge.
42. Harrison, R. 2013, Heritage: Critical Approaches. – London, Routledge.
43. DeSilvey, C. 2017, Curated Decay: Heritage Beyond Saving. – Minneapolis, University of Minnesota Press.