Living Heritage: Transformations and Adaptations of Vernacular Houses to Contemporary Needs in Sweida, Southern Syria

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Abstract

Vernacular architecture embodies essential local knowledge to adapt to local climate and the socio-cultural practices of the communities in day to day living. Undeniably, there is much research into vernacular architecture around the world. However, substantial research gaps persist regarding transformation processes, particularly in how residents adapt heritage structures to meet contemporary needs. Transformations of vernacular settlements represent ongoing negotiations between inherited architectural forms and evolving functional, social, and economic requirements. In this context, this research examines architectural transformations of vernacular houses in Sweida, southern Syria.

It employs a qualitative case study as a method that involves fieldwork. Nine settlements, stratified by the settlement type (urban, suburban, and rural), with a total of 146 houses were studied. Data were generated through three methods: (1) visual surveys and architectural documentation of house facades, spatial configurations, and material use; (2) non-participatory observations of household practices and spatial usage; and (3) discussions with residents regarding motivations for architectural changes. Archival research provided contextual information on the settlements' geographic, climatic, and historical backgrounds. Research was conducted between July and October 2023.

Findings reveal eight types of architectural transformations in four categories: structural, functional, morphological, and material changes. These have been driven by three primary factors: functional necessities, structural maintenance challenges, and evolving family dynamics. Rather than representing conflict between tradition and modernity, residents actively adapted vernacular forms to accommodate contemporary living requirements while maintaining spatial and cultural principles such as courtyards. This demonstrates that vernacular architecture remains dynamic, continuously shaped by residents' negotiation between preserving inherited cultural identity and addressing practical living needs.

Keywords: Vernacular architecture, Sweida, Transformations, Resident adaptation, Conservation, Southern Syria.

Introduction

Vernacular architecture embodies essential local knowledge reflecting climate adaptation and socio-cultural practices. As Jagatramka et al. (2024) says, vernacular houses are direct expressions of residents' changing values, perceptions, and ways of living. In Sweida, traditional vernacular architecture exemplifies this heritage through the extensive use of basalt stone and distinctive spatial configurations adapted to the climatic and social structures of the region (Clauss-Balty, 2008). However, since the 1970s, population growth, urbanisation, and socio-economic transformations have led to rapid changes in these settlements, with modifications to traditional forms (Abboud, 2006).

Research across multiple regions of Syria (Kousa et al., 2021; Sabri et al., 2023; Totah, 2006; Khadour et al., 2021), Turkey (Var and Kobayashi, 2019), China (Wang et al., 2016; Zhang et al., 2022), India (Vijayalaxmi and Arathy, 2022), and Nepal (Datta et al., 2016), has documented preservation challenges including material costs, shifting cultural practices, and limited skilled labour. Studies increasingly examine how residents interact with their architectural heritage and how communities balance traditional preservation with contemporary living requirements. Solutions emphasise participatory planning and adaptive management approaches.

Despite this growing body of research, substantial gaps remain. While studies have addressed residents' perceptions of conservation, limited research has investigated the specific adaptive strategies residents employ to balance heritage preservation with practical living needs, particularly in contexts with strict protection laws. Moreover, few studies have documented the types and driving factors of architectural transformations at the household level specifically in Sweida.

In this context, this study examines the architectural transformations of vernacular houses in Sweida, southern Syria, focusing on how residents adapt heritage structures to meet contemporary functional, social, and economic needs. It aims to understand how the residents negotiate between preserving inherited architectural and cultural identity and accommodating contemporary living requirements through adaptive transformations of vernacular houses.
Its objectives are as follows.

- To identify and document the types of architectural transformations undertaken by residents in Sweida's vernacular houses
- To analyse the driving factors behind residents' adaptive decisions (functional necessities, maintenance challenges, family dynamics, socio-economic changes)
- To examine how residents maintain cultural and spatial principles (such as courtyard organisation) while implementing practical modifications

Theoretical Framework

Vernacular Architecture: Definition and Significance

Vernacular architecture is defined as locally rooted construction practices shaped by environmental, cultural, and socio-economic contexts, representing a critical intersection of tradition and adaptation (Oliver, 2006; Zhao & Greenop, 2019). These structures are not merely functional shelters but deeply embedded expressions of collective identity, social practices, and cultural memory (Bosman & Whitfield, 2015). The significance of vernacular architecture lies in its integration of environmental sensitivity, cost-effectiveness, and cultural continuity, offering valuable lessons for sustainable design through passive climate strategies and resource conservation (Fernandes et al., 2015).

In Sweida's context, vernacular houses exemplify this heritage through unique basalt construction techniques and courtyard-centred spatial organisation, bearing influences from Nabataean, Roman, and Byzantine traditions spanning millennia (Clauss-Balty, 2008). When Druze communities migrated from Mount Lebanon in the 17th century, they repurposed ancient structures while adapting them to contemporary needs, creating a living tradition of continuous evolution rather than static preservation (Provence, 2005).

Conceptualising Transformation: Habraken's Analytical Framework

Understanding architectural transformation requires a multidimensional lens integrating cultural, technical, and ecological dimensions. This study adopts Habraken's transformation theory as its primary analytical framework, conceptualising the built environment through three interconnected orders: physical, territorial, and cultural (Habraken, 2000).

The physical order encompasses observable changes in building elements, materials, and spatial configurations, organised hierarchically from micro-scale modifications (partitioning, infill elements) to macro-scale transformations (floor plans, building ensembles). This granular approach captures incremental adjustments that collectively reshape the vernacular fabric.

The territorial order examines how residents negotiate spatial boundaries and usage rights within shared environments. Territorial space represents "space under the control of one power," with boundaries marking transitions between different controlling agents. These boundaries are not merely physical but represent negotiated relationships, revealing how the residents reinterpret spatial hierarchies to accommodate contemporary lifestyles.

The cultural order interprets values, traditions, and collective memory, influencing physical and territorial decisions. Vernacular transformations manifest as expressions of inter-generational knowledge transfer, where construction techniques and spatial norms encode cultural identity. For example, the persistence of courtyard layouts despite modernisation pressures underscores their role in sustaining social cohesion and hospitality practices.

By examining transformations across these three orders, researchers can decode the distinctive qualities of organically developed vernacular architecture, shaped and reshaped over generations of community life, revealing how physical structures, spatial organisation, and cultural practices interrelate.

Literature Review

Vernacular architecture has continuously adapted to changes in climate, technology, social organisation, and economic conditions throughout history (Jagatramka et al., 2021). The 20th century witnessed rapid transformations driven by urbanisation, globalisation, improved transportation, and the introduction of industrial materials (Sadhu & Srikonda, 2020). Contemporary research identifies three transformation stages: (1) minimal change, preserving traditional forms; (2) partial/hybrid adaptation, blending indigenous and modern elements; and (3) total transformation, where traditional dwellings are replaced by modern structures (Memmott & Ting, 2020).

Global case studies reveal vernacular transformations as a dynamic process shaped by complex interactions between social aspirations, cultural identity, economic factors, and environmental considerations. Rather than representing simple tradition-versus-modernity conflicts, research highlights how communities actively negotiate these tensions, creating hybrid forms reflecting both continuity and adaptation (Zhao & Greenop, 2019).

In the Middle East, vernacular architecture reflects religious, social, and environmental factors, producing forms emphasising privacy, multifunctional spaces, and climate responsiveness (Al-Jokhadar & Jabi, n.d.). Palestinian and Syrian rural houses traditionally featured thick stone walls, internal courtyards, and flexible living spaces responding to both climate and cultural norms. Recent decades have witnessed a significant transformation in Syrian countryside vernacular architecture, with traditional dwellings gradually replaced by modern residential buildings due to economic change, administrative reforms, and shifting social aspirations (Salhab et al., 2018).

According to Khadour et al. (2021), the Syrian transformation process typically unfolds in stages: initial adaptations improving comfort or accommodating new functions are followed by substantial changes in materials and spatial organisation, ultimately resulting in replacement by multi-story concrete structures. The drivers include economic development, agricultural livelihood decline, increased material accessibility, and desires for modern amenities.

Research reveals multifaceted transformation drivers encompassing socio-economic pressures, technological advances, environmental adaptation, policy interventions, and shifting cultural aspirations (Hanan, 2012). Key categories include:

1. **Material and Technical Factors**: Accessibility of industrial materials, durability concerns, and maintenance requirements significantly influence material substitution decisions. Communities often transition from basalt to concrete due to material cost considerations and perceived durability advantages (Ardhyanto et al., 2023).
2. **Socio-Economic Pressures**: Urbanisation, rural-to-urban migration, and economic development create housing pressures necessitating space expansion and functional diversification. Post-conflict contexts intensify these pressures, as seen in Sweida's experience with 71,313 internally displaced persons (UNHCR Syria, 2017).
3. **Family Structure Evolution**: Changing family organisation from extended to nuclear households drives spatial reconfiguration, bedroom multiplication, and privacy enhancement. These transformations reflect evolving social practices and domestic organisation (Kotharkar & Manoramabai, 2012).
4. **Cultural Aspirations and Social Status**: Research challenges simplistic economic explanations, revealing how social prestige and aesthetic preferences often outweigh functional considerations. Middle-class homeowners in various contexts actively choose contemporary materials despite thermal disadvantages (Imtiaz & Rempel, 2024), demonstrating agency-centred decision-making.

Despite these research findings, significant gaps exist in understanding community agency within transformation processes. As Fouseki (2020) points out, much existing research portrays residents as passive modernisation recipients rather than active agents deliberately negotiating between traditional knowledge and contemporary needs. Emerging research reveals sophisticated community decision-making processes where residents employ selective preservation strategies, prioritising culturally significant elements while adapting functionally obsolete components (Kousa et al., 2021; Totah, 2006).

Resident-led transformations demonstrate knowledge transmission across generations, where construction techniques and spatial norms encode cultural identity. Communities maintain behavioural adaptation capacities, adjusting daily routines and spatial use patterns to compensate for physical modifications, suggesting that vernacular wisdom extends beyond construction methods to encompass patterns of inhabitation that respond to environmental conditions.

Despite extensive global literature on vernacular transformation, substantial gaps persist, particularly in Middle Eastern and post-conflict contexts. Geographic imbalances leave many regions underrepresented; research originates predominantly from India and Asia, with relatively few studies addressing Syria and almost none specifically examining the Sweida Province (Asslan, 2022; Benkari et al., 2021; Vellinga, 2020).

Limited research has investigated residents' specific adaptation strategies, challenges faced in complying with protection laws, and impacts on historic area character (St. Clair, 2002). Current heritage conservation frameworks demonstrate inadequacies in addressing living heritage realities. Traditional conservation theories emphasising material authenticity over functional continuity fail to accommodate vernacular traditions' dynamic nature, where transformation represents inherent characteristics rather than regulatory violations (Fixler, 2009).

Understanding transformations of vernacular architecture requires integrating cultural anthropology, socio-technical systems theory, and environmental sustainability frameworks. This comprehensive framework informs heritage conservation approaches, acknowledging the inevitability of transformations while supporting community agency in architectural decision-making, ultimately contributing to more inclusive heritage management globally.

The Case Study

Sweida province lies in southern Syria, sharing borders with Daraa province to the West, Jordan to the South, Damascus to the North, and mostly desert to the East (Melhem et al. 1995) (Fig. 1). It extends over 5550 km2, has a population of 433,786 according to the 2014 census, and is divided into three administrative regions. From North to South, they are Shahba, Sweida, and Salkhad, which include 128 villages distributed across twelve districts. Climate is characterized by hot and dry summers, with temperatures often exceeding 30°C, and cold winters with occasional rainfall, particularly between December and February. The soil comprises a volcanic mass formed over time through successive volcanic eruptions dating back to the Early Tertiary geological period. The central part of the province features basaltic lava flows with a thickness of approximately 1200 m (Melhem & et al., 1995).

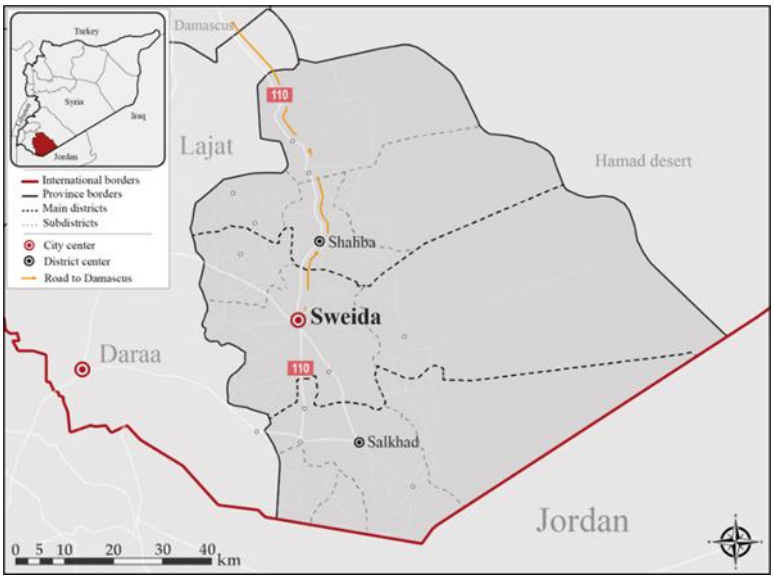

Fig. 1: Location of study area.
Source: the author, based on the map from Wikimedia

History and Culture

According to the American Expedition led by H. C. Butler in southern Syria, the rich architectural history of Southern Syria can be categorized into the prehistoric, Nabataean, Roman, Byzantine, and Islamic periods.

Most ruins consist of domestic architecture, with many well-preserved examples dating back to the Roman and Byzantine periods (Butler, 1916). Inhabitation in the region presents a unique case where modern inhabitants, who arrived from the 17th to the 19th centuries, chose to inhabit the well-preserved ancient Roman-Byzantine houses.

They decided to settle in houses that were in good condition after maintenance or preferred to recover ancient materials to build new houses, adopting the original construction techniques (Provence, 2005). The houses we observe today are thus a blend of ancient structures modified by the residents and newer homes incorporating original materials and methods. Some maintain historical integrity better than the others (Abboud, 2006).

Historic Registrations, Protection Zones, and Conservation Efforts

Decree No. 397, issued in 2008, officially registered the ancient city center of Sweida on Syria's national list of historic cities and archaeological sites, establishing distinct protection zones (Fig. 2). In addition to Sweida, several other towns and villages in the province have also been registered, and proposals for further historic sites are currently under review by the DGAM. The Fig. 2 illustrates the colour-coded protection zones of Sweida, with each colour from red to grey representing descending levels of legislative protection.

This zoning is based on historical significance, current condition, and location of each area, guiding permissible interventions to preserve the heritage of Sweida's (DGAM, 2000).
Despite these regulations, the historic towns have faced increasing violations, damage, destruction, and illegal excavations, particularly exacerbated by the conflict (Abdulkareem, 2013). In fact, this situation has placed significant pressure on both the legal authorities and local communities to safeguard these sites effectively.

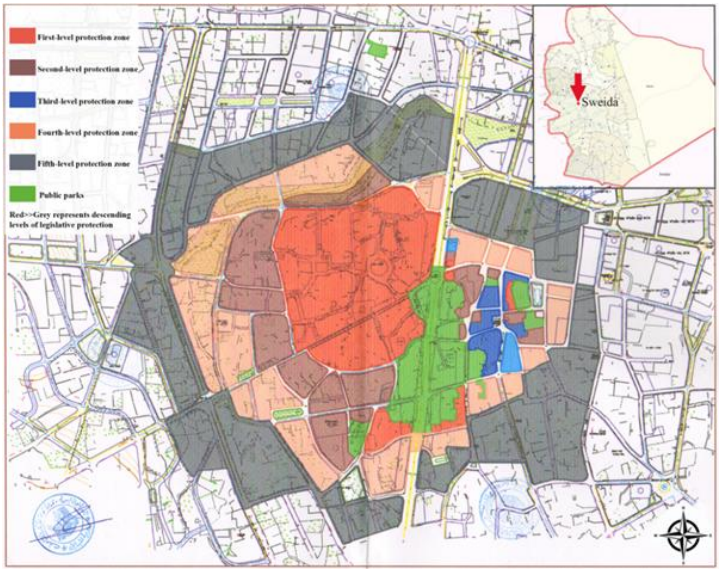

Fig. 2: Map of the protected zones of the ancient city centre of Sweida.
Source: DGAM

Preservation Challenges under the Syrian Antiquities Law

The Syrian Directorate General of Antiquities and Museums (DGAM) is the principal authority responsible for safeguarding the nation's cultural heritage. However, the DGAM faces significant challenges due to limited resources and minimal local community involvement (Sabri et al., 2023). Antiquities Law No. 222, established on October 26, 1963, and last amended in 1999, protects Syrian heritage, encompassing both public and privately owned historical sites. The law includes key articles relevant to property owners' responsibilities in preserving registered antiquities:

- Article 22: Mandates that registered site owners maintain their properties at their own cost, under the supervision of DGAM after obtaining official permissions.
- Articles 23 & 24: Prohibit any modifications or new rights of use and development over registered properties without DGAM's prior approval.
- Article 29: Requires owners to notify DGAM when selling or mortgaging registered sites to ensure adherence to preservation requirements (DGAM, 2000).

This legislation places significant responsibility on the DGAM but does not clarify the roles of the other stakeholders, often leading to tensions and inefficiencies in heritage management. For instance, DGAM's control over private houses creates conflict with property owners, who are limited in modifying their properties to meet the contemporary needs. This restriction has led to resentment among communities in historic areas, where residents feel that their property rights are secondary to preservation laws (Sabrine, 2022). Moreover, the lack of local involvement in preservation decisions has alienated the residents, who often feel disconnected from heritage policies that directly affect them. Without inputs from those who live in these historic buildings, preservation efforts face resistance, which can hinder effective conservation.

This challenge of balancing institutional preservation mandates with community engagement reflects broader concerns in heritage conservation, where the simultaneous study of conservation and rehabilitation policies becomes essential for restoring and continuing the collective memory of historical spaces (HaghighatBin et al., 2024).

Characteristics of Vernacular Architecture of Southern Syria

The distinctive style and use of local materials define the ancient architecture of southern Syria. Basalt stone was the primary building material, valued for its strength and durability. Its high resistance to tension and compression made it an adequate substitute for timber, which was scarce (Abboud, 2006). Dwellings are characterised by a module consisting of an arched room flanked by side aisles, usually on two levels (Clauss-Balty, 2022):

- Walls: Double-course basalt walls, 80–90 cm thick, composed of two parallel rows of basalt blocks connected by header stones, without using mortar or metal reinforcements (Fig. 3).
- Roofs: Roofs were exclusively built with basalt slabs, some as long as 3 meters, supported by corbels topped with a layer of mortar containing lightweight volcanic scoria. Rows of corbels allowed rooms to reach up to 5 meters wide, while semicircular arches enabled the construction of even larger, uninterrupted spaces.
- Floors: Floors were made of carefully arranged rectangular basalt slabs, laid in a staggered pattern. This durable flooring was used in key areas, including courtyards, reception rooms, and storage spaces.
- Openings and Layout: To ensure privacy and security, ground-floor walls were nearly windowless, with the structure organised around a central courtyard enclosed by high walls. Access to the home was typically through a main entrance that opened into the courtyard.

Fig. 3: Characteristics of traditional architecture in Sweida.
Source: author

New arrivals adopted local building techniques, passing these skills down through generations. Basalt stone remained the dominant construction material until the introduction of concrete. By the late 19th century, a shortage of carved stone beams led builders to use metal and ash beams for roofing. These roofs were layered with thorns to deter mice and topped with a thick layer of earth (Abboud 2006). Builders exerted significant effort to imitate the original masonry techniques, effectively utilising basalt's properties as a construction material. The reconstructions demonstrate competent and, at times, exceptionally skilled craftsmanship. Drawn from vast experience in restoring the abandoned basalt villages (Brown & St, 1988).

Research Methods

This study employed a qualitative research approach within a comparative, embedded case study design focused on vernacular houses in Sweida Province, southern Syria. Fieldwork was conducted between July and October 2023 and concentrated on inhabited basalt houses located within nine historic towns representing urban, suburban, and rural settlement types (Fig. 4). This design allowed comparison across different urbanisation contexts while keeping the unit of analysis, the vernacular house and its transformations, consistent.

Data were collected using four complementary methods to capture both physical changes and residents' perspectives:

- Visual and photographic surveys: Systematic visual surveys were carried out for 146 inhabited vernacular houses across the nine selected towns. For each house, exterior (and, where access was granted, interior) conditions were recorded. Standardised recording sheets and photographic documentation were used to ensure comparability across cases.
- Non-participatory observations: Short periods of non-participatory observation were conducted in and around documented houses and streets to understand how transformed spaces were used in daily life.
- Semi-structured interviews with residents: Interviews explored residents' motivations for change, decision-making processes, perceptions of heritage, experiences with maintenance, and how they balanced practical needs with attachment to traditional forms. Interviews were conducted in participants' homes, audio-recorded with consent when possible, and supported by field notes.

Settlement Selection and Sampling

A stratified purposive sampling strategy was used to select case study settlements and houses. First, nine historic towns were chosen to represent three settlement types, urban, suburban, and rural, using the following criteria:

- Presence of officially registered or pending heritage zones
- Existence of inhabited vernacular basalt houses
- Representation of different levels and types of transformation within each settlement type

This stratification ensured that transformations could be examined across contrasting urban contexts while keeping a focus on inhabited historic fabric rather than abandoned ruins. Within these nine towns, 146 houses were included in the visual survey based on the following conditions: they were recognisable vernacular basalt houses, currently or recently inhabited, and accessible with residents' permission for documentation.

Semi-structured interviews were then conducted with a subset of residents from the documented houses, prioritising households with long-term residence and direct involvement in decisions about modifications. This progression, from settlement selection to broad house survey, then to detailed documentation and resident interviews, provided both breadth across contexts and depth at the house level, in line with qualitative case study principles.

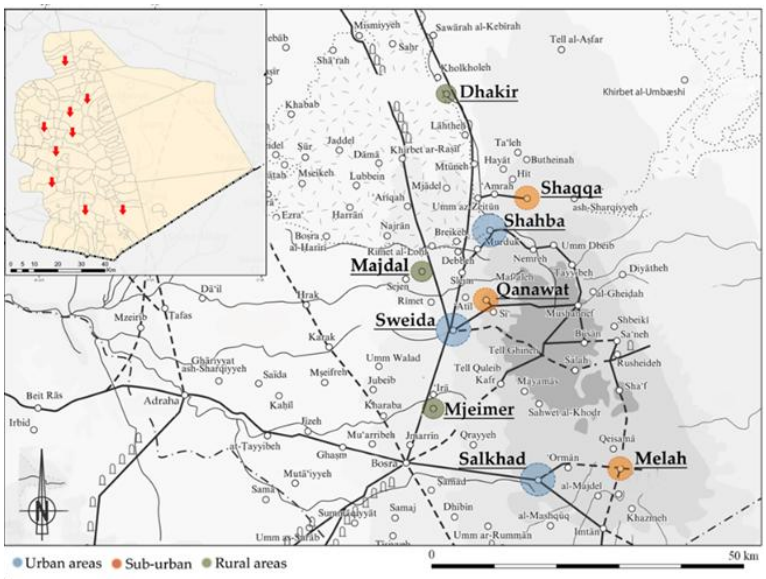

Fig. 4: Location of selected case studies.
Source: author

Survey and drawing data were coded according to transformation type (structural, functional, morphological, and material) and compared across urban, suburban, and rural settlements. Interview transcripts and field notes were analysed thematically to identify recurring motivations, constraints, and adaptive strategies, enabling triangulation between physical evidence and residents' narratives about change.

Findings

Fieldwork data from 146 houses (urban: 52, suburban: 49, rural: 45) across three settlement types revealed systematic patterns of architectural transformation. Using Habraken's analytical framework, transformations are organized across three interconnected orders: physical order (observable modifications to building elements, materials, and spatial configurations), territorial order (changes in spatial boundaries and usage rights), and cultural order (how residents negotiate identity preservation through physical adaptation). Analysis identified eight primary transformation types, which residents implemented in response to evolving functional, social, and environmental pressures. This section presents transformation patterns; driving factors are subsequently analysed in relation to existing research.

Structural Transformations

Analysis of 146 vernacular houses identified eight types of structural modifications organised across physical and territorial orders (Table 1).

The consistency of concrete roofing across all settlement types indicates a systematic technical driver affecting traditional building performance. Changes in openings showed minimal urban-rural variation, suggesting similar functional requirements across contexts. Vertical expansion showed greater urban concentration (27 urban vs. 18 rural), indicating settlement-type variations in spatial pressure patterns. (Figs. 5-7).

Table 1: Survey of different forms of structural Transformations and their causes.
Source: Author

No	Structural Transformations	Urban areas	Sub-urban	Rural areas	Reasons behind
1	Application of a concrete layer on top of the original structure of the roof (Fig. 5)	48	46	40	The earthen roof layer turned powdery and was washed away by rain, leading to internal leaks.
2	Change of roof building materials using wooden/metal beams. (Fig. 6)	12	16	11	Substantial stone loss and a shortage of skilled builders.
3	Vertical expansion (Addition of built floors). (Fig. 8)	27	22	18	Family expanding and the need for additional rooms, shifting towards a Nuclear family lifestyle.
4	House expansion (addition of rooms) using modern materials	24	22	20	
5	Changes in openings (Cancellations/additions). (Fig. 9)	49	47	43	For improved security, lighting, ventilation, and a personal desire for modernisation
6	Raising floors/Dropped (false) ceilings. (Fig. 7)	12	11	9	To lower the altitude of the high ceilings of vernacular houses or to install modern lighting.
7	Replacing the stone stairs with concrete stairs.	25	18	15	To provide access to the roof after demolishing part of the original stairs
8	Enclosing the courtyard. (Fig. 10)	29	26	28	The need for built-up area to be used as extra rooms
	Total number of studied houses	52	49	45	

Fig. 5: Applying a concrete layer on top of the original roof layers. Shaqqa, Melah.
Source: author, fieldwork

Fig. 6: Change in roof structure, using wooden beams and keeping the arch, replacing the arch with metal beams.
Source: Author, fieldwork

Fig. 7: Replacing the original roof structure with reinforced concrete. Qanawat.
Source: author, fieldwork

Fig. 8: Vertical expansion representation. Left: Shahba, top right: Majdal, bottom: Dhakir.
Source: author

Fig. 9: Sweida city, vertical expansion on the sides of the main highway.
Source: author, fieldwork. Sept 2023

Fig. 10: Different scenarios of courtyard enclosure. Top: using GI sheets, bottom left: using concrete. Bottom right: Building new concrete stair.
Source: author, fieldwork Aug 2023

Functional Transformations

Functional modifications documented in (Table 2) reflect adaptive use of traditional spaces to meet contemporary requirements. Addition of modern amenities (bathrooms/kitchens) was most prevalent: 49 urban (94.2%), 46 suburban (93.9%), and 39 rural (86.7%) houses. Conversion of room functions within existing structures occurred in 26-29 houses per settlement type (52-56% frequency), often converting underutilised spaces to storage or additional rooms. Interior space partitioning appeared in 18-26 houses (35-50%), typically dividing large traditional halls into smaller rooms. Complete functional changes (house-to-commercial conversion) occurred in 27 urban, 12 suburban, 9 rural houses (17-52% variation). House splitting into multiple dwelling units was documented in 22 urban, 15 suburban, 7 rural houses (15-44% variation). Additional modifications included entrance relocation (5-12 houses), courtyard shading additions (13-18 houses), and veranda additions (12-15 houses).

The near-universal addition of modern amenities across all settlement types suggests fundamental inadequacy in the original spatial organisation for contemporary living standards. Significant urban-rural variation in house splitting (22 urban vs. 7 rural) and complete functional change (27 urban vs. 9 rural) indicates that settlement type substantially affects functional adaptation strategies. Conversely, interior partitioning and space conversion show minimal urban-rural variation, suggesting these represent universal responses to spatial organisation incompatibilities.

Table 2: Recorded functional Transformations, frequencies, and causes behind them. Source: author

No	Functional Transformations	Urban areas	Sub-urban	Rural areas	Reasons behind
1	Complete House Functional Change (Fig. 13, 15)	27	12	9	Urbanisation, private investment, abandoning the house and using it for storage or as a stable
2	Splitting the house into two or more dwelling units. (Fig. 15)	22	15	7	Abandoning the residents and giving the house for rent or splitting the house among the heirs.
3	Change in the direction of the entrance	12	8	5	Improving accessibility and aligning the house with newly constructed routes.
4	Conversion of spaces function within the house (Fig. 11)	29	26	28	Unused rooms (in the case of large houses) were often used as storage areas or animal shelters.
5	Interior space partition	26	22	18	Family expansion, desire for privacy, and creating smaller rooms from the vast halls
6	Additions of modern amenities (Bathroom and kitchen). (Fig. 12)	49	46	39	Lack of existing amenities in the original structure, and enhancing the living environment
7	Addition of a shading element in the courtyard. (Fig. 10)	18	16	13	Providing a shaded path between rooms with external amenities
8	Addition of a veranda for the upper floors.	13	12	15	To improve access because of deterioration. And as a result of the house's vertical expansion

Fig. 11: Left: Functional transformation from a house to a cafe in Sweida. Right: Functional transformation from a room to a shop in Melah.
Source: author

Fig. 12: Different ways of adding amenities (Kitchen and toilet): External concrete addition 1,5,6. Incorporating amenities within the structure 2,3,4.
Source: author, fieldwork, Sep-Oct 2023

Fig. 13: Left: A case of functional change in an urban area (Sweida). 1 was taken in 2003, 2 in 2010, Source: Archive of DGAM and 3 in 2023 by the author. Right: Functional change in Sub-urban area (Majdal). From a storage area to a restaurant. The top photo was taken in 2015. Source: Archive of the owners, and the bottom one was taken in 2023 by the author.

Morphological Transformations

Morphological transformations encompass changes in surface treatments and material substitutions. Four primary types were documented in (Table 3) (Fig. 14).

The universality of internal plastering (80-98% of all houses) and floor alterations (82-93%) indicates systematic technical imperatives affecting all settlement types similarly. Material changes in windows/doors showed less variation (68-81%) than roof-related modifications, suggesting different drivers for different transformation types. Facade infill variations (68-79%) were more consistent than functional modifications, indicating material substitutions respond to uniform technical pressures rather than settlement-specific factors.

Table 3: Recorded Morphological Transformations, frequencies, and their causes.
Source: Author

No	Surface and material Transformations	Urban areas	Sub-urban	Rural areas	Reasons behind
1	Cement infill on facades. (Fig. 8)	41	39	35	Providing stability, weatherproofing, and preventing unwanted pests
2	Internal walls and roof plastering with a layer of cement. (Fig. 14)	48	44	41	Installing an electricity wiring system on uneven surfaces due to irregularities in the original built form
3	Alteration in flooring (Cement screeding or Tiling). (Fig. 14)	50	45	42	Enhancing the mud flooring/replacing the stone flooring that was used in the fixing of the walls
4	Change in the materials used for windows/doors	42	37	35	durability and enhanced security

Fig. 14: Different levels of using modern materials for interior cladding.
Source: Author

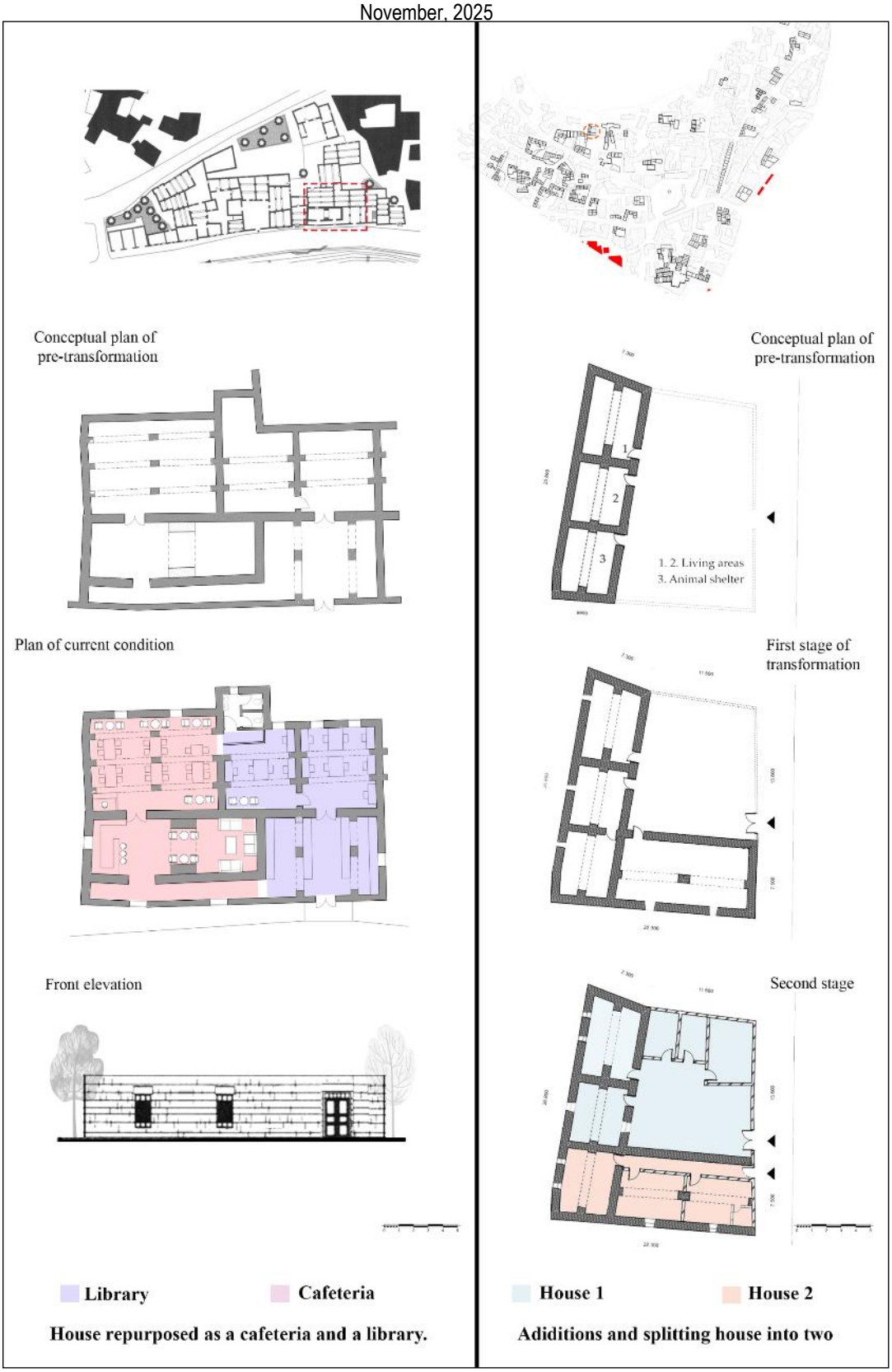

Fig. 15: Left: Functional transformation in an urban area. Source: Author, Sweida, September 2023. Right: The Transformation led by an inheritance conflict resulted in the splitting of the house into two additions featuring modern amenities.
Source: author, fieldwork August 2023, Salkhad

Summary of Transformation Patterns Across Settlement Types

Analysis across three settlement categories reveals both universal and context-specific transformation patterns. Transformations occurring with similar frequency across all types (concrete roofing 83-94%, bathroom/kitchen additions 87-94%, interior plastering 80-98%, floor changes 82-93%, opening modifications 83-94%) suggest drivers operating equally across urban, suburban, and rural contexts, primarily technical performance requirements and contemporary amenity expectations.

Transformations showing significant urban-rural variation (house splitting 15-44%, complete functional change 17-52%, vertical expansion 35-52%) suggest settlement-type-specific drivers related to urbanisation pressures, population density, and economic opportunities. Urban contexts show substantially higher rates of complete functional change and house subdivision, indicating that settlement size influences income-generation strategies through rental conversion and multiple-unit occupancy.

Material transformations demonstrate remarkable consistency across settlement types, indicating that technical imperatives, durability, performance, and infrastructure compatibility override settlement-specific factors in material selection decisions. Functional transformations, by contrast, show substantial variation, indicating that social and economic factors (family structures, employment, migration patterns) operate differentially across settlement contexts.
This pattern suggests two classes of transformation drivers: (1) universal technical and performance requirements affecting all settlements similarly, and (2) socio-economic pressures operating differentially across settlement types. The following section examines these driving factors in detail**.**

Eight types of architectural transformations, occurring at varying frequencies across settlement types, indicate multiple categories of drivers. These range from technical performance requirements affecting all settlement types similarly (roofing, interior plastering) to socio-economic pressures operating differentially across urban, suburban, and rural contexts (house subdivision, complete functional change). Analysis of these driving factors in relation to existing research is presented in the Discussion section.

Discussion

The transformations observed in Sweida's vernacular houses reflect broader patterns documented globally, yet with distinct regional characteristics. While Jagatramka et al. (2024) identify primarily functional adaptations in Indian vernacular contexts, and Kousa et al. (2021) document similar material substitutions in post-war Aleppo, this research reveals a more nuanced negotiation between heritage and contemporary necessity. Residents in Sweida are not passively accepting modernisation but actively creating hybrid architectural forms that selectively preserve cultural identity while accommodating modern living standards. This finding extends beyond previous research's emphasis on either preservation constraints or modernisation pressures alone.

This negotiation is shaped by four interconnected drivers: transformations in family structure and social organisation, shifts in economic livelihoods, technical and maintenance constraints, and external pressures from migration and conflict displacement. Understanding these drivers reveals how residents respond creatively to complex, overlapping challenges, suggesting that heritage transformation represents not architectural decline but adaptive resilience grounded in community decision-making.

Urban Expansion, Drought-Induced Migration, and War Impact in Sweida

The 2007-2008 drought created unprecedented housing pressure through rural-to-urban migration—a phenomenon documented across the Middle East and North Africa. Whereas drought-response patterns in Morocco (Khadour et al., 2021) show gradual rural depopulation, Sweida experienced accelerated urban concentration (62% city, 38% countryside) within a single decade. This rapid concentration reflects compound pressures: agricultural collapse (70% wheat fields unharvested) combined with Syrian civil war displacement (71,313 internally displaced persons as of 2022).

Migration-driven heritage transformation has been extensively documented. Salhab et al. (2018) analyse similar patterns in Syrian coastal regions, where economic migrants from the agricultural sectors occupy heritage housing and implement unauthorised modifications. However, Salhab's work focuses on coastal areas with external in-migration. In contrast, Sweida demonstrates internal rural-to-urban migration within a single province, potentially enhancing community continuity and preserving local knowledge. Conversely, the civil war dimension appears unique to Sweida's timeframe; most comparative heritage studies predate 2011 and cannot address the effects of conflict-driven displacement on transformation intensity.

The concentration of economically disadvantaged populations in traditional urban quarters directly correlates with documented building code violations (2,600 violations recorded 2011-2021 in Sweida city).

This pattern reflects Abu-Lughod's (1986) observation that heritage buildings occupied by low-income populations experience accelerated deterioration due to maintenance constraints. However, Sweida's case demonstrates active adaptation rather than mere deterioration; residents are systematically improving comfort and functionality despite economic limitations, suggesting agency-driven modification rather than passive decline. This challenges preservation frameworks (as referenced in Totah, 2006) that position poor heritage residents as obstacles to conservation rather than as creative adapters managing complex constraints.

Technical and Maintenance Imperatives

The widespread application of concrete roofing (83-94% of houses across all types) directly addresses the deterioration of traditional earthen roof layers. This response mirrors material substitution patterns documented globally, yet reveals context-specific constraints. Disli and Gediri-Gökçen (2025) identify maintenance of historic service systems as critical for heritage sustainability, arguing that when period-appropriate technologies become unavailable, functional systems fail. Sweida's case demonstrates exactly this failure mechanism: the traditional annual roof compaction ritual ('Madhale' practice) required substantial community labor coordination and specific basalt-working knowledge. As these practices ceased, reflecting social atomization and skill loss, moisture infiltration created urgent interior deterioration threatening habitability.

Unlike Western heritage contexts studied by historic preservation literature (where professional conservation practices substitute for traditional maintenance), Sweida residents employ practical improvisation rather than conservation science. Concrete overlayment solves immediate leaking but compromises thermal performance and alters structural loading, responses that heritage conservation professionals typically oppose as destructive. However, when analysed through residents' constraints (limited budgets, unavailable skilled workers, urgent habitability needs), these modifications represent rational choices within constrained options rather than heritage destruction motivated by indifference. This finding suggests that heritage preservation frameworks must account for maintenance capacity constraints, rather than merely aesthetic preferences, when evaluating the acceptability of contemporary interventions.

Social and Lifestyle Transformations: From Patriarchal Extended Households to Nuclear Family Structures

The shift from patriarchal extended families to nuclear households has driven structural modifications documented here (vertical expansion 35-52% frequency) and globally. Wang et al. (2016) document similar patterns in rural China, where sunken courtyard houses designed for extended families are subdivided for nuclear units. Comparable research from India (Vijayalaxmi & Arathy, 2022) on weaver community housing shows identical patterns: interior partitioning and floor additions responding to changes in household structure.

However, Sweida's modification intensity appears higher than documented precedents. Chinese and Indian cases typically show a single modification phase per household, whereas Sweida demonstrates simultaneous modifications (vertical expansion, functional subdivision, and material replacement) occurring over 15-20-year periods in urban areas.

This intensity likely reflects a combination of rapid social change AND external pressures (migration, conflict, and displacement) absent from other contexts. Additionally, unlike in India, where modifications preserve community identity through craft continuity, Sweida's modifications often involve material substitution that disrupts traditional craftsmanship, suggesting that the rapidity of modification may determine whether cultural continuity is preserved or lost.

Security and Comfort Requirements: Traditional Spatial Organisation and Security Paradigms

The original architectural design of vernacular houses in Sweida embodied sophisticated security and privacy strategies, fundamental to traditional Syrian domestic architecture (Alabidin, n.d.).

These houses were characterised by their almost windowless ground floor facades (Fig. 16) (Clauss-Balty, 2008), with primary openings oriented exclusively toward interior courtyards rather than external streets. This architectural strategy served multiple functions: it provided security against potential theft, maintained family privacy, and created a controlled microclimate through the central courtyard system (Khamui et al., n.d.).

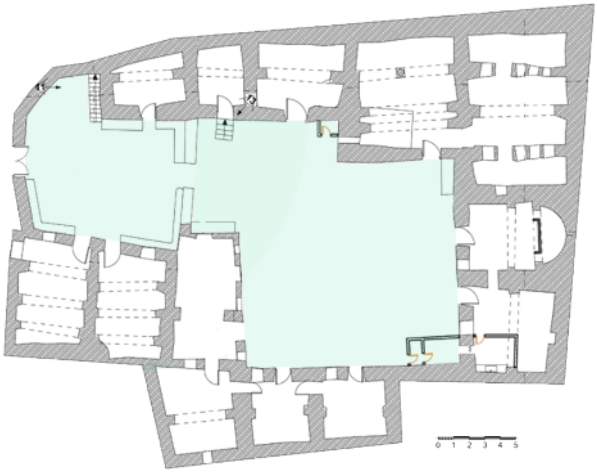

Fig. 16: Houses with windowless ground floors.
Source: Author, fieldwork Sep 2023

Socio-Economic Transformations and their Impact on Vernacular Architecture: From Agrarian to Industrial Society

A critical factor influencing architectural transformations in Sweida's vernacular housing stock is the fundamental shift in society from its traditional agrarian foundation to an increasingly industrialised and modernised community. This socio-economic transformation has profoundly altered the functional requirements of domestic architecture, rendering many conventional agricultural spaces obsolete while creating new spatial demands that drive contemporary modifications. Following their resettlement in Jabal al-Arab, southern Syria, the Druze community established a predominantly agrarian society, dependent entirely on farming and animal husbandry (FIRRO, 1992). This agricultural foundation shaped the architectural typology of vernacular houses, which were designed to integrate seamlessly with farming activities and livestock management. The spatial organisation of these dwellings reflected the practical necessities of agricultural production, storage, and animal care that formed the economic backbone of their society in the region.

The architectural response to these agrarian needs created highly specialised spaces within the domestic environment. Traditional houses often included dedicated areas for animal housing, grain storage, feed preparation, and food processing, all essential to the community's subsistence economy. These functional spaces represented sophisticated adaptations to local environmental conditions and agricultural practices that had evolved over centuries of rural life. The transformation of Druze society accelerated significantly during the mid-twentieth century, particularly after the 1950s, when the community transitioned from a traditional agrarian base to an industrial and service-oriented economy (FIRRO, 1992). This shift was characterised by increased participation in government employment, adoption of modern transportation through car ownership, and integration into broader patterns of Syrian modernisation and urbanisation.

This transformation aligned with broader Syrian societal changes that occurred throughout the twentieth century, influenced by state-led development policies and global economic trends (DAWISHA, 2003; Khoury, 1985). The modernisation process affected fundamental social structures, economic activities, and cultural practices, including housing patterns and architectural forms across Syrian communities. The Druze experience in Sweida, therefore, represents a localised manifestation of wider national transformations that reshaped traditional rural societies throughout the region (Buzpınar, 2024).

The vernacular architecture of Druze houses initially reflected comprehensive integration with agricultural activities through highly specialised functional spaces. Stables maintained their original function with integrated feeding systems called "ma'alef" in the local dialect - box-shaped recesses carved into thick basaltic walls where animal feed was placed for cows, horses, and camels (Fig. 17).

Fig. 17: 1: Feeders 'Ma'alef, 2: 'Kwara'.
Source: author

Storage systems represented another critical component of agricultural architecture through spaces called "Kwara" - rectangular box-like structures with top openings and small bottom holes, constructed from mud mixed with straw. These storage facilities enabled villagers to preserve their wheat harvests from the fields, providing essential food security during the winter months and protection against drought years. The design of these storage systems reflects a deep understanding of grain preservation techniques adapted to local climatic conditions. Additional specialised spaces included the "Tabban," featuring roof openings called "Rosana" created within basaltic slabs, through which bags of hay were emptied directly into storage rooms below (Fig. 18).

Fig. 18: 3: niche wall, 4: Traces of 'Tannour' fire smoke on the stone, 5: 'Rosana'.
Source: author

This architectural solution features efficient vertical circulation systems specifically designed for handling agricultural materials. Bread-making areas called "Tannour" were dedicated spaces for producing traditional Arabic bread using wood-fired ovens, as evidenced by persistent black staining on stone surfaces from smoke residue still visible during fieldwork. The socio-economic transformation from an agricultural to an industrial society has rendered many traditional functional spaces obsolete, creating significant challenges for contemporary household utilisation. As documented by Abu-Lughod (1986), vernacular architecture designed initially for agrarian needs requires substantial adaptation when agricultural activities cease to be economically viable or socially relevant (ABU-LUGHOD, 1986). Fieldwork observations revealed distinct spatial adaptation patterns that correlate with settlement type and the degree of agricultural abandonment. In urban and suburban areas, many agricultural spaces have become entirely abandoned as residents have discontinued farming activities altogether. These spaces are frequently repurposed as additional rooms or converted to general storage areas. However, many remain underutilised due to their large scale and lack of natural lighting, as they were designed as windowless spaces for agricultural functions. Rural areas exhibit more varied adaptation patterns, with some households retaining their original functions for stables ("ma'alef"), hay storage ("Tabban"), and grain storage areas, where agricultural activities continue.

Climate Control and Integration of the Lighting System

The modification of floors and ceilings addresses multiple contemporary requirements that conflict with traditional spatial proportions. Historical vernacular houses featured high ceilings designed for passive climate control in hot, arid conditions (Haj Ali, 2022). While effective for thermal management through natural convection, these elevated ceiling heights created practical difficulties for modern lighting installations and spatial proportions preferred in contemporary domestic life. False ceiling installations have emerged as a primary solution for integrating modern electrical and mechanical systems within traditional structures.

The hardness of basaltic construction materials makes installing electrical wiring and plumbing systems extremely challenging using traditional methods, necessitating the use of suspended ceiling systems to conceal modern infrastructure. These modifications demonstrate the adaptation of "traditional spatial proportions to contemporary functional requirements and technological systems," where thermal performance considerations must balance with the practical demands of modern utilities and lighting technologies. Integrating modern comfort systems requires spatial modifications that often conflict with traditional architectural principles. Climate adaptation motivated the addition of courtyard shading, demonstrating the continued relevance of environmental comfort considerations in contemporary modifications.

Climate-responsive design in vernacular architecture relied on passive strategies, including "natural lighting and cross-ventilation, allowing for low energy consumption and thermal comfort".

Contemporary comfort expectations, however, demand mechanical climate control, artificial lighting systems, and modern appliances that require spatial accommodations not anticipated in original designs. Research on historic service systems reveals that traditional architectural elements were specifically designed to provide maximum comfort under natural conditions, incorporating passive systems for heating, lighting, ventilation, and drainage that shaped the implementation of domestic technology and building materials (Disli & Gediri-Gökçen, 2025). The fieldwork data reveal systematic patterns of architectural transformation across the study region, with specific interventions, particularly roofing modifications and opening changes, occurring almost universally regardless of settlement type. The driving factors demonstrate that transformations result from multiple pressures, including technical necessities, social changes, and modernisation aspirations. This indicates that vernacular architecture adaptation represents a complex negotiation between heritage preservation and contemporary living requirements.

Material Performance and the Drivers of Modernization

The documented material transformations reveal systematic inadequacies in traditional building materials when subjected to contemporary performance requirements. This aligns with findings from China (Zhang et al., 2022) and Nepal (Datta et al., 2016), where material substitution emerges as a universal response to climate deterioration and performance expectations. However, Sweida's pattern shows higher-frequency interior plastering (80-98% universal) than rural Nepal (40-60% documented), suggesting that urban contexts experience more intensive infrastructure integration pressures. Durability concerns emerge as primary drivers across multiple transformation categories, such as traditional basalt materials, while structurally sound, require maintenance knowledge (annual roof compaction with 'Madhale' stones) that has become economically and practically unfeasible. This finding extends Disli and Gediri-Gökçen (2025)'s argument about historic service systems, revealing that when craft knowledge disappears, material substitution becomes inevitable rather than discretionary.

Implications for Habraken's Transformation Framework

Applying Habraken's (2000) three analytical orders (physical, territorial, cultural) reveals important findings about heritage transformation dynamics. Physical order modifications (concrete roofing, interior plastering) responded primarily to technical necessities and appeared across all contexts with remarkable uniformity (80-98% frequency). This universality suggests physical transformations are driven by performance imperatives largely independent of cultural variation.

Territorial order changes (space subdivision, entrance relocation, courtyard enclosure) showed greater urban-rural variation (15-52% range for house splitting), indicating that settlement density and social context substantially influence how residents renegotiate spatial boundaries. This aligns with Habraken's assertion that territorial boundaries represent negotiated relationships between controlling agents, in this case, between residents seeking expanded living space and inherited architectural constraints.

Cultural order persistence, maintenance of courtyard principles, selective basalt preservation, and continued linguistic reference to 'beit' (room-as-house) concepts despite modifications suggest that residents consciously preserve cultural meanings even physically transforming structures. This contradicts preservation assumptions that modernisation automatically erases cultural continuity. Instead, findings demonstrate what Habraken theorised: that vernacular architecture encodes cultural order through spatial practices and social meanings that can persist despite physical change. This distinction between physical transformation and cultural continuity has significant implications for heritage conservation frameworks, suggesting that preservation objectives should prioritise cultural continuity and spatial practice patterns over material authenticity.

This research's strengths include systematic documentation of 146 houses across diverse settlement types, direct resident perspectives through interviews, and triangulated data collection methods (visual surveys, architectural documentation, observations, and interviews).

The application of a multidimensional analytical framework (Habraken's three orders) provides a richer interpretation than single-method heritage studies. Research conducted in 2023 captures transformation status during relative post-conflict stability, allowing documentation of longer-term modification patterns and resident decision-making reasoning.

Limitations include geographic specificity (Sweida province only), limiting generalisation to other Syrian regions or Middle Eastern contexts. The case study methodology, while providing depth, cannot produce statistically generalizable findings to broader populations. Post-conflict timing means earlier transformation phases and impact on displaced populations remain partially undocumented. Research focused on inhabited heritage excludes abandoned vernacular buildings, potentially underrepresenting heritage loss extent. Focus on residential vernacular architecture excludes other traditional building types (religious and commercial structures), limiting the scope of the cultural continuity analysis. Finally, while interviews captured resident perspectives, analysis reflects researcher interpretation and may not fully represent community understanding of transformation meanings.

Conclusion

This research examined three core aspects: (1) architectural transformations residents implemented in vernacular houses, (2) how residents actively adapted heritage structures to contemporary needs, and (3) what transformations reveal about cultural continuity.

Analysis of 146 houses documented eight transformation types organised into structural, functional, and morphological categories. Universal transformations (concrete roofing: 83-94%; interior plastering: 80-98%) indicate a response to technical imperatives that affect all contexts equally. Context-specific transformations (vertical expansion 35-52%, house subdivision 15-44%, functional change 17-52%) showed significant urban-rural variation, reflecting settlement-type-specific socio-economic pressures. Transformation intensity correlates with external pressures: vertical expansion concentrated in the early 2000s; violations accelerated from 2011 to 2021 during conflict-driven displacement (2,600 documented violations).

Residents demonstrated sophisticated agency in modifying heritage structures. Rather than passive modernisation, residents selectively adapted vernacular forms: maintaining courtyard layouts in 46-56% of houses, preserving basalt materials where economically feasible, and continuing traditional spatial terminology despite physical modifications. Residents negotiated constraints (financial limitations, legal restrictions, available materials) and competing needs (family growth, livelihood changes, contemporary comfort), making deliberate choices about modifications. This reveals transformation as active community adaptation.

Cultural elements persisted alongside change: courtyard-centred spatial organisation was maintained in the majority of houses; traditional social practices continued verbally despite physical changes; residents' preference for basalt materials reflected cultural values beyond performance. Simultaneously, significant cultural loss occurred: agricultural storage systems were abandoned (representing a loss of agricultural knowledge); seasonal spatial practices were eliminated; mechanical systems replaced passive climate strategies. This reveals selective rather than complete cultural continuity, driven by: (1) persistence of social functions (family gathering remained important; agriculture ceased); (2) compatibility with contemporary needs; (3) economic feasibility; (4) regulatory environment.

Geographic specificity to Sweida Province limits broader generalization. Case study methodology provides depth but not statistical generalizability. Post-conflict timing (2023 fieldwork) means the 2011-2017 conflict phase remains partially undocumented through direct observation. Research focused on inhabited heritage excludes abandoned buildings and excludes non-residential vernacular types, potentially underrepresenting heritage loss and limiting cultural continuity analysis to residential domains.

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Ethical Approval and Informed Consent
This research was conducted in accordance with the Declaration of Helsinki and institutional ethical guidelines for qualitative research involving human participants. Verbal informed consent was obtained from all interviewed residents before interviews, with consent recorded at the beginning of each session. Participants received comprehensive information regarding research purposes, data usage, publication intentions, and withdrawal rights. In accordance with local cultural preferences, consent was provided verbally rather than in writing. All interview recordings, transcripts, and field notes are stored securely and accessed only by the research team. Participant anonymity and confidentiality have been maintained throughout; individual residents are not identified, and houses are referenced only by settlement location and transformation type.

Disclosure statement
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