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Representing land use response in a laissez-faire framework: the case of three informal transportation nodes in the Beqaa Valley, Lebanon

Keywords:

Urban Settlements, Lebanon, Middle East, Mixed Use, Land Use Classification

Abstract

The Pan-Arab Autostrad (الاوتستراد العربي) is a limited access facility designed to connect the Syrian capital Damascus and the Lebanese capital Beirut. The construction of this 4-lane facility is anticipated to be completed in the next 5-10 years. Sections of the facility are operational and have prompted land use responses from settlements that depend on it. This paper explores the impacts of high-capacity transportation infrastructure onto an existing urban settlement, with emphasis on three transportation nodes. The paper will examine the physical aspects of urban settlements and explore graphic representation techniques that will inform land use classification for geospatial analysis.

History of road and settlement: A snapshot.

The Pan-Arab Autostrad (PAA) in Lebanon, originally conceived in the late 1940s, was designed to accommodate growing commuter and commercial traffic between the Lebanese capital, Beirut and the Syrian capital, Damascus. The concept of the Autostrad was not to create new links, but rather to enhance existing connections. The traffic between the two capitals was already serviced by a series of linked roads, building up to the Beirut-Damascus Road (BDR) (Manasseh, 1958). These roads are typically unmarked, varying in width from the equivalent of 2 to 4 total lanes, facilitating long commuter and freight trips (Beirut-Damascus) and shorter trips between governorates and across the country limit (Beqaa-Damascus, Beirut-Beqaa, Beqaa-Beqaa). Major contributors to the steadily climbing traffic are commuter trips to and from Beirut and large

trucks transporting goods from the Beirut Port to the Beqaa and Damascus, stirring conversation amongst Lebanese transportation experts and non-profit organizations about the need to revive the Beirut-Damascus commuter and freight rail. Lebanon's rail was largely built and operationalized during the end of the Ottoman empire and during the French Mandate (1890s-1920s), but ceased to operate at the onset of the Lebanese Civil War (1975-1990). The Autostrad is designed as a 4-lane limited access facility, flanked by shoulders, grade separated, centered with concrete barriers. To access the Autostrad from the BDM and the service roads, vehicles drive on ramps that lead to roundabouts and merge onto the facility (an example can be seen in the Bar Elias Node, fig 2). Today, the Autostrad remains 5-10 years away from completion, stalled by budgetary interruptions, security issues, conflicts, land acquisition, design changes, and governance discord (Zawya UAE Edition, 2018). The earliest segments of the BDR network and nucleation of urban settlements in its path date back to 3000 B.C. But that does not mean the relationship between road and settlement can be summarized as a continuous correlation that grew seamlessly since the Roman Empire. Governance in Lebanon has had a history of instability and conflict, largely along lines of religious affiliations. Since the disintegration of the Ottoman Empire (1918), smaller interest groups, divided along sectarian lines, have created today's fragmented landscape. This fragmentation further grew in the French Mandate (1918 – 1943) shifting allegiances with regional powers and beginning to dissolve in 1926 to beget Lebanon's current political boundaries in 1943. After independence, Lebanon's civil war (1975 – 1990) left a significant physical impact particularly in Beirut. Subsequent refugee crises (1948, 1967, and 2011) demarcated informal urban and peri-urban informal settlements and placed pressure on the country's already poorly managed natural resources. Armed conflicts with Israel (1996, 2006) led to the destruction of transportation, communication, and public service infrastructure. While traces of the Roman Empire era remain visible in historic sites such as the temple of Baalbek and the castles of Anjar, Sidon and Byblos, the impact of the Ottoman Rule,

French Mandate, and subsequent conflicts are also manifested in the distribution, organization and fragmentation of urban territory. An example is the clustering of family members or groups of the same religions in the same areas to preserve the social "bi'a" (environment). More recently, transient residences have emerged, meant to house residents from different religions, yet which rarely become a place where people feel they belong (Bou Akar, 2018).

Theorizing the relationship of settlement and road.

Building onto this idea of "transience", this report will proceed using two main terms: "settlement" and "node". The report's use of the word "settlement" serves one purpose: to avoid categorizing urban areas under "town, city, hinterlands, suburban" classes. This paper is a part of a larger ongoing research project on urban settlements in the Beqaa Valley, and has yet to distill a set of urban settlement terminology that is representative of the area and able to enter academic discourse on urban studies. As such, the term "settlement" will replace the words of town, city, and/or village and will signify places where people live. The "node" will, in this paper, will signify the part of the settlement nearest to the main transportation link (in this case, either the Beirut-Damascus Road or the Pan-Arab Autostrad), serving both as the first contact between the commuter and the settlement and as the front of that settlement.

With this distinction, the node becomes a stretch of land that sustains a relatively fast-paced relationship with the transportation infrastructure and traffic. Other parts of the settlement, while naturally impacted by transportation changes, have a slower land use response and a different scale. Example: In the event of a sustained commuter traffic increase upon the main transportation segment, the land use in the node will react first, potentially via increase in the opening shopping business, increase in privately owned transportation stop frequency, higher residential occupation and construction of new buildings to accommodate the demand, before the

effects begin to trickle through to the settlement outside the node. In the event of a sustained decrease in commuter traffic, the impacts will be visible first in the node itself. This is partly due to the node's obvious proximity to the transportation network but is also guided by its transience. While the settlement – as a whole – tends to retain its built form and land use characteristics and resist change, the node does the opposite, almost acting as a shock absorber that eases the larger settlements into the inevitable land change. From this platform, the paper will examine the built environment of three transportation nodes with emphasis on the distribution of land use activities and its physical characteristics, culminating the findings into a graphic summary that visualizes dominant land uses and activities.

Data and methodology.

This paper aims to create a graphic summary of the 3 nodes using the following:

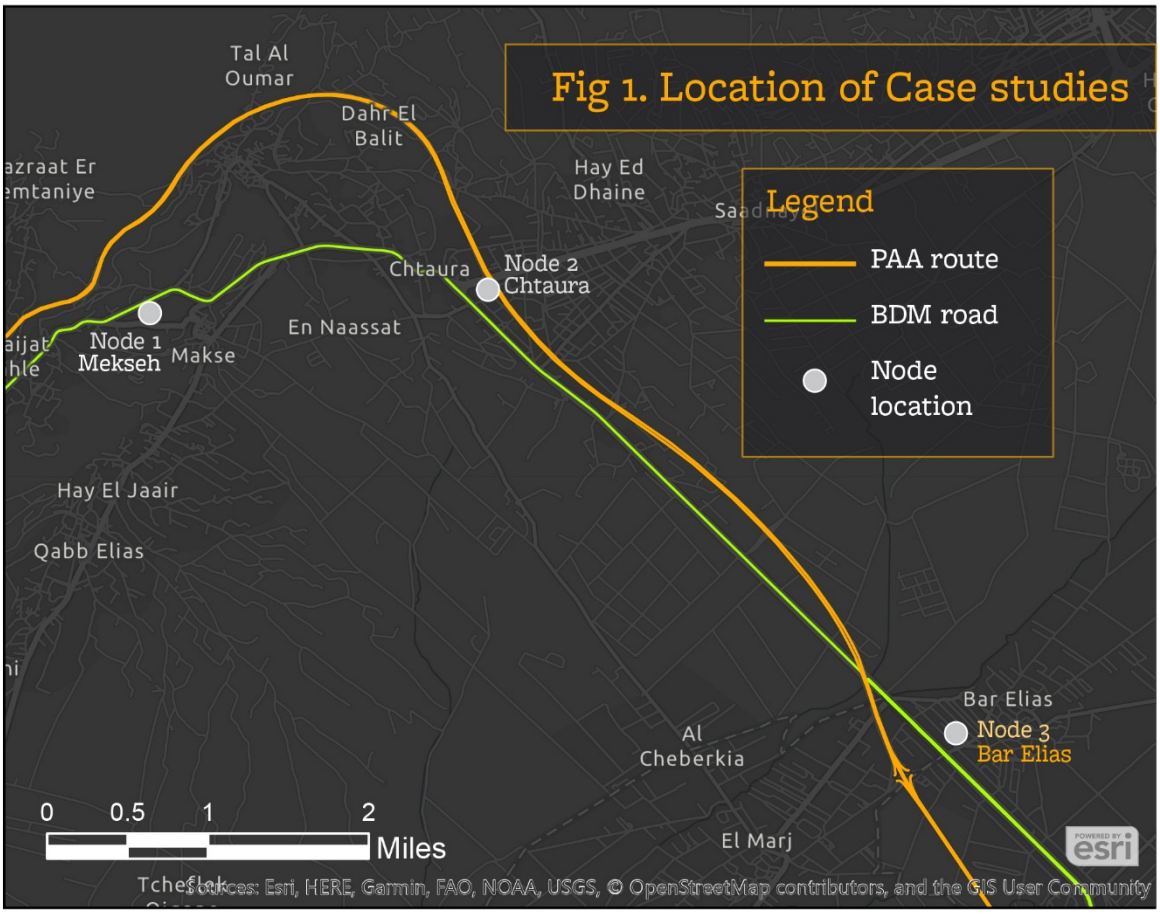
- **Site visits:** Including site photos and observations on land use.
- **Sketchup model:** Using high resolution satellite imagery and site visits, building footprint traces will inform a 3D model. In this study, exact heights of buildings were not measured. Instead, the building heights are based on number of floors, with the assumption of each floor is 10 feet high.
- **Geospatial Analysis**: The graphic summary will then help launch a) inventorying public space usage, and b) translating findings into land use classifications.

Site Description: Three Nodes

The sites that this paper targets are situated in Lebanon's Beqaa Valley. The Beirut Damascus road network crosses through the city of Beirut, Beirut's hinterlands, Mount Lebanon, and the

Beqaa Valley before crossing the Syrian border into Reef Dimashq and finally reaching Damascus.

The Beqaa Valley holds approximately 40% of Lebanon's agricutlural areas and holds one of Lebanon's designated "industrial cities" (The World Bank, 2016). Urban settlements in the Beqaa are shaped by the typical drivers (e.g. transportation, topography, population, natural resources and climate), but due to Lebanon's tendency to 'fragment' along the lines of sectarian and community divides, settlements galavanize in diverse forms. This diversity will be represented in the report below, comparing the 3 nodes along the PAA and the BDR. To identify a 'node' in this continuous urban fabric, we use existing political boundaries to identify cadasters and city/town limits. Within these boundaries, areas closest to the road network which have the most dense built environment are then identified as potential nodes. Following these early steps, we identified Bouarej, Mreijat, Mekseh, Jdita, Chtaura, Taalabaya, Taanayel, Bar Elias, Deir Zanoun, Marj, Majdel Anjar and Anjar as potential nodes. Of these nodes, Mekseh emerged as a worthy case study due to evidence of planning lead by a single economic/political entity. It is less formal and more recent than its neighbors Bouarej and Mreijat, both in close proximity to PAA and BDR. Chtaura also rose in the hierarchy due to its site at a significant fork of two significant roads, the BDR and the Zahle main road. It receives traffic from Beirut, Damascus, West Beqaa, and Zahle, positioning it as a node more critical than Jdita, Taanayel, and Taalabaya, which are all within close proximity. The Bar Elias node was selected because of the obvious link between the BDR and the PAA as detailed below. Its boundary grew to follow the BDR historically, creating a commercial-residential corridor and offering easy access to the Bar Elias Plaza, stretching a continuous built fabric, making it more legible than Marj, a less dense settlement punctuated by agricultural land, Anjar, a more distant settlement, and Deir Zanon and Majdel Anjar, both smaller settlements.



Mekseh Node

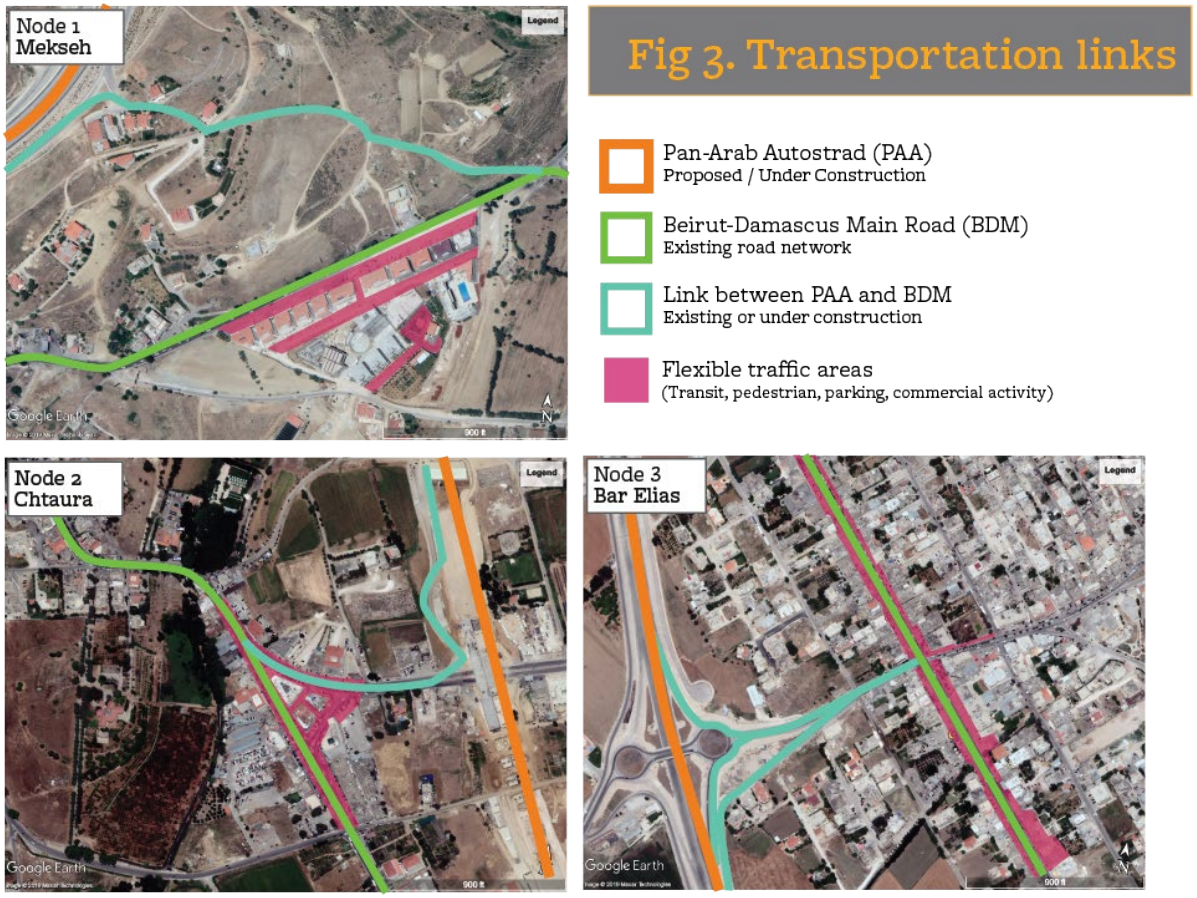
The Mekseh node is different from the Chtaura and Bar Elias nodes mainly in two aspects: location and governance. Located in an arid mountaineous region with scattered residential and commercial establishments (whereas the Chtaura and the Bar Elias nodes are urban), it has been developed recently by a business entity whose CEO is currently in political office. In these circumstances, the node does not resemble the settlement it represents, and is governed by a

single administrative entity, which rendered delineating its border rather straightforward. Dubbed the “Zone Gate”, it is developed to act as a gateway to Mekseh, a settlement situated south of the Autostrad, sporting restaurants and shops with ample parking space on the road façade, with a terraced secluded summer/winter resort. It has been developed to attract commuter traffic and local demand for entertainment and may be a precursor for an emergent typology in transportation-oriented development.

Fig 2. Aerial view of 3 nodes

Chtaura Node

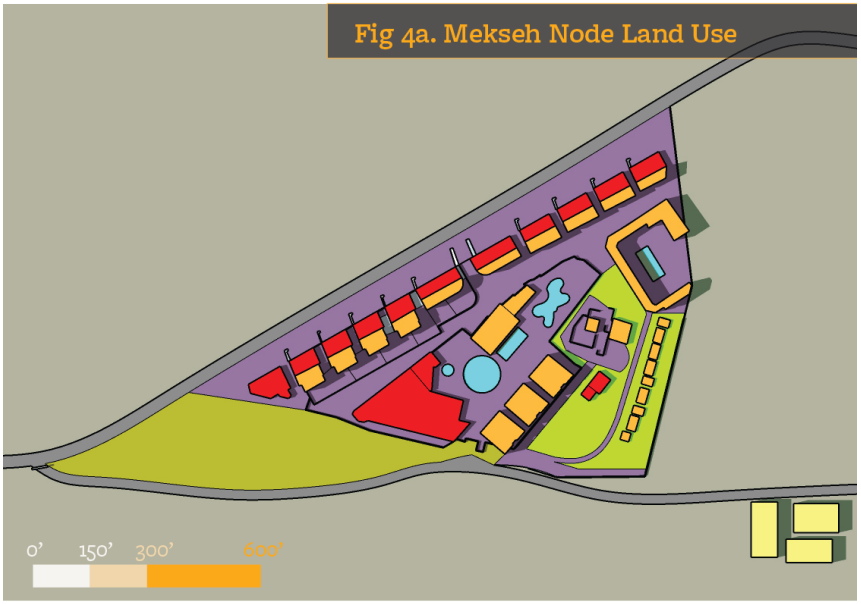
The Chtaura node is at the meeting point of two main roads, the BDR and the Zahle main road. The segment of the Autostrad near the node is still under construction, so its impact on the node is not yet fully apparent. The node houses a hospital and two police stations and is known as an optimal location to exchange currency or hail a van (privately owned public transportation that can hold up to 12 passengers) to travel to Damascus or Beirut. Traffic flow and its location positioned it as an informal transportation node, inviting professional offices (Health Care, Engineering, Lawyer offices) and banks. Its fringes are adorned with plant nurseries (a specialty of Taalabaya, its neighbor), recent large department stores, and agricultural lands. The limit of the area of study cannot be clearly discerned, so some of the fringes were included to assess how the node begins to meld into the settlement that it represents.

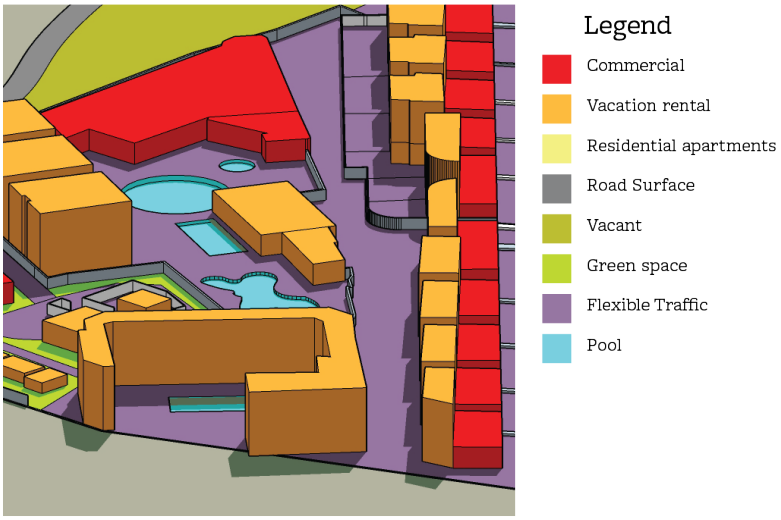


Bar Elias Node

The Bar Elias Node's limit was not entirely discernable. The PAA segment corresonding to Bar Elias is functional, running parallel to the BDM, creating what could develop into a gateway into the settlement. However, the fabric that extends along the BDM from that entry point is continuous in land use morphology (see figure 4c). While newer buildings are shifting the hierarchy (more floors, different construction material, larger signage), the node has not yet significantly changed to reflect the increase in traffic by both roads. Similar to Chtaura, increase in number of banks, the addition of a new hospital in the heart of the settlement (outside the area

of study), and the emergence of large establishments are precursors to future changes that will transform the node and the settlement it represents.





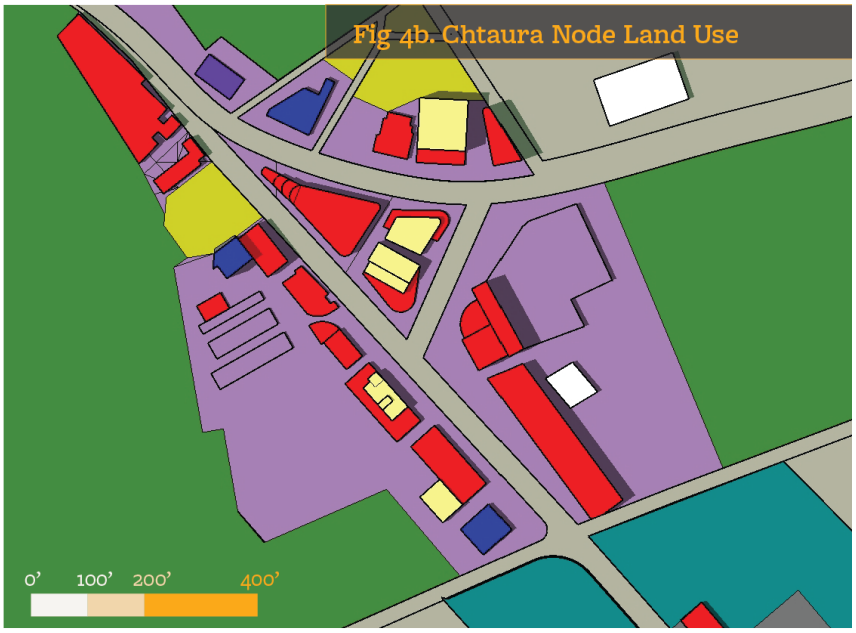
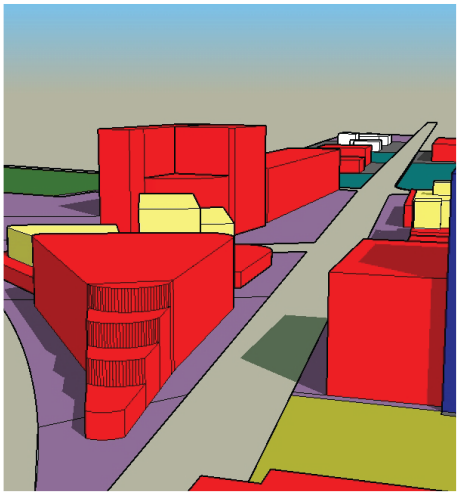
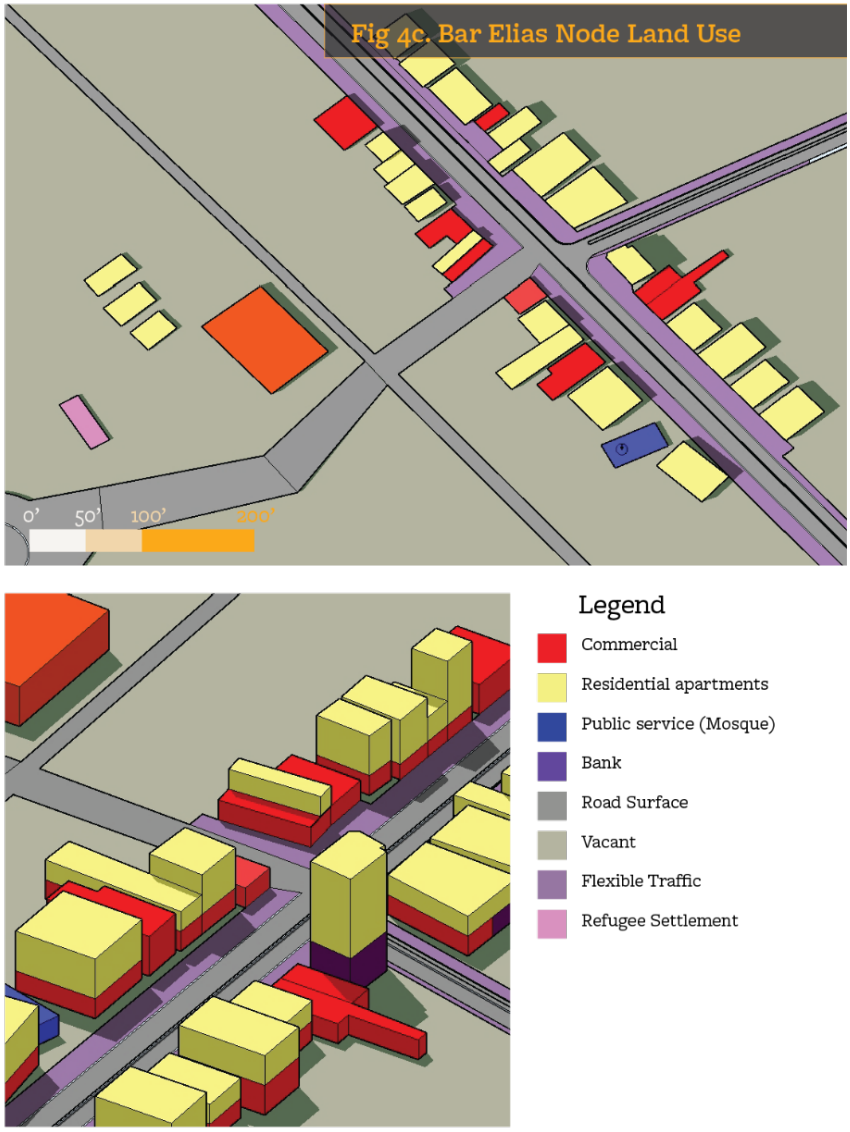


Fig 4b. Chtaura Node Land Use



Legend

- Commercial
- Residential apartments
- Public service (Hospital, Post, Police)
- Bank
- Road Surface
- Vacant
- Flexible Traffic
- Agriculture land
- Plant nursery



Comparing land uses

Commercial-Residential Mix: All three nodes' commercial activities populate building façades, creating the first line of contact between commuter and urban fabric. The Mekseh node's commercial activities are mostly restaurants, including a local sweet chain "Sea Sweets", a dairy product shop, and one Adidas outlet store. Both Bar Elias and Chtaura's commercial buildings include governmental offices (notary public, municipality). Store scales in Chtaura and Bar Elias

are similar, being smaller (less square footage, owned by smaller businesses) and more diverse than Mekseh's.

Photos 5-7. Commercial activity. from left to right: Heat and cooling service shop, a barber shop, and a bakery on the ground floor, topped by one floor of apartment buildings in Bar Elias; Jewlery shops and restaurants topped by professional offices in Chtaura; large scale shops in Mekseh.

Flexible Traffic Space: The space between the edge of the road and the beginning of the building is a host for more than car parking. In the Chtaura node, this space is used for pedestrian circulation, transit drop off/pickup, and hosts mobile produce and trinket merchants. The border between public and private, pedestrian and vehicular traffic becomes permeable and creates a space that is open to interpretation. In the Bar Elias node, the footprint of that flexible space is thinner and more continuous (See figs 4c and 4b), and the configuration of that permeability in the public-private, vehicular/pedestrian borders is, in essence, similar. This is illustrated in the use of some parts of the sidewalk for displaying goods for sale, placing signage for advertisement (Photo 9). In both nodes, Chtaura and

Photo 8. Chtaura Node bustling with traffic including van transit. The hospital is in the tall building, backed by stretches of agricultural lands. The aluminum shelters serve as parking lots.

Photo 9. Along Bar Elias Node: Flex space used for parking, displaying signage, and selling produce.

Bar Elias, this space is alive with various activities, acting almost as an urban edge ecosystem. Mekseh's front edge resembles both nodes, where the stairs and the parking lot allow for this open interpretation of the space (see Photo 7) but evident physical impact of user experience has yet to be manifested. Mekseh's inner flexible space, which will be exclusive to resort clientele (pool and gym members, resort renters), could be a stark contrast to the other two (see Photo 10). The Mekseh layout often separates pedestrian and vehicular circulation but viewing how the Beqaa'i public interacts with flexible space, assumptions cannot be made on how these flexible spaces will be used for socialization and play.

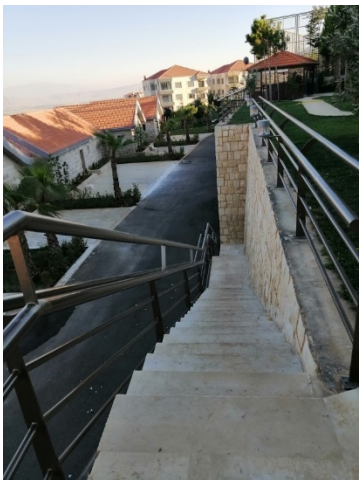


Photo 10. Flexible space inside the Zone Gate node.

Banks, Police Stations, Notary Public, Municipal Services: The Chtaura and Bar Elias nodes both house these services within or very close to their location, whereas Mekseh, due to it being a recently installed commercial establishment, does not, which sets it apart from the other two nodes. A few public services offices in Chtaura and Bar Elias operate in ground floor shops or two doors down from a lawyer's office, which indicates that sometimes public services can be incorporated in a commercial urban setting. Also important to note are the primed lands for development surrounding the Mekseh's Zone gate. A scenario where land development of residences, restaurants, and services are constructed around the Zone gate as a center, providing a dense mixed use urban fabric similar to the other two nodes, is very likely.

Scale and Fragmentation: Noticeable is the fragmentation in two of the nodes (Chtaura and Bar Elias). On the footprint level, the Bar Elias buildings are relatively smaller than Chtaura's and are likely owned by a larger group of people. This visible fragmentation is also reflected in architectural styles and signage governed by trends or cost more than an enforced code. However, amidst this fragmentation, consistency in a mixed-use prototypes (building with a commercial showroom on the ground floor, topped by 2-4 floors of residential apartments) is easily discernable in Fig 4c. These prototypes, initially conceived to house families' workplace and residence, retain their shape in the face of socio-economic changes (shop is occupied by a different business, owner of the shop retires, building sales, emigration). On the entrance from the PAA to Bar Elias, newer larger buildings are emulating the existing mix of land uses in one building. Chtaura's fragmentation presents itself on a more vertical scale, with the central buildings designed to house shops and businesses, and nearby buildings sporting more floors for apartment housing. The argument could be made that land uses are more clustered, hence less fragmented, but a look at the variety in services found in one building provides insight on how the market can populate an informal transportation node without much attention to consistency in types of goods and services offered or architectural and signage styles. In this environment, the individual's impact is sovereign. On the residence front, with Chtaura being a coveted area to live (proximity to Beirut, Zahle, and Damascus), residents come from more diverse backgrounds, contributing to the node's transient and changing aspect.

Photo 11. Chtaura's Shams building, the triangular center of the Chtaura Plaza Node. Ground floor: Sea Sweet (a sweets chain store), drugstore, clothing store, the Municipality of Chtaura, travel agency, Western Union. Top floors: insurance companies, magazine publishing houses, doctor's offices, real estate agency.

Translating into land use classification.

To begin venturing into how field observations can transition into graphic data that can be used in a geospatial analysis platform, a clearer description of "mixed use" is essential to create a classification set reflective of the area of study. To delve into this challenge, the classification set will be disaggregated: if, in one building, the first floor is a commercial shop and the second floor is an apartment residence, two land uses will be attached to the building's footprint. This in turn will delve into different combinations of land uses, and derived classifications.

The first step will delineate disaggregated land uses derived from the three case studies.

Abv.	Land Use	Includes
R-A	Apartment Residence	Residential apartments as observed in Chtaura and Bar Elias and outside the Zone Gate perimeter. Typically found in buildings of 3+ floors.
R-H	House Residence	Houses, akin to a single-family house, observed in rare instances in Bar Elias.
R-R	Rental Resorts	Bungalows and apartments for vacation retreats.
C-CFS	Chain Food Store	Local chain food stores are trending in the Beqaa Valley. Newer installations typically have larger footprints. Includes sweet shops, restaurants.
C-LFS	Local food store	Non-chain local food stores and restaurants.
C-HG	Home goods shops	Includes stores that sell furniture, household items, toys.
C-El	Electronic stores	Phones, laptops, and other screens
C-CL	Clothing stores	Includes both local and chain stores. This is due to just only one clothing chain store in all 3 case study areas.
C-CX	Currency exchange	Currency exchange shops.
S-Rep	Repair services	Auto, equipment
H-DO	Health Clinic	Doctor's offices and health clinics.
H-H	Hospital	Hospital.
H-DG	Drug Store	Pharmacies
CV-P	Police Station	Police Station.
CV-M	Public service	Municipal office, notary public, religious buildings.
Sur-TV	Transportation	For auto and van transit circulation.
Sur-Fx	Flexible Space	Pedestrian, parking, mobile commercial activities.
Agri	Agricultural	Agricultural lands

These disaggregate classes are based on trends of activities found in all three nodes. For example, smart phone shops (C-El) are frequently found around the Beqaa. These shops also offer telecommunication services (internet, phone plan). They are a staple in any medium to high

density urban settlement. The opening of a chain food store signifies that there is demand and potential for economic growth and engages other chain stores in a competition scene.

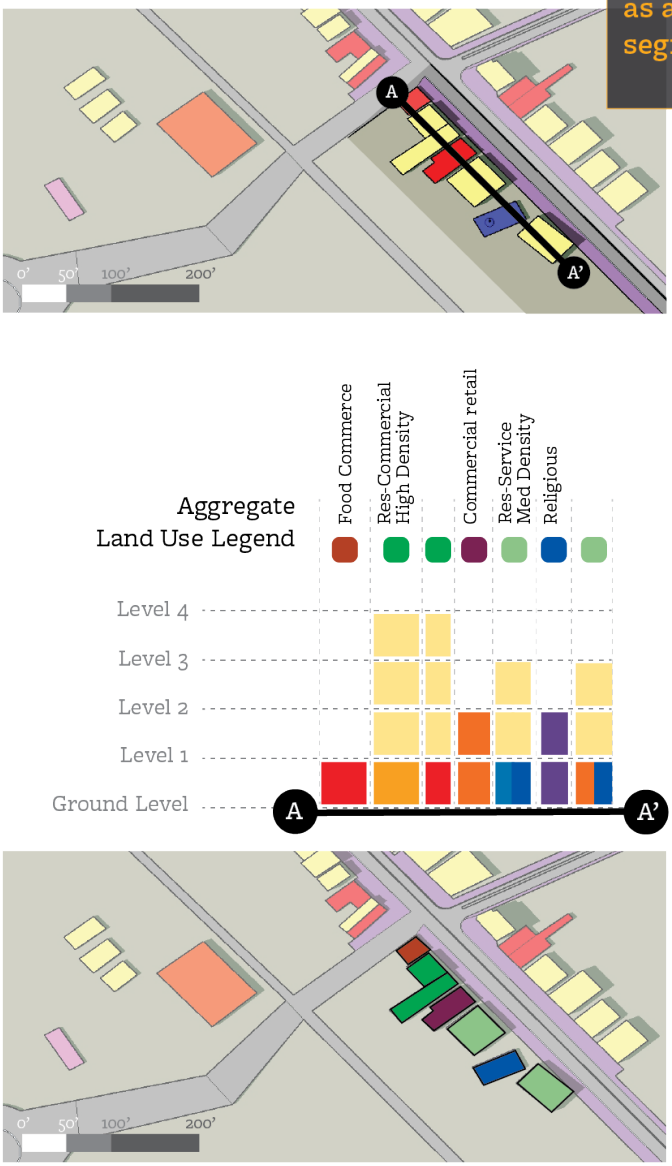


Fig 5. Disaggregating data, Classification as applied to a segment in Bar Elias.

Applying these classes onto a segment of the case studies as demonstrated in Figure 5, aggregate land use classes would emerge as a result of adding every land use on a vertical axis, resulting in case-specific land use classifications that step beyond the “mixed use” development. This aggregate land use classification can be used in a 2D Geographic Information System environment (vector or raster based). This in turn can inform planning endeavours on organizing or enriching a commercial scene (food industry), densifying land uses, or re-inventing the area as a entry gate to the settlement it represents. This disaggregate classification can also be used as is in a 3D platform, relying on citizen science and BIM to facilitate navigation of the area.

Conclusion

The node-settlement framework can be a useful method to understand and plan infomal transportation nodes in the Beqaa region towards higher efficiency and transportation-oriented design (designated lanes for van pickup/dropoff, clustered parking spots, ADA accessible pedestrian infrastcuture, urban trees for shade) without compromising its cultural and aesthetic aspects (signage,various architectural styles, mobile merchants). Should traffic increase in the Beqaa Valley, planning for efficiency and historic preservation will become essential to support the Valley's competitiveness as a strategically located settlement to live and work. Research in Lebanon, particularly in urban studies, is usually obstructed by the lack of data on land uses. The field observation and graphic representation method can help generate a platform and classification set for geospatial analysis towards achieving local and regional planning goals.

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