CALYX: A GEOMORPHOLOGICAL APPROACH TO FORMATION OF URBAN SPACE IN THE CONTEXT OF ANKARA

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
URBAN DESIGN
IN
CITY AND REGIONAL PLANNING

JULY 2018

Approval of the thesis:

CALYX: A GEOMORPHOLOGICAL APPROACH TO FORMATION OF URBAN SPACE IN THE CONTEXT OF ANKARA

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ABSTRACT

CALYX: A GEOMORPHOLOGICAL APPROACH TO FORMATION OF URBAN SPACE IN THE CONTEXT OF ANKARA

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July 2018, 189 pages

That geomorphology constitutes a basis for the urban formation does not seem to be valid argument today, considering the current urbanization processes and urban experiences. As a challenge, this study is grounded on the inquiry that geomorphology is not a mere physical surface but contains certain spatial qualities that are effectively integrated in the urban formation processes through the prevalent productive capacity of the era.

At that end, *calyx* is taken at the focus of the study as a geospatial phenomenon. An exploration into calyx typologies and towns through the mapping of an array of instances is followed by a detailed analysis in the case of Ankara.

'Traditionally formed' and 'contemporarily envisioned' urban formation processes of Ankara as well as the shifting urbanization approaches with reference to the calyx are analyzed by a series of reproduced visual narratives. In that sense, this research offers a fresh perspective into the urban formation of Ankara and a method of analysis by taking the geomorphological qualities at the core of inquiry.

Keywords: Calyx Geomorphology, Urban Formation Processes, Ankara

ÖZ

ÇANAK: ANKARA BAĞLAMINDA KENTSEL MEKANIN OLUŞUMUNA YERBİÇİMSEL YAKLAŞIM

Yavuz, Irmak

Yüksek Lisans, Kentsel Tasarım, Şehir ve Bölge Planlama Bölümü
Tez Yöneticisi: Prof. Dr. Adnan Barlas

Temmuz 2018, 189 Sayfa

Güncel kentleşme pratikleri göz önüne alındığında yer-biçim bileşenlerinin kentin mekansal oluşumunda etkin olduğunu söylemek güçtür. Buna karşı olarak, bu çalışmada yerbiçimlerinin kentsel gelişim için sadece fiziksel bir yüzey sunduğu fikrinin aksine, yerbiçimlerin mekansal nitelikleriyle ve dönemin yaygın üretim kapasitesiyle kentin oluşum süreçlerinde etkinliği araştırılmaktadır.

Bu noktada çalışmanın odağında coğrafi uzamsal bir olgu olarak *çanak* yerbiçimi bulunmaktadır. Bu olguyu incelemede, farklı çanak tipleri ve kentlerinin haritalar üzerinden araştırılmasının ardından Ankara kenti özelinde detaylı incelemeler yapılması takip etmiştir.

Bununla bağlantılı olarak, Ankara kentinin 'geleneksel olarak üretimi', 'çağdaş tahayyülü' ve değişen kentleşme yaklaşımları çanak yerbiçim bağlamı ele alınarak bir dizi yeniden üretilmiş görsel anlatılar üzerinden çözümlenmiştir. Bu çalışmada yerbiçim nitelikleri sorgulamanın merkezine alarak Ankara'nın kentsel oluşumuna yeni bir bakış açısı ve yeni bir çözümleme yöntemi sunmaktadır.

Anahtar Kelimeler: Kentsel Oluşum Süreçleri, Çanak Yerbiçimi, Ankara

To Ankara

ACKNOWLEDGEMENTS

This study would not be complete without the guidance and support of many precious people. This long list starts with Prof. Dr. Adnan Barlas whom not only supervised this thesis with his wisdom and patience, but also instilled an alternative outlook on life with his personality. I owe him gratefulness for his contributions. I am also indebted to examining committee members; Prof. Dr. Baykan Günay, Prof. Dr. Çağatay Keskinok, Assist. Prof. Dr. Burak Büyükcivelek, Assist. Prof. Dr. Meltem Şenol Balaban. I especially owe sincere thanks to Prof. Dr. Baykan Günay for sharing his valuable time and ideas whenever I needed in this study.

I would like to extent my heartfelt gratitude to kind members of Faculty of Architecture of TED University for their endless tolerance. I owe special thanks to Assist. Prof. Ela Ataç Kavurmacı, Assist. Prof. Dr. Zeki Ülkenli, Assist. Prof. Dr. Cansu Canaran, and Assist. Prof. Dr. Ersan Ocak for their support and contribution. I am also thankful to assistant colleagues for their warm-hearted encouragements when I needed motivation.

I would like to express my earnest gratitude to every single person who made METU Urban Design Studio a homelike place to share knowledge and friendships. I thank many scholars and friends who contributed to this work in one way or another.

Especially, I am deeply grateful to Erman Özgür for his precious encouragement, patience, and endless support. I thank him for standing by my side during the hard times and joyful moments.

Last but not least, I would like to convey my sincere thankfulness to my family. I am grateful to Neriman Yavuz, Şükrü Yavuz, and Deniz Işık for their unconditional care. I also am indebted to my beloved grandmother Perihan Karakan for welcoming me with open arms whenever I needed.

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INTRODUCTION

1.1 Problem Statement

Geomorphology, as the physical system of earth forms, contains geo-scale spatial qualities that transcend the mere landforms into ‘geomorphological space’ before any man-made urban form is established. As a multi layered value system, geomorphology inherits spatial references to be integrated as parameters in the complex process of urban formation. Therefore, the conceptions of geomorphological space become manifest in the formation of urban space. To elaborate, these geo-spatial conceptions are embodied in urban form, settlement pattern, urban morphology, utilization of land and socio-spatial processes. Such reciprocal relationship is evident in the spatial history of Ankara. It could be suggested that the geomorphological variables often defined the context of urban formation, generating identity and orientation, even though the city is brutally criticized for lacking character and identity today.

The criticism falls into place considering the fact that the influence of geomorphological space on the formation of “traditionally distinguished” and “contemporarily envisioned” Ankara have been corrupted after the mid-20th century. Ever since, the practice of urbanization caused systematical disruptions in the formation of the city with reference to its geomorphological context.

The urban growth expands homogeneously, disregarding the contextual references in macro scale. Fragmented interventions corrupt these references in mezzo scale and

market oriented architectural solutions conflict with the topographical conditions in micro scale (Figure 1). Partial attempts to recover the obsolete components of geomorphological environment[1], on the other hand, emerge as the nostalgic and caricature images of the past. Consequently, the 'tabula rasa' condition, adopted as a basis in the current practices of urban planning, urban design and in the production of built environment have destroyed the legibility of the geomorphological space. Hence, spatial references that are gathered from geomorphology are no longer available in the meaningful organization of urban space and the spatial processes have been cut off from its essential context.

There have been several researches on micro-histories of spatial formations taking its context from geomorphology in the last few decades. Urban transformation processes in valleys, especially the case of Dikmen Valley, has been the focus of interest in these studies. The current urban projects and practices on the valleys, on the other hand, have been the subject of investigation conducted by disciplinary non-governmental organizations[2]. Even though these are successful attempts to emphasize the significance of context, such investigations require a wider framework on the disciplinary crossing of geomorphology and urbanism.

Eventually, the problems, on which this study is grounded, are twofold in terms of disruptive urbanization processes in practice and lack of a holistic and interdisciplinary framework in theory: the loss of geomorphological space as the fundamental context of urban formation and limited knowledge based on the geomorphology-urban formation reciprocity in the theoretical discourse of urbanism, specifically in the case of Ankara.

[1] The revitalization of Gümüşdere Ihlamur Vadisi Project could be exemplified as a partial intervention.

[2] Most of the cases, UCTEA Chamber of City Planners pioneered the process.

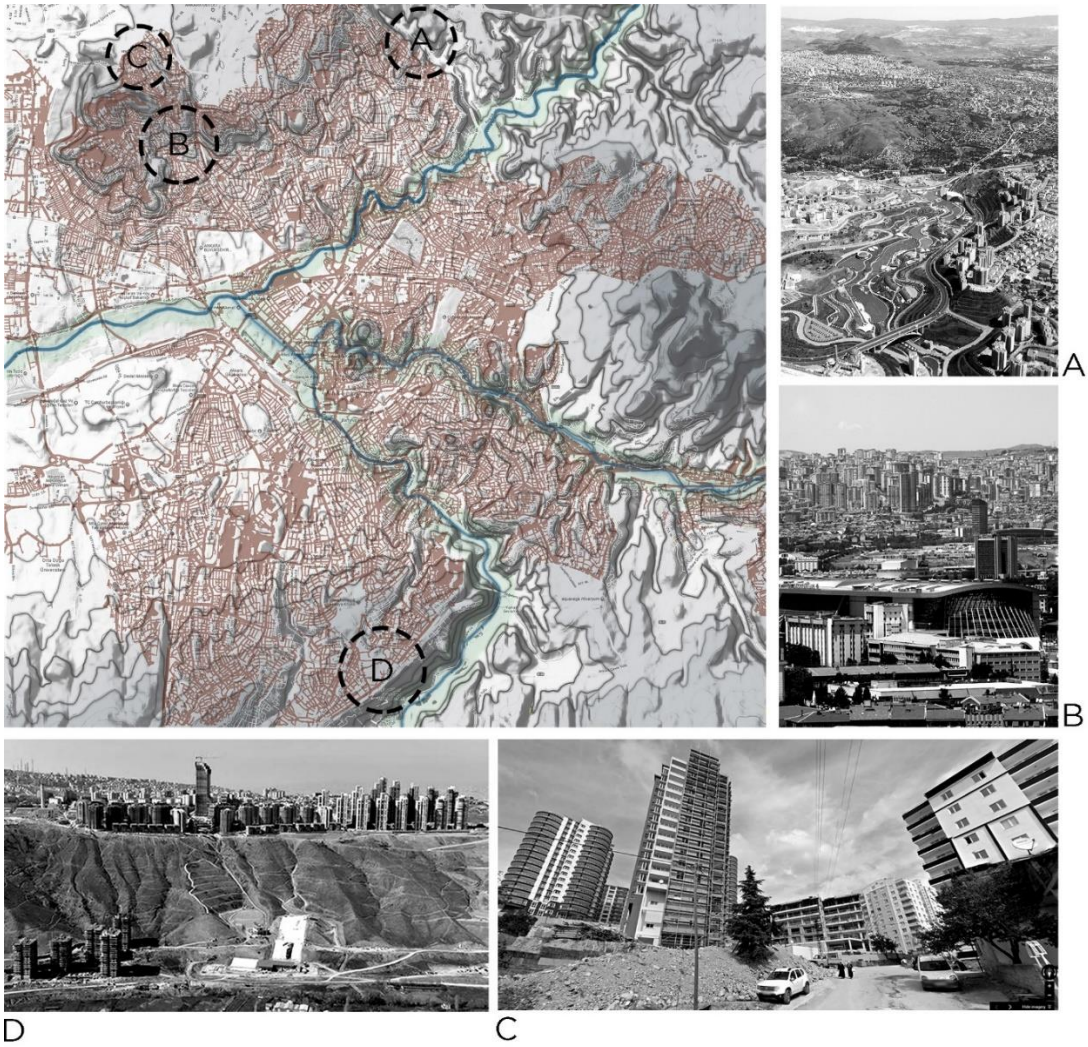


Figure 1. The homogenous urban formation regardless of the geomorphological context. (A) Kuzey Yıldızı Vadisi (Personal Archive), (B) northern terraces of Etlik (Günay, 2018), (C) Karşıyaka (Google Maps Street View, 2016), (D) İmrahor Vadisi (Hürriyet Haber, 2015)

1.2 Aim and Scope of the Study

Today, a conflict exists between past practices of urban formation in its strong correlation with the geomorphological context and current urbanization processes at work that are independent from the context. At this juncture, this research targets to

unfold the significance of geomorphology in the formation of urban space. Some preliminary steps will be taken in order to achieve this major objective. These steps could be listed as follows:

- Setting forth the key concepts to define the geomorphological space as the major subject of the study, explaining the key components of geomorphological space, gathering different approaches to geomorphological space in theoretical discourse of urbanism;
- Identifying 'calyx' as a type of geomorphological space and investigating different patterns of urban formation established in calyx through multiple examples;
- A detailed analysis of a geo-referenced calyx through the case of Ankara;
- A narration of urban formation of Ankara with reference to the structural components of calyx.

Finally, major influences of geomorphology in the formation of urban space, different approaches taken towards geomorphological elements in the planning process and the sequential formation of the urban space will be investigated. The shifting meanings of geomorphology and the loss of its meaning in the urban formation process will then be discussed.

The scope of this study consists of two categories: time scope and geographical scope. The time span of the analysis is limited to the 1970's. Within this interval, the beginning of the 20th century marks a critical turn based on its social, spatial, economic and political reformations with the foundation of the Republic. Therefore, the two epochs that are substantial in the search for the correlation in question are pre-Republican period comprising the Roman and Ottoman eras, and the Republican Period. The former will reveal the multi-faceted relationship of geomorphology in the naturally evolving formation of urban space. The latter, on the other hand, will unravel the approaches of pioneering figures in the spatial configuration of the capital city, predominantly generated in line with the ideals of Republic.

The geographical scale of the analysis is framed by the inner calyx (*iç çanak*), since the area is well defined in terms of geomorphological formation and since the area has been the locus of the urban formation within the defined time span.

1.3 Research Questions

The study is structured with sequential questions in order to achieve its aim of revealing the influence of geomorphology on urban processes (Figure 2). The initial question seeks for a theoretical ground:

- What are the structural components of geomorphology in relation to its spatially distinguished qualifications?

The following questions are then grounded on the exemplification of a geomorphological space defined as 'calyx' (*çanak*):

- What are the typological and geomorphological attributes of calyx in its spatial definition? What are the patterns of urban formation in the context of calyx?

A detailed analysis on the calyx type of geomorphological space through the selected case is sought with the following question:

- What are the structural components of calyx as the geomorphological space of Ankara in macro, mezzo and micro scales?

The questions related to the urban formation, thereafter, could be located within a defined context. In order to investigate the main inquiry of the research the following questions are posed in the context of Ankara:

- How the geomorphological context of the calyx influenced the formation of urban space before the Republic was founded?
- How did protagonists of the Modernist design approach to urbanism influenced by geomorphological setting in the planning process?
- How urban space have been eventually formed in relation with the geomorphological context?

The concluding question of the research is:

- How the correlation observed in two different epochs could be conceptualized as a contribution to the spatial history of the city in the planning and design discourse?

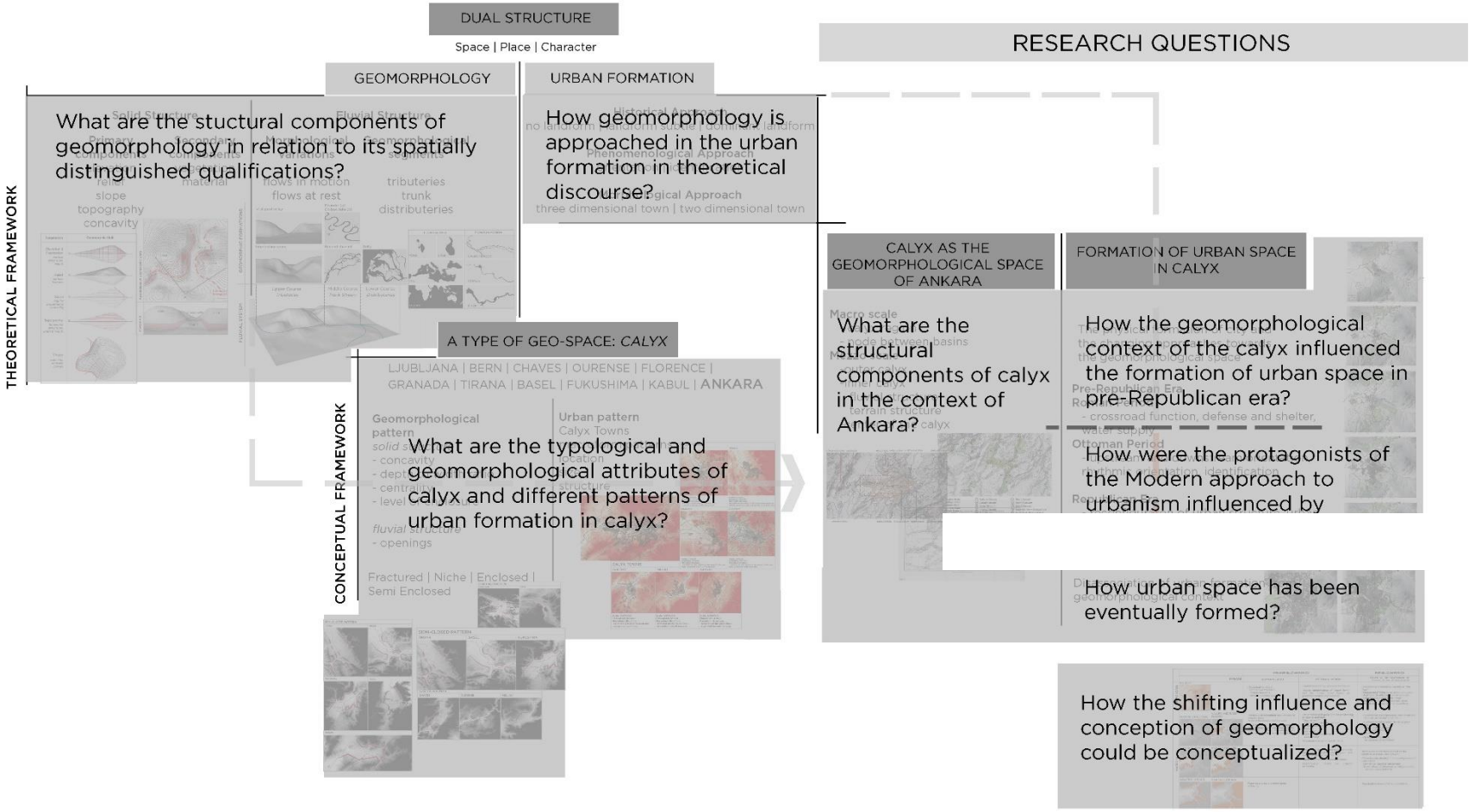


Figure 2. The research questions that are posed in the formulation of the study

1.4 Methodology

The production of visual data through different modes of mapping and integration of archive material forms a basis for the method of analysis (Figure 3).

1.4.1 Mapping

To investigate the relationship between geomorphological setting and urban formation of Ankara, different types of mapping are instrumentalized. Various materials and software programs are integrated in the mapping process. The outputs that are obtained from the mapping processes are the major research material in this study. This section informs the reader on the different modes of mapping techniques, the materials integrated in the mapping process and analysis process based on the research material.

1.4.2 GIS Based Mapping

Two sets of visual material as a part of a two staged mapping research are produced by means of using the software of ArcGIS Pro (Figure 4). The first set consists of digital elevation maps of particular cities in various scales in order to define the calyx as a geomorphological space as well as to unfold typological variations of calyx. The typology differences are based on the level of enclosure, forms of enclosure and scale as gathered from the elevation maps. The first stage of mapping process facilitated for the selection of certain geographical regions, hence, certain towns that are to be analyzed in the study.

The second set of maps depicts different layers in the structural components of geomorphology and the urban form within the given setting. The layers of solid structure are mapped in five categories on the interval of valley and basin floors, lower terraces, higher terraces, lower plateaus and higher plateaus. The elements of fluvial structure are also mapped as an integral component of geomorphology. In the second stage of the mapping process, the urban form of selected cities were later superimposed on the produced maps, so that the patterns of urban formation and development based on size, scale, location, and macroform within the given setting could be analyzed.

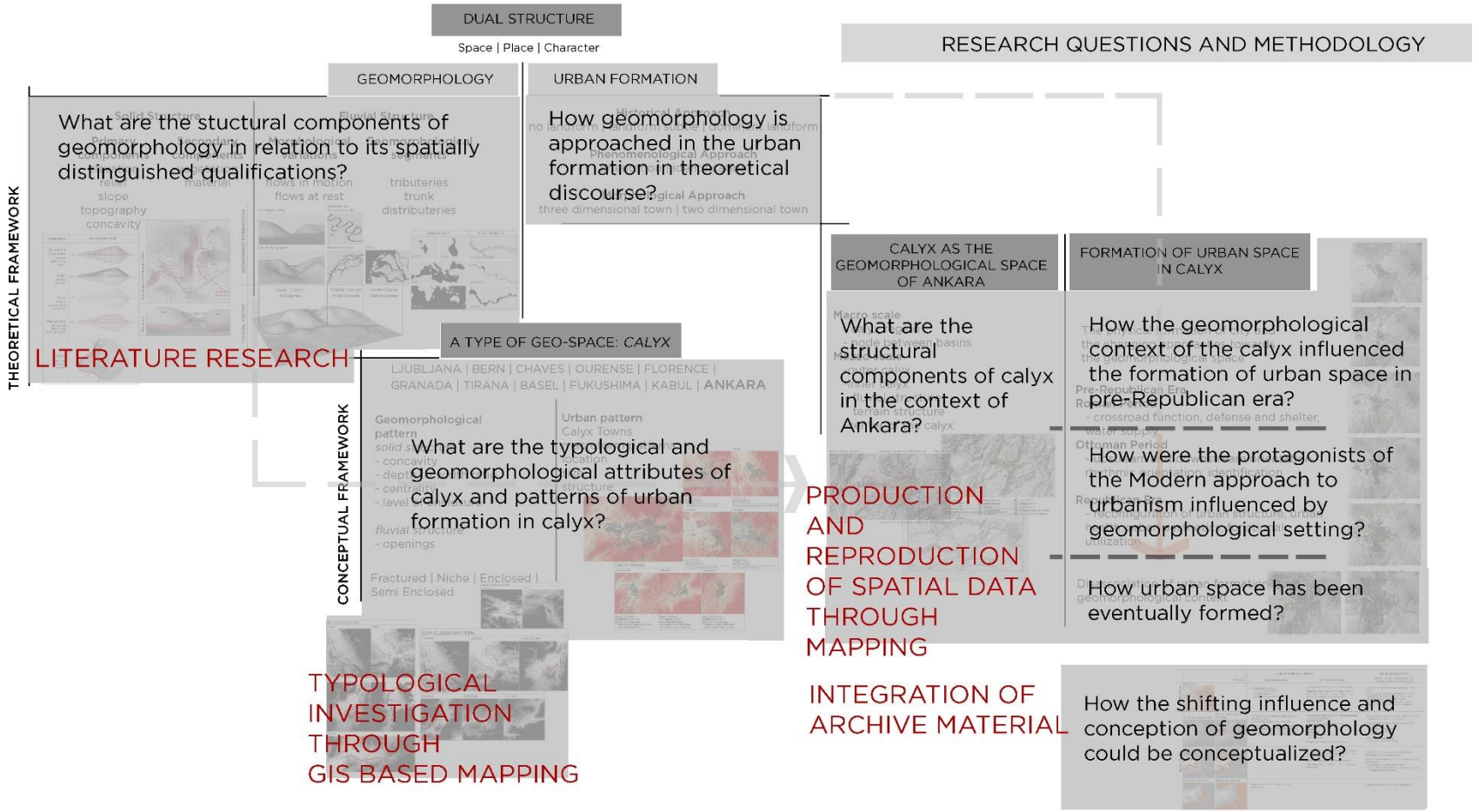


Figure 3. The diagram demonstrating the methods that are applied to the certain parts of the research

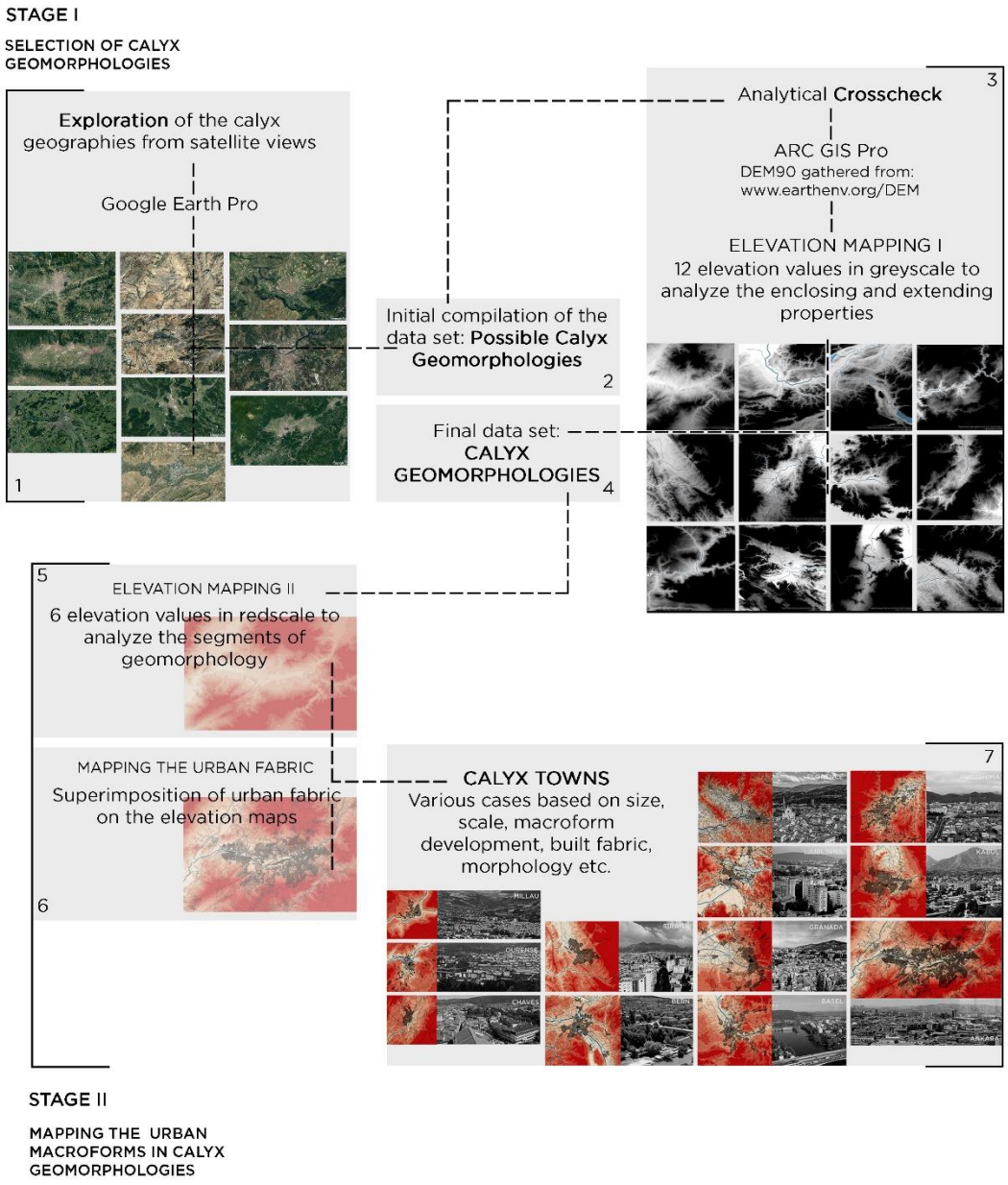


Figure 4. The algorithm of the mapping process of calyx geomorphologies and calyx towns

1.4.3 Reproduction of Spatial Data

The spatial data in cartographic medium such as maps, plans, and sketches was reproduced, so that a standardized visual language could be developed in order to analyze the sequential urban formation of Ankara in the calyx geomorphology. The twofold process of reproduction could be listed as follows (Figure 5):

1. Production of base map[3] on which the fluvial and solid structure of the case in question are visualized. In this part of the process the fluvial elements in terms of streams and their tributaries are mapped. The representation of solid structure is based on both elevation and geomorphological layers separately. The base map is utilized as a visual medium on which the retrospective analysis of urban formation is conducted.

2. Production of the narration maps by means of superimposition of visual archive materials such as city maps and urban development plans onto base map is conducted. The materials are processed through operations of juxtaposition, superimposition and layering without any alteration of the content. These technical operations bring along the potential to produce a holistic frame[4] and a consistent representation with the merging of various data gathered from different maps.

[3] The raw elevation data for the production of the base map is borrowed from Akçura (1971, p. 14).

[4] This is rather critical since every map and plan has a different frame of reference with the possibility of containing partial information. Furthermore, the representation and the scope of a spatial data differ in every map and plan based on its cartographical language and focus. For instance, a significant information on urban space might be missing or represented very differently in another map.

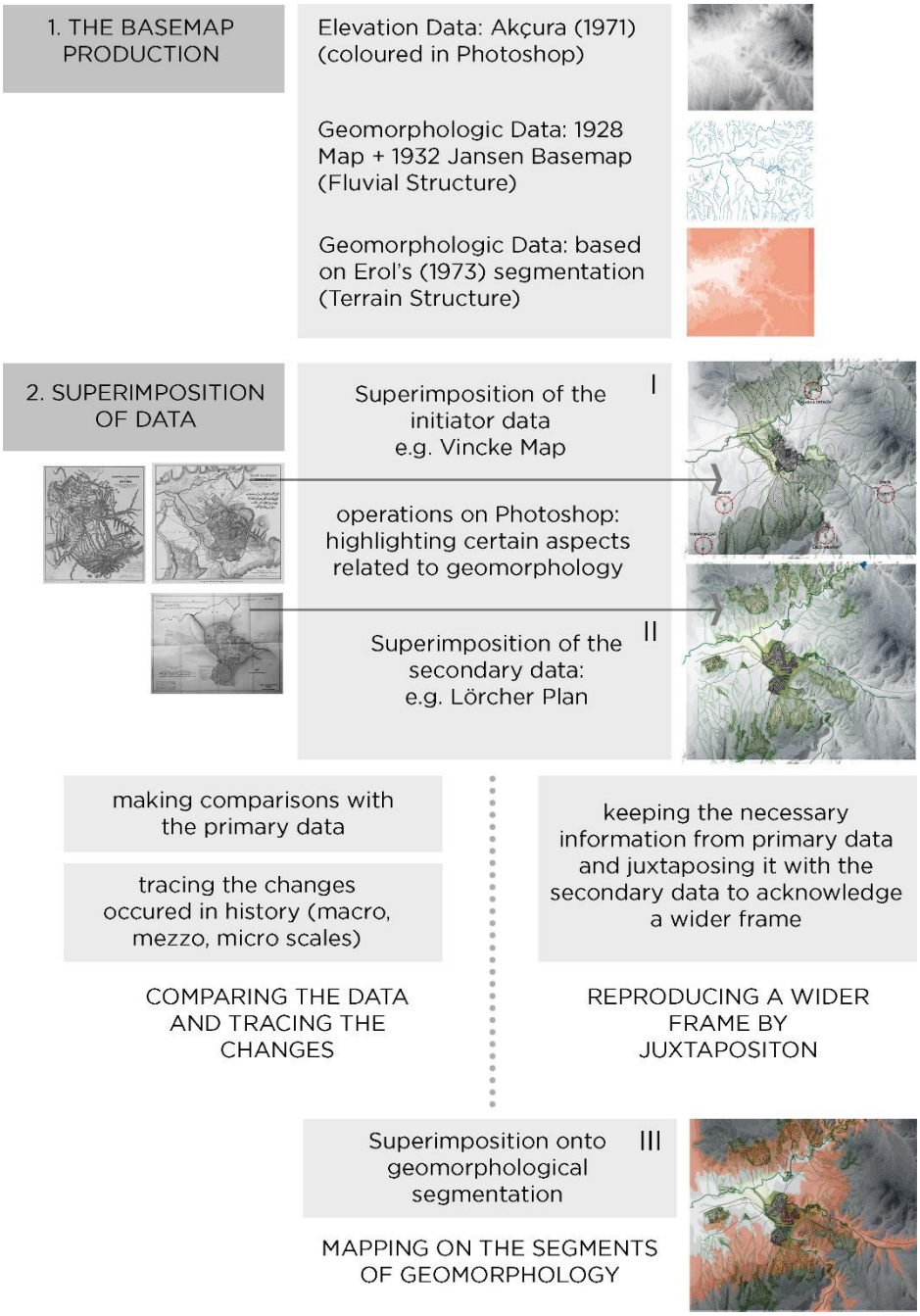


Figure 5. The process of mapping the urban formation through reproducing the visual materials

1.4.4 Integration of Archive Material

To investigate the correlation in question, diverse set of visual and written archive materials are integrated in the research process.

- Historical maps and written documents such as Kiepert Map, Maercker-Kannenberg-Schaeffer Map, Arrowsmith Map, retrieved from the visual inventory of The University of Chicago Archive, are utilized in order the define the geomorphological context of the city in a larger scale.

- Urban Development Plans proposed by Lörcher, Jansen, and Yücel Uybadin that varies in scope and scale, as well as city maps of Ankara mostly produced by General Directorate of Mapping were processed so that spatial visions in theory and urban formation in practice within the context of the calyx could be analyzed. The drawings and sketches produced by Jansen, gathered from the archive of the Architecture Museum of Berlin Technical University, are integrated as well.

- Travel journals and itineraries that inform about the pre-Republican era, as well as the plan reports of Lörcher, Jansen, and Yücel-Uybadin that reveals the spatial visions in the Republican era are used as historical references.

1.4.5 Analysis Process

The reproduced maps and the collected archive material are analyzed in chronological order to understand the direct and indirect effects of geomorphology in the formation of urban space. In that sense, the materials are grouped according to time intervals, and key characteristics of urban formation are pinpointed. Thereafter, different intervals are compared to track changes through the medium of maps.

The stages of analysis are divided into two sections by reference to different approaches adopted towards the geomorphological context of the city (Figure 6);

1. The first stage of analysis encompasses the interval of pre-Republican period, starting from the Roman era until the end of the Ottoman era. This period

reflects the urban inhabitants' approach to the geomorphological structures and the calyx in varying scales.

2. The second stage of analysis focuses on the cycle of production of spatial visions in constructing the modern capital followed by the process of implementation in Republican era. These two processes are not mutually exclusive but they are organically connected. However, the distinction could be based on the differing approaches towards geomorphology in the process of idealization and in the process of implementation.

    - Highly influenced by the urban theories and practices dominant in the 20th century, the approaches towards the calyx manifested in the plans of the urban planning experts are investigated in the idealization process. The first four development plans of Ankara analyzed at this stage are; 1924-25 Lörcher's Master Plan, 1932 Jansen' Master Plan, 1935 Jansen Greater Ankara Plan, 1957 Yücel-Uybadin's Master Plan.

    - In the implementation process, the urban formation in practice after or before the development plans were enacted is dwelled on. How the formation of urban space is led by different dynamics, and the effects of the urban development on the calyx in terms of continuities and discontinuities are revealed. Eight consecutively produced city maps of Ankara form a basis for this part of the study encompassing the development taking place between 1928 and 1976, until the inner calyx is fully occupied.

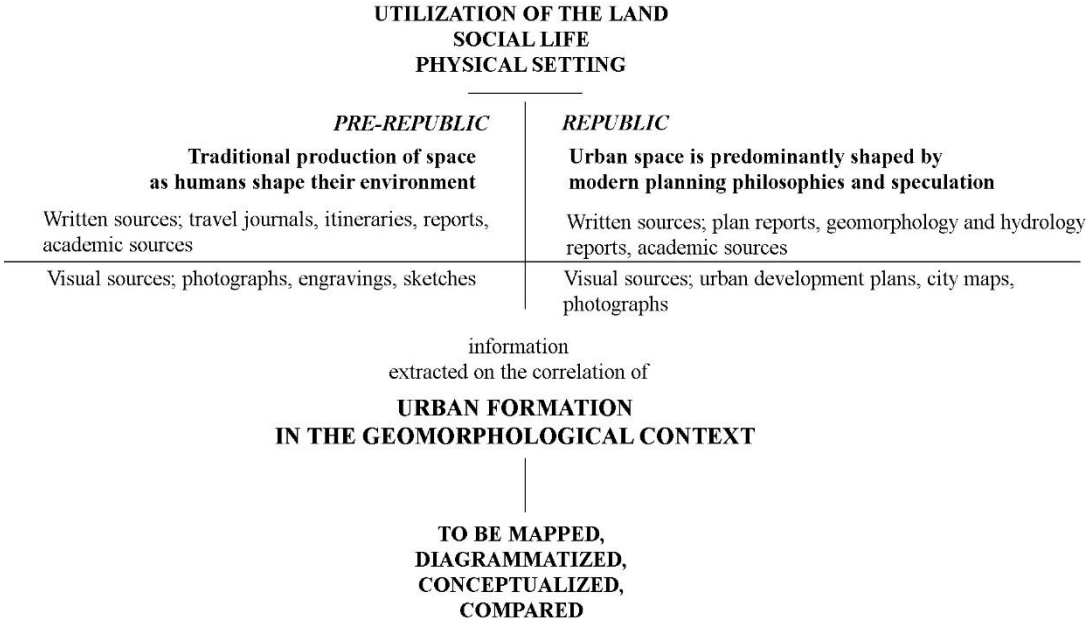


Figure 6. The diagram of two partite stages of analysis

The parameters of analysis in chronological time intervals are urban form, settlement pattern, land uses, and their correspondence with geomorphological structures. The overall interpretation and evaluation of the changing approaches to geomorphological setting is expected to reveal;

- Redefinition of the geomorphological context in which the urban formation of Ankara has been realized;
- Visualization of the chronological formation of urban space through the medium of mapping;
- Demonstration of the shifting approaches towards the geomorphological space through time by means of comparative analyses;
- Depiction of the continuities and ruptures in the relationship between the components of calyx and the urban formation.

1.5 Structure of the Thesis

This work, located on the disciplinary crossing of geomorphology and urbanism, first builds a theoretical framework to address geomorphology as spatially distinguished entity in *Chapter II*. It revisits the basic components of space and place that denominate spatial qualities of the natural environment as a conceptual toolset to be used in the following sections of the study. Grounded on the domain of geomorphology, the structural components of the geomorphological space are explained with spatial references. A concise literature review was integrated as to demonstrate differing approaches to geomorphology within the disciplinary framework of urbanism.

In *Chapter III*, a conceptual framework was formed on 'calyx' as a type of geomorphological space. It explores the concept of 'calyx', the etymological roots and its potential to define a geomorphological phenomenon. It discusses a set of examples that demonstrate the characteristics of calyx and distinguishes typological variations in mere geomorphological terms. Later, it explores patterns of urban formation founded on the calyx and generate analyses based on size, location within the calyx, settlement pattern, urban form, and macroform structure.

In *Chapter IV*, the geomorphological space of calyx is deepened through a detailed analysis conducted on a selected case, Ankara. It defines the geographical context of the calyx in macro scale, it explores the structure of the calyx in mezzo scale with reference to the components entailed in Chapter I and it looks closer to the unique landform qualities at center of calyx in micro scale. As such, a contextual background is formulated on which the urban formation of the city will be narrated.

In *Chapter V*, a historical analysis of urban formation in relation to geomorphological structure of Ankara is unfolded. It centers upon the milestones in the urban formation commencing from pre-Republican era, it extracts key references from Roman and Ottoman era, and it elaborates on the reciprocity and the dissolution between domains of inquiry in Republican era. While the former reflects the social apprehension of geomorphological space embodied in the urban formation, the latter presents the

spatial envisioning emanating from the geomorphological context and pinpoints stages of the rupture.

In *Chapter VI*, different approaches towards geomorphological space is conceptualized. It summarizes the shifts in the apprehension of geomorphological space manifested in the formation of urban space.

The detailed structure of the thesis could be followed in Figure 7.

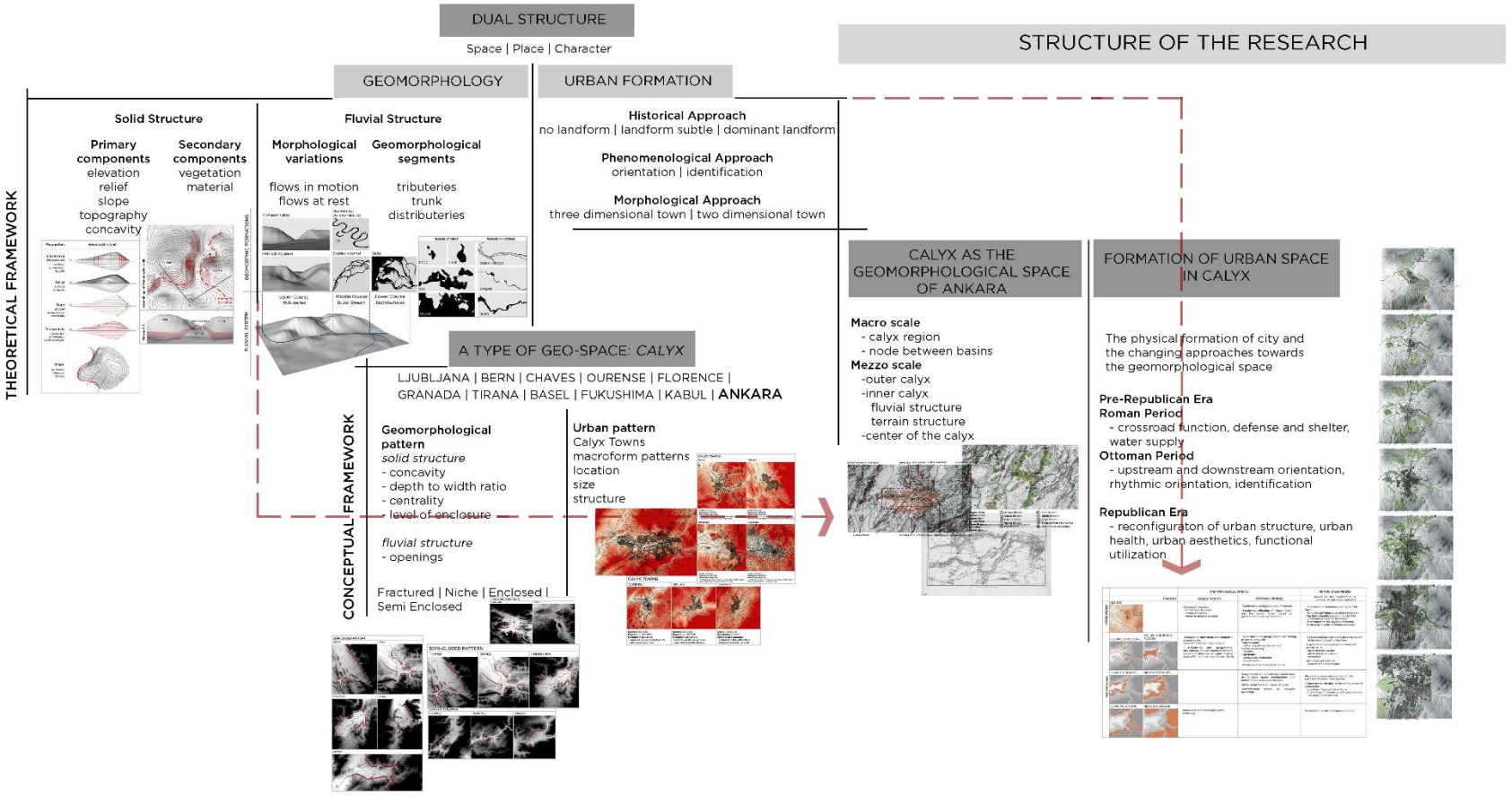


Figure 7. The diagram of the structure of the research

CHAPTER 2

DUAL STRUCTURE IN THE ORGANIZATION OF THE ENVIRONMENT

The spatial formation of cities have been the focus of analysis in different contexts to be investigated by scholars in the discourse of urbanism. Different approaches to the phenomena have been developed by variety of scholars. Among these, the Italian school, the French school, and the English school have been predominantly used as a reference ground in the examination of urban processes. However, very few scholars paid attention to the landform qualities and the reciprocal formation of urban space. These two domains of research have been conducted separately in the fields of geography, geomorphology, and urbanism.

The main argument of this research presupposes that the production of built environment has been influenced by geomorphological forces. It could be further suggested that there is a reciprocal relationship as geomorphological structures play a part in the urban formation, later to be shaped by the formation. In line with this, the potentials of the geomorphological qualities as a reference ground for urban formation and the impacts of man-made interventions on the geomorphological units are crucial to investigate. Therefore, the reading of the urban formation in relation to the geomorphological environment is necessitated as the method of the study so that the correlation between urban formation and structural agents of geomorphology could be revealed.

At this point, it is clarified that the study navigates between two domains as the dual structure in the organization of the environment. The first domain is the given setting referred as geomorphology, natural environment, and landform composition/quality/setting.The second domain is the man-made intervention that eventually lead to a spatial formation in the form of a built environment. The search for the relationship between two domains requires theoretical knowledge and conceptual tools in the analytical investigation of both domains.

2.1 The Elementary Concepts in Reading the Dual Structure

The discourse of urbanism and the literature developed in the last century offers generous conceptualizations focused on the second domain, the urban space. The complex phenomena of city as the total construct of urban spaces has been decomposed to its parts, analyzed, and conceptualized within the disciplinary framework of urbanism. The scholars have been developed theoretical systems, conceptual sets, tools, algorithms in order to understand the structure and the organization of this complex phenomena.

Some scholars approached the problem from a historical perspective evaluating the evolutionary processes in the formation of space. In his seminal book on the architectural history, Sigfried Giedion (1967) brings together the precursors of architectural discourse, the fragments of architectural precedents and the pioneering ideas related to city planning through the use of a basic conceptualization. The shifts in the volumetric qualities as the constituent of space and the transforming organization of the inner and outer space is laid on the core of this conceptualization. Based on such analysis, Giedion puts forward a threefold conception of space. The three-staged development of architectural space is set into a framework through changing interplay of interior and exterior spaces.

Rather concise analysis of the city has been made by Kevin Lynch (1960) through the decomposition of the city into identifiable parts. In that end, Lynch brings forward the concepts of path, node, edge, district, and landmark as the components of city. A legible organization of these elements forms the structure of the city enabling the

formation of an image through the clear perception of environment. Grounding his approach within the disciplinary crossing of environmental psychology and urban planning, Lynch asserts that the essential purpose of "orientation" in urban space is sought by means of the imageability of the environment. The terminology brought by Lynch has been highly influential in terms of understanding, analyzing and describing the distinctive characteristics of the environment, as well as evaluating the qualities of the urban spaces.

Some scholars proceeded beyond the analysis of the second domain through evaluating the urban space within the broader environmental context. This effort required the understanding of the environment as a result of the intermingled relationship between the two domains.

A similar approach was set into defining the qualities of urban space by Gordon Cullen. In his conceptualization, the environment is composed of elements that are natural and man-made such as buildings, trees, nature, water, traffic, advertisement, etc. He suggests that there is an art of relationship between these elements, the perception of which results in the production of townscape. Cullen suggests that this art of relationship is succeeded through weaving these elements together in such a way that "drama" is released. The word drama is particularly emphasized so that the city as a dramatic event could become recognizable through differentiation of "here" from "there", "this" from "that", "I" from "you". Here, it could be said that Cullen's use of "drama" corresponds with the Lynch's "imageability". In that regard, Cullen's analysis involves complex set of relations that are encountered in urban space rather than Lynch's precise elements in reading of the city. Yet, it is to say that their approaches are complementary in emphasizing the organization of elements in order to create a legible environment.

2.1.1 The Structure of Space

The approach to total environment as a product of natural and man-made interactions is further analyzed by Norberg-Schulz (1984) in his seminal book. In Genius Loci: Towards a Phenomenology of Architecture, Norberg-Schulz makes a clear distinction

between natural place and man-made place in search of a relationship between these two domains. In doing that, he conceptualizes the total environment as existential space and he investigates its components in order to reveal its psychic implications as well as practical and functional aspects.

The elementary components of the existential space is revealed by Norberg-Schulz as a twofold structure: *space and character*. The initial concept, space, has been numerously endeavored to be described. Among these definitions, his attempt focuses on the qualities of *concrete space* as the key concepts to be integrated in the discourse of the book. As stated by Norberg-Schulz (1984, p. 11):

> "Space" is certainly no new term in architectural theory. But space can mean many things. In current literature we may distinguish between two uses: space is three-dimensional geometry, and space as perceptual field. None of these however are satisfactory, being abstractions from the intuitive three dimensional totality of everyday experience, which we may call "concrete space."

The first takes space as the pure analytical terms, the second on the other hand, emphasizes the sensory processes, meanings, experiences gathered by the users of the environment. By the term concrete space Norberg-Schulz does not negate the both approaches, he puts forward the principles and aspects in the three dimensional organization of space, as well as taking space in phenomenological terms as perceived environment with an atmosphere, or character.

Enclosure and Extension - *centrality, directionality, continuity, and proximity*

Referring to the Giedion's narration of architectural and planning history through diagrammatic change in the spatial configurations of *inside and outside relationship,* Norberg-Schulz centers on *enclosure and extension* as the essential aspects in the analysis of the concept of space. To elaborate, extension implies the context in which the enclosure is created. It forms a setting for the events and a scene for instances. In that sense, Norberg-Schulz indicates landscape as an extension where settlements are formed. Approaching the issue from a similar perspective, a building plot or a

building block could be further exemplified as an extension where the building or building groups are grounded on and rise above. At this point, a backward reading informs about the quality of enclosure in configuring the concrete space. It is suggested that a settlement forms an enclosure such that a building, or a building ensemble imply an enclave in an extending landscape rendered in a figure-ground relationship. This relationship substantiates an identity for an enclosed settlement which will be elaborated later for a better understanding of geography and settlement relationship.

Within the greater set of enclosed systems and extending ground, the definitive aspects of *centrality, directionality, continuity, and proximity* is considered essential in the formation of concrete space. As Norberg-Schulz (1984, pp. 12-13) explains it;

> "In a wider context any enclosure becomes a *center*, which may function as a "focus" for its surroundings. From the center space extends with a varying degree of *continuity* (rhythm) in different *directions*… Finally it has to be mentioned that natural elements (such as hills) and settlements may be clustered or grouped with a varying degree of *proximity*."

Boundary

The structural property of an enclosure, the degree of extension, directionality, and rhythm is defined as *boundary* by Norberg-Schulz. In fact, boundary is regarded substantial for the dual structure in the organization of the environment. Quoted from Heidegger it is highlighted that (p. 13) "a boundary is not that at which something stops but, from which something begins its presencing". In that sense, the boundary structurally differentiates "here" from "there" and "this" from "that" so that the legibility is procured as manifested in the works of Cullen and Lynch. In other words, putting Cullen's terminology into work, boundary creates drama. This state of drama is not only a valid condition for townscape as suggested by Cullen, but also it is a prevalent condition for landscape. Therefore, it is suggested that geomorphological environments composed of continuous extension, discontinuous enclosure, a direction, or a rhythm are open to analysis through the morphological reading of

boundary. Similarly, the spatial organization of man-made environments is suitable for investigation through its boundary.

Levels of Environment

Finally, Norberg-Schulz unfolds the hierarchy of the spatial organization observed in the environment through the concept he coined as *environmental levels*. This term is utilized in order to inform about the scale of the object in discussion. The spectrum of environmental levels encompasses continents, countries, regions, landscapes, settlements, buildings as nested environmental systems. In this ordering, the environment is not leveled by means of designated boundaries, but it is gradually sorted in terms of geomorphic qualities in series.

The principles of any spatial organization mentioned before such as enclosure, extension, centrality, directionality, continuity, and proximity could be attributed to and reinterpreted in different environment levels. In that sense, boundaries in various forms as the structural agents of any enclosure repeats itself in different environmental levels. Boundary, facilitating the formation of space, also articulates nested spatial organizations in levels of environment.

2.1.2 Character

Apart from the scalar quality in terms of environmental levels, Norberg-Schulz dwells on character in close correlation with the boundary as space-defining attribute. The formal articulation of boundaries is regarded by Norberg-Schulz as the basis for how the characteristic of a particular space is apprehended. In other words, the making of boundary in terms of how it encloses, how it grounds, how it rises, how it directs defines the *character* of spaces.

Norberg-Schulz approaches the character as a two-faceted concept. On the one hand, character is determined by "concrete form and substance of space-defining elements", on the other, it is perceived as an abstracted quality. For instance, a landscape could be exemplified such that a valley manifests certain geomorphologic structure as a formal quality while it represents a delimited space, a directed opening or a channel

as perceived characteristic. A plateau surrounded by the mountains corresponds to a particular geomorphological articulation with a certain characteristic as it centralizes space and manifests extension towards its boundary. Not only types of natural environment but also elements of built environment constitutes character. For example, a hospital or a school could be identified with its formal constitution in concrete terms as well as these places convey practicality as a character; or a mosque could be imagined through its particular concrete form while its character signals solemnity.

2.1.3 Place

The space and place duality forms a pedestal for a great variety of arguments in the field of urbanism. The majority of these discussions focuses on the diagrammatic quality in the three dimensional organization of elements as the identifier of space, whereas place is described in terms of how the meaning is attributed, how the aspects of space is experienced and interacted physically and socially in relation to the human factor.

Although the concepts of space and place are compared and contrasted, these notions are not mutually disjointed and does not imply a symmetric difference. On the contrary, space and place are complementary terms in the discussion of environment. In that sense, space facilitate an abstract and universal field for discussing the qualities of places having different characteristics in different environmental levels. In that sense, Norberg-Schulz approaches to the concept of space as the structural element of place by stating (1984, p. 11) “Space denotes the three-dimensional organization of the elements which make up a place”. In other words, the parts of space and character contribute to form something greater than the sum: the place. To elaborate, in an attempt to develop an understanding on the phenomena of place Norberg-Schulz (1984, p. 6) explains:

> “What, then, do we mean with the word “place”? Obviously, we mean something more than abstract location. We mean a totality made up of concrete things having material substance, shape, texture and color.

> Together these things determine an “environmental character”, which is the essence of place.”

The phenomena of place is searched for at the lower environmental levels in the domain of urbanism. Defined by Norberg-Schulz as “being a totality made up of concrete things” it is contradictory to limit the discussion into a certain scale. In fact, the phenomena of place is manifold and demonstrates a nested pattern in series. In that sense, the lower level of environmental series are dominated by man-made places, whereas natural places which engulf man-made places constitute the domain at the top of the environmental levels (Norberg-Schulz, 1984, p. 16). In that order, lower level organizations functions as to gather and center, while the pattern of extension is unveiled in the higher series.

At this juncture the provided framework could facilitate for a closer look into the intrinsic structure of the geomorphological domain in question.

2.2 Geomorphological Space

Detailed descriptions and categorizations of the spatial aspect of geomorphology are conducted in variety of fields. Among the professionals who perform this task, geomorphologists, geologists, geographers come forward as these disciplines are dedicated to unravel the physical attributes of the Earth.

As humans dwell depending on the physical realities of the Earth, the given geographical attributes of environment form a pedestal for the field of urbanism. Landform compositions emerged as a result of the natural processes and complexities of the environment define the spatial context for urban formation.

Norberg-Schulz attempts to define the structure of the natural environment with the principles that constitute the phenomena of space and character. The nested formation of natural places constitutes a series of environmental levels, having continents and countries in higher levels down to a small prairie encircled by group of trees. The natural place in an environmental level within which the everyday life takes place is termed as “landscape”. The distinctive quality in the spatial organization and the

character of a landscape depends on the extension. The extension pattern characterized by the physical condition of space is referred as “surface relief” (Norberg-Schulz, 1984, p. 32).

At this point it is significant to develop some insight into the interrelated terminological uses. The term surface relief informs about the raw “shape” of the ground in terms of depressions, and elevations, i.e. ruggedness, flatness, fissured etc. The configuration and representation of the surface relief in a way to demonstrate the relative positions of depressions and elevations in a medium with the defined set of rules is termed as *topography*[5] (Merriam-Webster). The scientific study of the historical processes in the formation of surface relief, as well as describing and categorizing the formal features of the surface relief is referred as *geomorphology* (Huggett, 2007). The physical components of the surface relief is addressed as geomorphological units or landform elements. This term has a potential significance for the systematic study of surface relief in terms of its structural properties in the discourse of urbanism.

The field of urban planning and urban design show great interest in the potential opportunities and threats created by the structural configuration of surface relief. In that, the formal constitution of landscape explained through the term *land-form* brings on new possibilities in the search for a relationship between geography and urban form. Therefore, instead of the term “surface relief” which informs about the shape of the terrain, the term landform or geomorphology which refers to a spatial quality in terms of its formal attributes is favored throughout this study.

It is also critical to grasp the hierarchical organization in the structure of environment as a result of part and whole relations. In that, geomorphic units constitute the basic component as the singular landform element. The composition of geomorphic units

[5] However, this term also used in the investigation of structural relationships of the physical and social phenomena in correlation with space such as “topographies of politics”, “topographies of faith” etc.

generate a geomorphic space. The assemblages of various landform patterns constitute geomorphologic systems in grand scale.

From this point on, the concept of landform rendered as a spatial basis could be further developed. It is useful to recall the statement that locates the principle of extension at the core in the analysis of spatial organization and character of any landscape (Norberg-Schulz, 1984, p. 32). Before proceeding any further, it is necessary to set forth the terminological difference between *land-scape* and *land-form*. The former embodies variety of meaning such as an object of cultural production, a medium of design in which variety of actors coexist, and a locus for human perception, subjective experience, or biological function (Waldheim, 2016, p. 3). The use of landscape with a spatial reference, as followed in Norberg-Schulz, involves the rendering of a natural environment through perceptual processes. The latter, on the other hand, involves the structural reading of the natural environment. These two concepts does not imply a mutually exclusive correlation, however, these are to be superimposed in understanding the properties of natural places. In fact, the structure of geomorphology determines spatial properties of landscape and character. Thereafter, the discussion of formal qualities of the landscape necessitates first the elaboration into the structural components of geomorphology.

2.2.1 The Structural Components of Geomorphological Space

The physical forces that shape landforms, and the processes that these forces are dependent on in the formation of surface relief denominate the structural components of geomorphological space. Huggett (2007, p. 32) defines the variables that have an impact on the formation of landform structure as:

> "The Earth's surface – the toposphere – sits at the interfaces of the solid lithosphere, the gaseous atmosphere, and the watery hydrosphere. Gases, liquids, and solid are exchanged between these spheres in three grand cycles, two of which – the water or hydrological cycle or rock cycle (Figure 8) – are crucial to understand landform evolution."

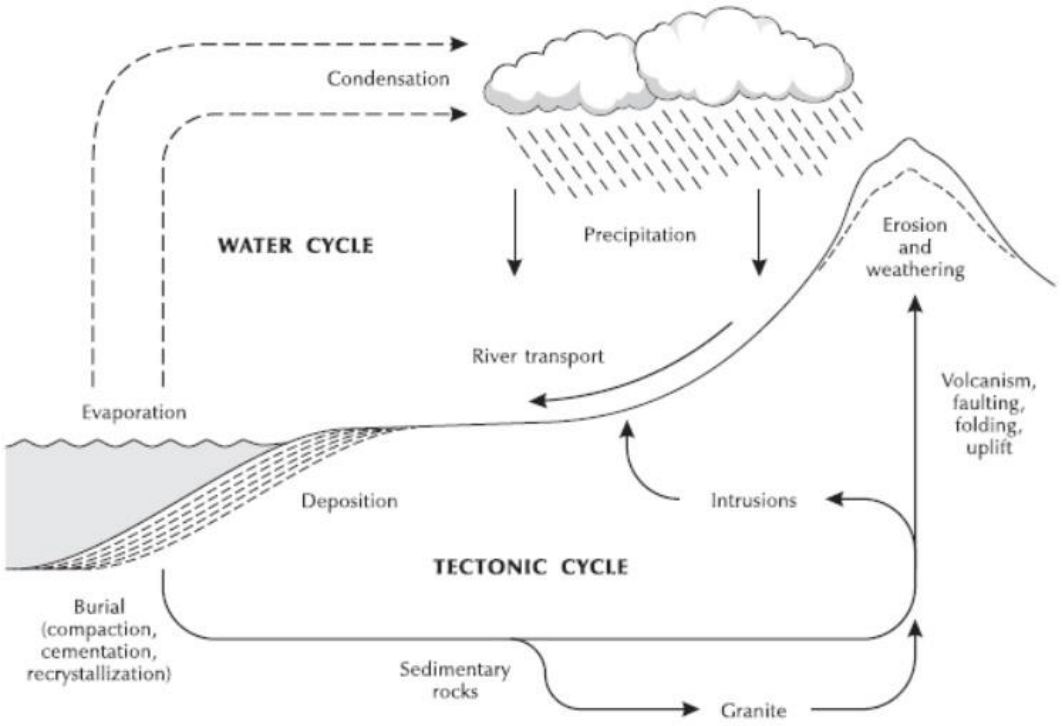


Figure 8. The rock cycle, the water cycle and how they form geomorphological space (Huggett, 2007)

The rock and the water as distinctively distinguished elements involved in the geomorphological processes could be considered as the basic structural components of geomorphological space. Therefore, the two partite structure could be addressed as *solid structure* and *fluvial structure* based on the differences in their material composition, hence the differences in their spatial characteristics.

The processes through which these materials are transformed into different patterns of surface reliefs are equally significant in grasping the structural formation. The two cycles of toposphere previously addressed by Huggett, the rock cycle and the water cycle, are the major processes that form the structural components, and transform these structures in geomorphological time span. The solid structure, in that respect, is formed as a result of *tectonic forces* and *fluvial forces*. The process is explained by Huggett (2007, p. 32) as:

> "Volcanic action, folding, faulting, and uplift may all impart potential energy to the toposphere, creating the 'raw relief' on which geomorphic agents may

> act to fashion the multifarious array of landforms found on the Earth's surface – the physical toposphere. Geomorphic or exogenic agents are water, waves, and ice, which act from outside or above the toposphere; these contract with endogenic (tectonic and volcanic) agents, which act upon the toposphere from inside the planet."

The fluvial structure, in terms of surface drainage system and sub surface drainage system, is formed as a result of fluvial forces to a great extent, although tectonic forces indirectly contribute to its formation. It shall be noted that these forces are collaboratively at work and are integral parts of earth system, although this study favors a division between the two for the convenience of analysis.

The following section will introduce the general spatial characteristics of solid structure and fluvial structure.

2.2.1.1 Solid Structure

The primary structural component of landform is inherently the surface relief, as the geomorphological space is distinguished by how the surface relief extends. The pattern of extension is predominantly defined by fluvial forces and tectonic forces as previously discussed. While fluvial agents configure the lower levels of solid structure by means of incisions forming corridor-like linear extensions or vast fields of expansion, tectonic agents shape the higher levels by means of massing resulting in boundary formation. The formation of solid structure is an intricate process the result of which presents an infinite pattern in the configuration of geomorphological space.

The extension pattern and the variation in the surface relief is sustained through geomorphic units. Identification of a geomorphic unit necessitates an information on the parameters of relief, slope, elevation, and topography in reference to width, height, length, concavity and convexity properties (Figure 9).

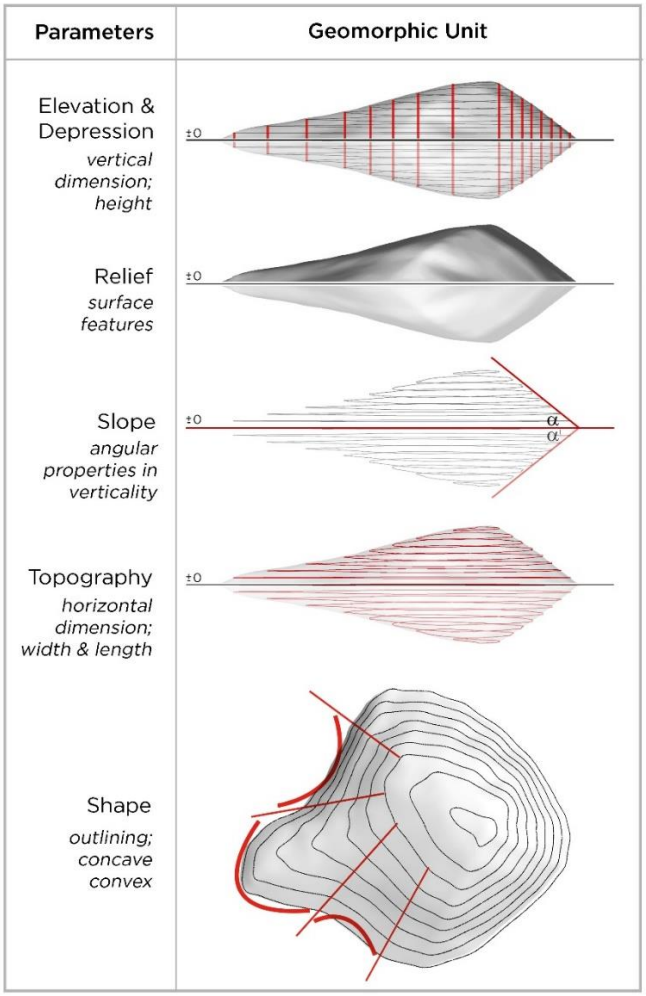


Figure 9. The parameters in the formal configuration of geomorphic units

On the one extreme of the various patterns of landforms, vast fields of expansion generate a flat plain without any qualitative aspect in the landform. As the surface relief indicate variations, a landform composition is fluctuated, directed and defined in terms of spatial aspects. In that sense, the configuration of the landform pattern potentially demonstrate the characteristics of nodes, paths, domains (Figure 10). Norberg-Schulz provide three space defining elements that lead to the formation of landforms as such. Isolated hills and mountains, as the primary space-defining elements forming enclosures where basins and plains are laid, centralize space and manifest extension. Valleys very characteristically direct and delimit space in an axial condition. Uniform cluster of fields or hills, on the other hand, present an extended spatial pattern (Norberg-Schulz, 1984, p. 32).

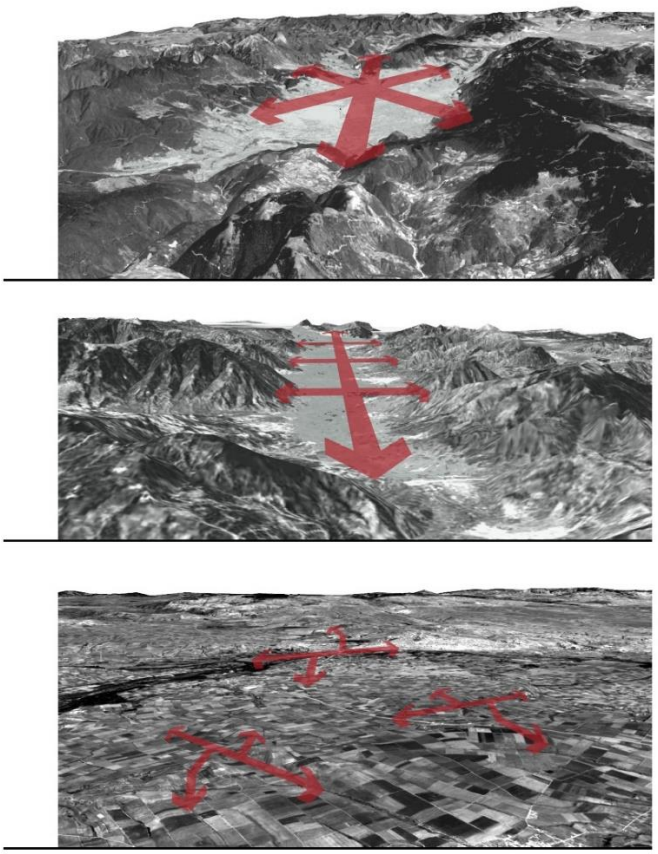


Figure 10. Space definitions in different geomorphological formations

The heterogeneous composition of geomorphic units generates complex formations in which unique patterns are manifested as landform characteristics. The space definition of the any geomorphic composition is in close correlation to geomorphic units' capacity to form boundary (Figure 11). This boundary, as the silhouette of the surrounding "walls", creates an enclosure determining the spatial configuration (Norberg-Schulz, 1984, p. 35).

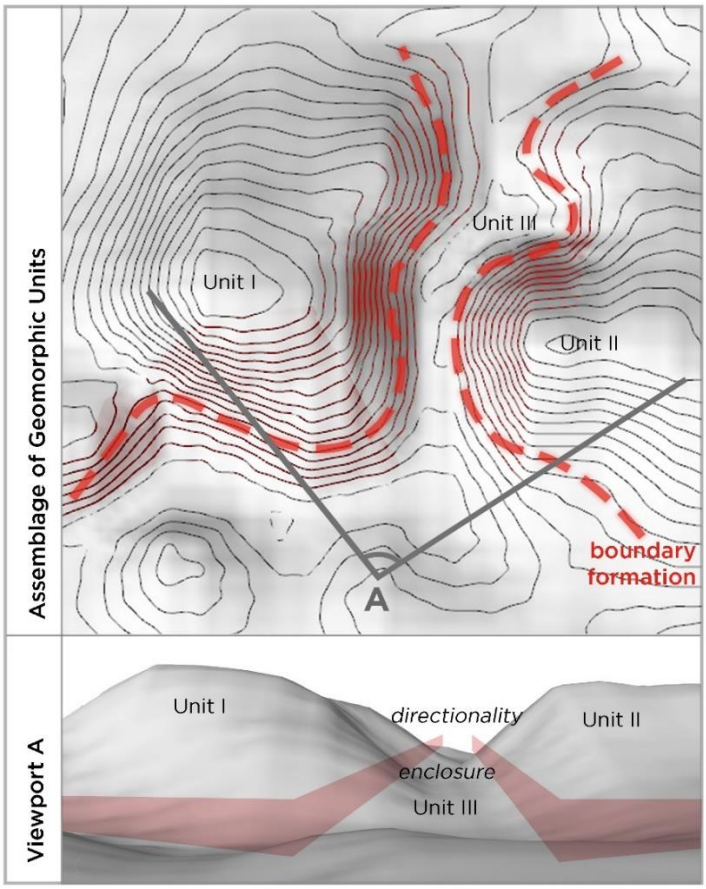


Figure 11. Boundary formation and enclosure as the space defining properties of geomorphological structures

Additionally, the texture of the ground based on geomorphological processes, the color of the ground based on surface material, and the vegetation features of the ground secondarily indicate variations in the surface relief. These properties are not directly reflected in a formal articulation of landform, however, these secondary elements gain a perceptual quality to the landform pattern. In that, texture, color, and vegetation constitute a basis for the formation of landscape. Thereafter, homogenous landforms with variations in surface material and vegetation might be perceived as a vivid landscape (Figure 12).

Figure 12. The primary structure and the secondary structure

2.2.1.2 Fluvial Structure

Apart from the solid structure, fluvial bodies are substantial space-defining elements in the structure of geomorphological space. The morphological attributes in fluvial structure constitute a basis for *defining the water body, transforming the surface relief, and defining the adjoining land*. The morphological variety is based on width to length ratio of the water body, the way that the water body extends, directs, and centralizes, as well the size and the scale of footprint area. In that, linear extension and zonal extension are major physical patterns in defining the morphology. These variations also generate certain movement patterns that relate with rules of physics as flows at rest and flows in flux. The former pattern is seen in the case of pond, lake, sea, and ocean bodies, whereas the latter pattern is observed in the case of creek, brook, stream, and river courses in an ascending scale (Figure 13).

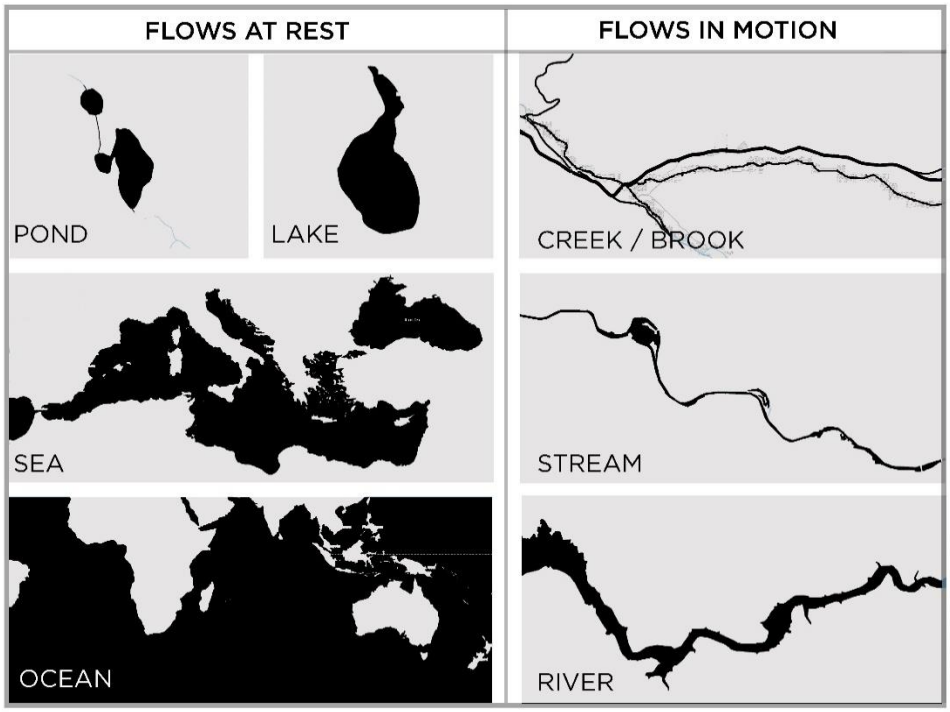


Figure 13. The morphological variations in the fluvial structure

The fluvial elements are not additional to the surface relief, but the elements operate as the agent of shaping the geomorphological structure. The geomorphological segmentation of fluvial structure are analyzed in tripartite sections; upper course, middle course, and lower course (Figure 14). The categorical differences of these courses are based on the altitude and the function of fluvial system. The extended fluvial course is also distinguished as upstream and downstream in reference to the direction of the water flow.

The fluvial pattern in upper course, referred as *tributaries*, function as a collecting system for the fullest extent. The surface relief naturally incised by the fluvial processes in the upper course display the geomorphic units of v-shaped valleys, interlocking spurs, waterfalls, cascades, ravines, gorges, etc. As the common spatial characteristic, these structures direct and delimit the space following the course of a fluvial element.

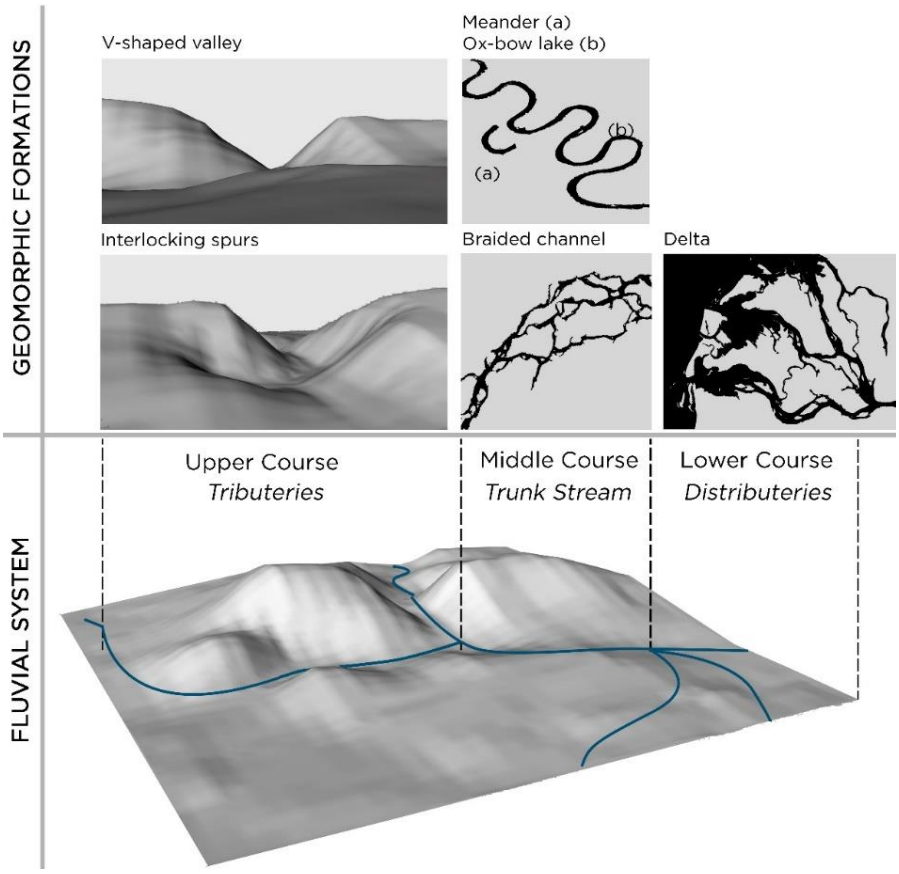


Figure 14. Geomorphological formations in different elevational segments of the fluvial structure

The fluvial elements also contribute to formation of a diverse and distinct pattern in the middle and lower courses. The fluvial pattern in the middle course, referred as *trunk stream*, function as transporting system, whereas, the fluvial pattern in the lower course, referred as *distributaries*, function as the distributing system approaching to sea-level. The fluvial elements at these levels have the role of directing and defining space not only through the formation of surface relief but also through the intrinsic formal quality of itself although it runs through extended basins or planes. The morphological variations found in this scope are meanders, ox-bow lakes, braided channels, deltas, lakes, ponds, etc.

Changing in the spatial structure of landforms through the interaction of fluvial elements with the surface relief is also emphasized by Norberg-Schulz. As he (1984, p. 39) suggests "the presence of water may emphasize place-structure of the surface

relief. A valley is literally underlines by a river, and the image of a basin is strengthened by a lake." At this point, the types of spatial configurations generated by the bodies of water such as island, point, promontory, peninsula, bay, lagoon, and fjord could be given as examples (Figure 15).

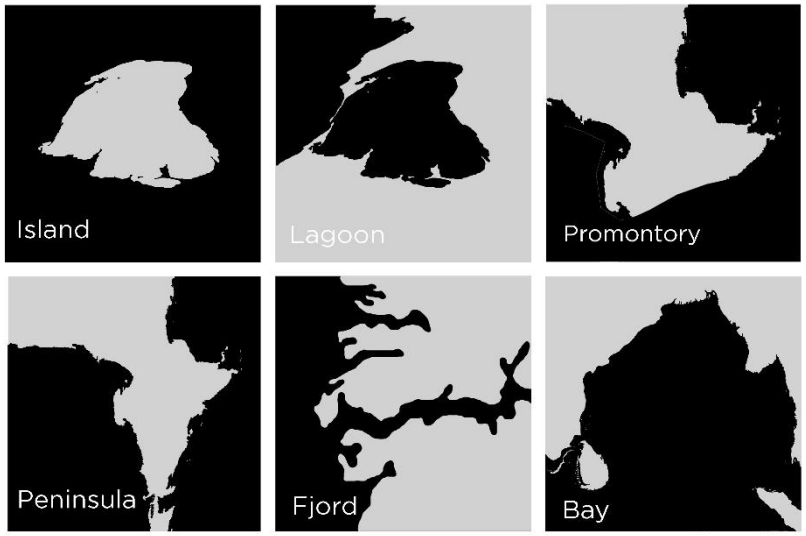


Figure 15. Macro scale spatial configurations generated by water bodies

As a phenomenologist, he does not only address the formal articulation of landforms, but also he touches upon the landscape qualities that fluvial structures potentially create. At this point he (1984, p. 35) states that:

> "In general the presence of water adds a certain micro-scale to landscapes whose relief lacks this dimension, or it adds to the mystery of landscapes which already possess the micro level. When water is present as a swift river or cascade, nature itself becomes mobile and dynamic. The reflecting surface of lakes and ponds also has a dematerializing effect which counteracts the stable topographical structure."

Huggett (2007) adds another dimension to geomorphological perspective by stating that fluvial elements indicates a temporal dynamism in addition to the spatial dynamism emphasized by Norberg-Schulz. He draws attention on the processes of geomorphology as the fluvial elements play major role in shaping the solid structure through the course of history. As Huggett states (2007, p. 5) "Aristotle (384-322 BC) conjectured that land and sea change places, with areas that are now dry land once

being sea and areas that are now sea once being dry land." In that sense, fluvial structure appear as the most dynamic and ephemeral phenomena than the solid structure in the formation of surface relief.

The changes in the fluvial structure, therefore, result in transformation of the landform pattern as the alterations oscillate between erosion and deposition causing the production of the surface relief and the vanishing of the surface relief. As a result of the erosive process, valley and cascade formations take shape in the surface relief. It is an ancient phenomenon of interest as Seneca (4 BC-AD 65) dwells on the power of rivers to erode valleys (Huggett, 2007, p. 5)

The deposition processes results in the formation of an extended spatial pattern on the coastal areas. It is also possible to encounter with deposit processes in the history of ancient Anatolia. The geomorphologic analysis of floodplains and delta of Küçük Menderes (Cayster River) demonstrate that a naturally formed bay located on the Aegean coast, where the settlement of Ephesus and the Artemision is laid, had been deposited by the silt flocculated in the lower fluvial course (Kraft et al., 2007, p. 123) (Figure 16). The fluvial elements' role in the formation of surface relief is further found in the coasts of the Fertile Crescent. Herodotus (c. 484-420 BC) refers in his famous saying "Egypt is the gift of the Nile" to depositing of the bay on the northern part of the Egypt by the gradual accumulation of the silt of Nile in its delta region (Huggett, 2007, p. 5; Kraft et al., 2007, p. 121).

Such statements reflect that dynamism of fluvial courses makes formation of geomorphology as a part of an evolutionary process. The historic map depicting the shift of the water courses in River Rhine and Neckar visualizes the dynamism of fluvial structure in a millennial cycle from 6th century until 1850 (Figure 17). Apart from the macro scale transformative processes, today, the fluvial structure and the solid structure that constitute landforms are subjected to modifications in micro scale through the advances in technology.

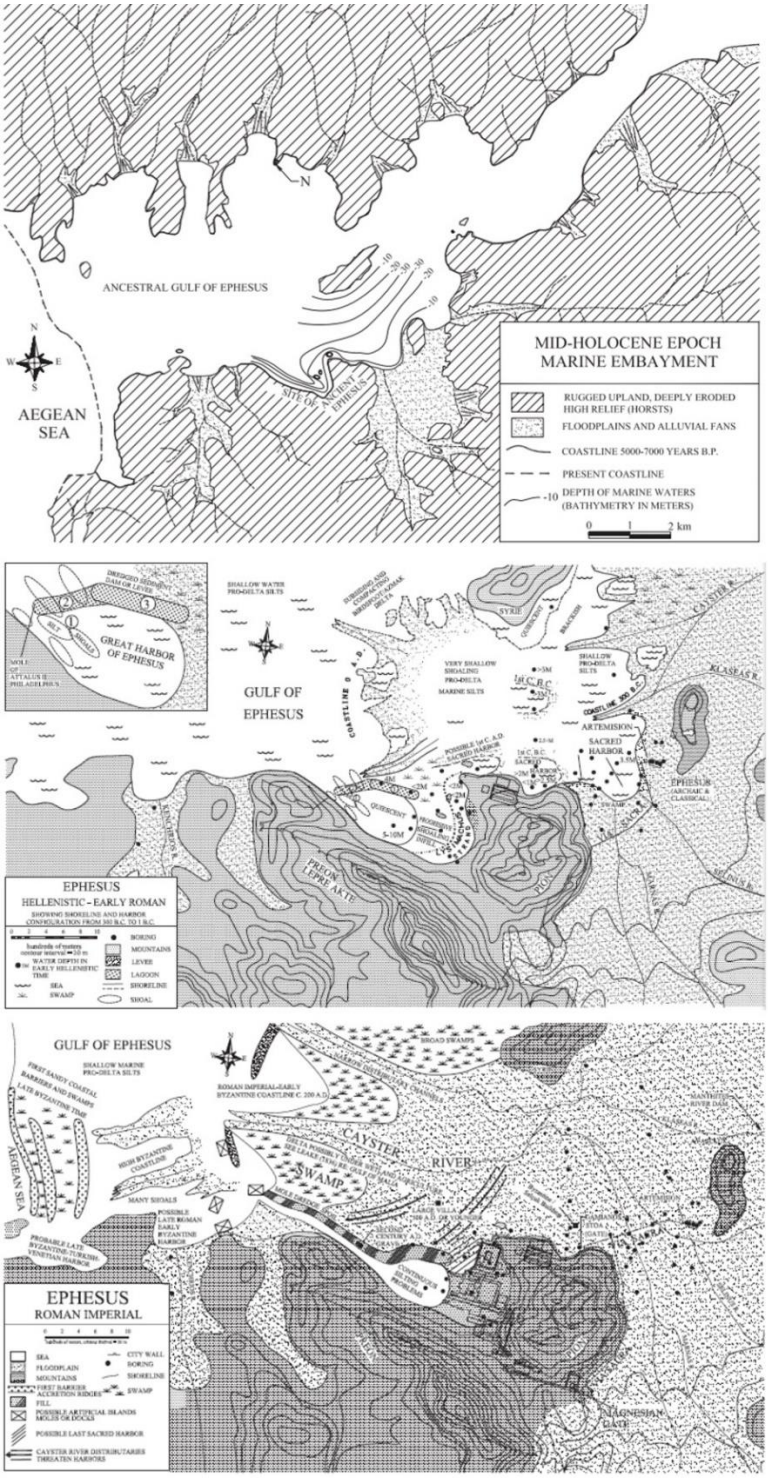


Figure 16. Changing geomorphology and location of Ephesus and Artemision in time through alluvial depositions

Figure 17. The map depicting the shifting course of River Rhine and Neckar, "Charte des alten Flußlaufes im Ober-Rhein-Thal", (Prominsky et al., 2012)

2.3 Urban Formation within Geomorphological Space

The natural environment where geomorphological formations become manifest and the productive capacity of humankind that transformed natural environment into man-made space has been conceptualized by variety of scholars in the domain of urbanism. Historically, different patterns of urban formations observed in history could be classified based on the physical configuration in relation to geomorphological dominancy. Phenomenologically, the perception of geomorphology in the process of configuring man-made environment could reveal potential utilities of geomorphology in the urban formation from an alternative perspective. Morphologically and functionally, the role of geomorphology in the formation of settlement patterns in regional layouts and its role in the attribution of character to the urban formation could be discussed.

2.3.1 Theoretical Approaches to Investigate Geomorphology and Urban Formation

Kurt's (1966) work provides a valuable contribution to the theoretical discourse as he provide a review of literary sources on the crossing of geography and urbanism (Table 1). It could be gathered from the chronology of the writings on the relationship between man and the intervention on the nature as an extension of the geomorphology as early as the industrial revolution. A critical approach to the devolution of natural environment through man-made interventions were criticized in the earliest work.

Table 1. Chronology of theoretical approaches to urban formation and geomorphology (adopted from Kurt, 1966)

Sources	Date	Content
George Perkins Marsh	1800's	Critical analysis of interventions on the environment
Alexander Ivanovich Woeik	1842-1914	Disassociation of man and the natural environment
Jean Brunhes	1910	Patterns of settlements, housing types in relation to terrain condition
Edwin Fels	-	Natural environments' transformation by the machine age
Le Corbusier	1948	Design approach to urban form and landform relationship
Chris Tunnard	1953	Designers role regarding the landform structures
Ludwig Hilberseimer	1955	Analysis of urban form and geographical features
Sylvia Crowe	1956	Intervention to landscape
Francois de Pierrefeu	-	Critical approach to urban form and topography
Paul Grillo	1960	Design approach to urban form and nature
Gordon Cullen	1961	Analysis of townscape and terrain condition
Benton Mackaye	1962	Suburbanization and natural environment
Paul Spreiregen	1965	Analysis of urban form and landform

2.3.2 A Historical Approach

The geomorphological context has been an integral part of the urban formation processes. The geomorphological space did not remain as a passive agent and participated as an active agent in the formation of built environment through its regained meaning in different socio-cultural contexts. A retrospective look into the patterns of urban forms reveals that:

> "The topographical features of the city were usually revered and served as the most important, both structurally and socially; where several geographic dominants come together there was usually vigorous growth, whether it was the temple acropolis, The hilltop castle, or cathedral monastery, all were built of permanent materials, all conceived on a colossal scale" (Kurt, 1966, p. 34).

The geomorphological dominancy and informational capacity in the formation of urban space could be divided into three (Figure 18): no landforms/flatlands, subtle landforms, and landforms dominant. The influence of the geomorphological context in the ancient forms of urban spaces could be classified in concordance with the complexity degree of landform patterns on which the settlement were established.

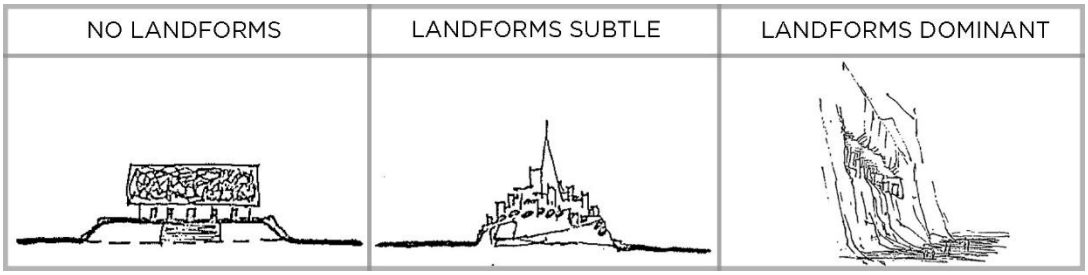


Figure 18. The categorization of the landform dominancy in the urban formation (Kurt, 1966)

The ancient settlements that were laid onto a flat surface without any structural variety in the geomorphological pattern, are configured in a way to produce artificial landforms through the erection of grandiose structures. As Kurt explicitly elaborates;

"If no characteristic feature was available in the townscape structure, it was often built up on a monumental scale to dominate the community just as an earth form would, as reflected in the Mesopotamian ziggurat, the "holy mountain" or the Mayan stepped temples [Figure 19]. The importance of the city of the dead in Egypt was marked by the artificial mountains on the flat deserts" (Kurt, 1966, p. 34).

Figure 19. The ziggurat of Tchogha Zanbil, İran (a) (Commons Wikimedia, 2008), the ziggurat of Anu and the Stone Temple, Uruk (b) (Ayad Kadhum, 2013) and the Egyptian Pyramids (c) (www.history.com)

The settlements of Ancient Greek and Ancient Rome were founded on undulating landforms subtle (Figure 20). These civilizations attributed sacredness to the higher plateaus with the presence of acropolis or other types of places of worship. The controlled urban expansion was pursued within the geomorphological enclaves. As Kurt puts it;

"The Greek landform is rocky and hilly; it is powerfully assertive. They [Ancient Greeks] ascribed values to particularly prominent or unique features of the land, as did many early civilizations. The high places in the land became sacred. The small, often isolated valleys of Greece did not permit large economic units like those of the big river valleys of Asia and Egypt" (Kurt, 1966, p. 48).

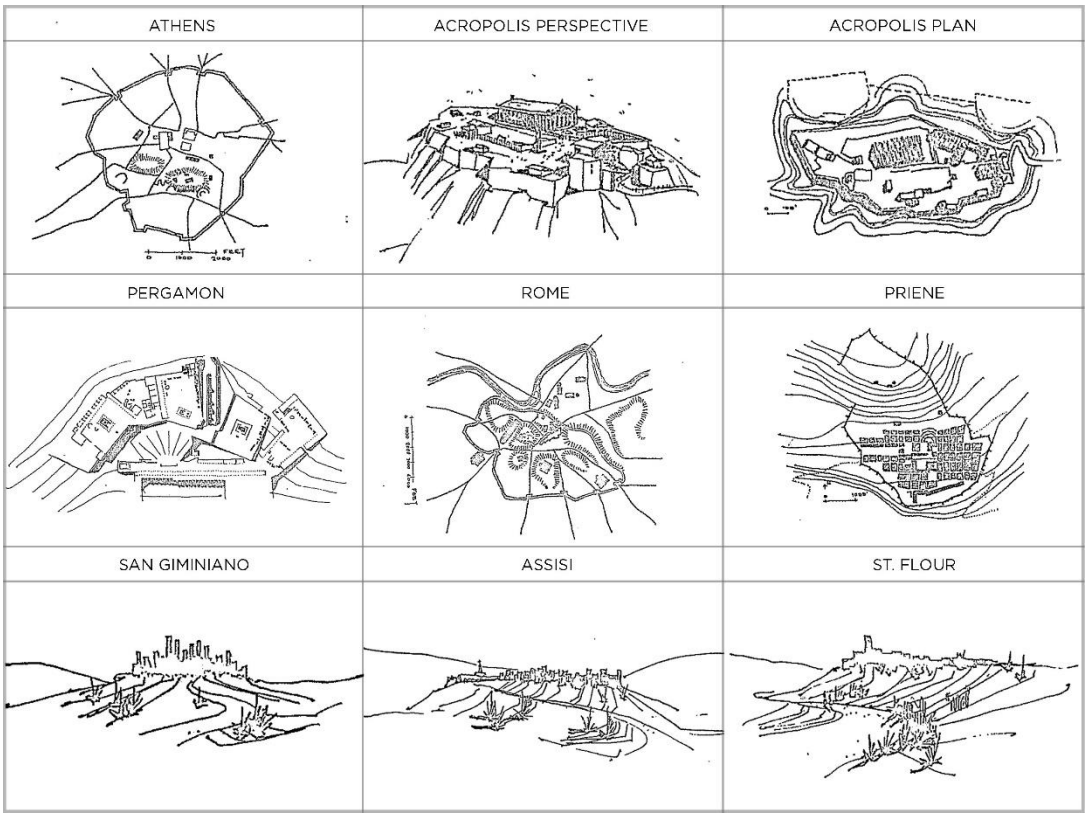


Figure 20. Ancient Greek and Ancient Roman settlements laid onto landform subtle (Kurt, 1966)

The earliest Roman settlements were established on hillsides due to the marshy ground condition of lower levels of terrain on the course of River Po. The hill towns benefitted from the functional and scenic attractiveness brought by the landform subtle. The elevated terrain provided the necessary defense opportunity, seclusion, and control of the natural routes on the surrounding valleys.

Some ancient Chinese and American-Indian settlements were laid out with a total adaptation to the dominant landform structures (Figure 21). In that case, the process of urban formation totally conform to the formal attributes of the geomorphological

structure. Kurt (1966, p. 72) dwells on the formation of Southwest Cliff Dwellings in relation to the conditions of the site:

> "They provided an almost entire natural shelter, and additional living space could be obtained by roofing their dwellings as well. The architecture was a combination of hollowing the stone and building stone and adobe structures on myriad levels; as a result the architecture and planning are inseparable. They existed within the landscape and became merely part of it, affected by the topography and its location."

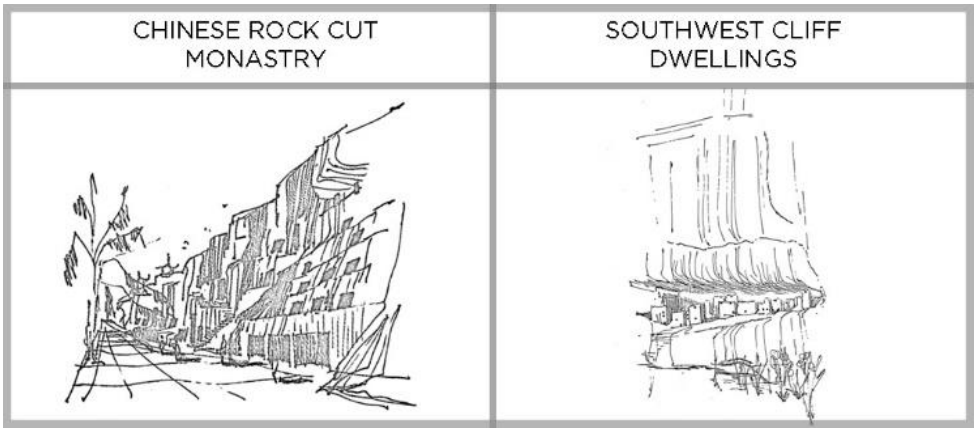


Figure 21. Ancient settlements established in landform dominant (Kurt, 1966)

2.3.3 Phenomenological Approach

The definition of space in terms of the principles in its formal configuration is provided by Norberg-Schulz (1984, pp. 12-13) in relation to its capacity to create extension, enclosure, figure-ground relationship, centralization, direction and rhythm, and proximity. The "concrete space", as suggested by Norberg-Schulz, could be analyzed as a three dimensional geometry through these concepts. By doing that he analyzes the properties of natural place and man-made place in their reciprocity to shape one another.

Yet, he dwells on an alternative definition of space by taking it as "perceptual field". In that, Norberg-Schulz asserts that "the survival depends on good relationship to a place in a physical as well as a psychic sense" in the configuration of man-made place

under the influences of natural setting. The psychological functions of "orientation" and "identification", in that regard, facilitated for the perceptual configuration of space in the making of built environment, in other words, in the concretization of *Genius Loci* –the spirit of place. As he explains more explicitly (Norberg-Schulz, 1984, pp. 18-19);

> "To gain an existential foothold man has to be able to *orientate* himself; he has to know *where* he is. But he also has to *identify* himself with the environment, that is, he has to know *how* he is a certain place."

The space, especially in the case of natural environment, has been analyzed by various scholars in terms its perceptual properties related to orientation and identification. Kevin Lynch, who introduced the concepts of "node", "path", "district", "edge", "landmark" as the structure of urban space, investigates the orientation in the urban environment by means of reading the environmental image constituted by the composition of these structures. The structure of natural environment, therefore, creates a basis and facilitate for the systems of orientation providing for the "imageability" of the environment.

Identification with the environment is equally significant in perceptual configuration of urban space. Unlike orientation, mainly dependent on the physical and functional attributes of space, identification is rather based on character, and individual or common experiences related to the general character of environment. Norberg-Schulz (1984, p. 22) dwells on the man and environment interaction in terms of identification by stating that "human identity presupposes the identity of place."

In light of these basic concepts, the phenomenon of natural environment is conceptualized under five different modes of natural apprehension by Norberg-Schulz (1984, pp. 24-32). The first mode focuses on the natural forces and landform elements as *things* to attribute meaning and drive character from their certain properties. To provide an example, mountains were attributed as "*centers* through which the *axis mundi* goes, a spot where one can pass from one cosmic zone to another". The material properties of rocks and stones were associated with

“imperishableness”. As another *thing* to present meaning *vegetation* has been the “manifestation of living reality”. Further to that, water has been considered as “the primeval substance from which all forms come and the presence of which give identity to the land”.

The second mode is denoted as *cosmic order* based on the courses of the sun, the moon, stars and so forth. The disposition of *cardo* and *decumanus* in relation with the courses of the Polar Star and the sun revels that the natural understanding of Romans were dominated by the cosmic order.

The third mode involves the designation of natural elements with human traits by means of attributing them with a *character*. The “personification” of landform elements with deific figures in ancient Greek sets an example to third mode. Such appreciation of environment is eventually reflected in the settlement configuration and is evident in social rituals taken place in Greek cities such as Delphi and Eleusis.

The fourth mode of natural apprehension is put forward as *light*, mostly associated with divinity. The temporality of light condition during the day is embodied in the architectural configuration of solemn structures.

The fifth mode is denominated as the *temporal rhythms* as an integral part of the nature in terms of time perception. The temporal rhythms affect the appearance of places, but further to that these rhythms are influential in the organization of *rituals* related to events based on seasonal changes.

Considering the structure and the apprehension of natural environment, Norberg-Schulz (1984, pp. 42-48) categorizes different patterns of natural places and the conjugated formation of urban spaces under four sections. He puts forward the type of landform combination which produces the Nordic landscape as the romantic landscape characterized by “an indefinite multitude of different places”. The rich variety of places in the landscape is ensured by a “rarely continuous, but a subdivided land having a varied relief; rocks and depressions, groves and glades, bushes and tufts that create a rich microstructure”. This natural setting consisting indefinite variety of

different spaces is embodies with a scattered settlement configuration composed of dense and indeterminate clusters with irregular enclosures.

As opposed to the romantic landscape, cosmic landscape "does not contain individual places, but forms a continuous neutral ground". Encountered in the desert countries of the Near East, cosmic landscape manifests "the infinite extension of the monotonous barren ground". The natural qualities of cosmic landscape is manifested as "oasis" condition in terms of settlement pattern signifying tightly enclosed and intimate place. The urban form is composed of uniform, isotropic or labyrinthine spaces organized around mosques or neighborhoods.

The classical landscape characterized by neither monotonous ground, nor manifold places, on the other hand, is distinguished by "the intelligible *composition* of distinct elements; clearly defined hills and mountains, clearly delimited, imageable natural spaces such as valleys and basins, which appear as individual *worlds*". The classical landscape forms a setting for the classical periods where Greek and Roman civilizations dominated the Mediterranean world. The configuration of urban spaces presented an intelligible composition of distinct elements, evenly distributed light, clear air, a harmonious equilibrium, and a meaningful order of places as an equal partner of natural environment.

Although landform compositions are categorized by the common denominating properties, they hardly present a segregated pattern, but unified as synthesis. Such landform combinations within which antagonistic characteristics are manifest are addressed as complex landscapes. As exemplified by Norberg-Schulz (1984, p. 47); "Naples, where classical spaces and characters meet the romantic atmosphere of the sea and the chthonic forces of the volcano, or Venice where cosmic extension comes together with the ever changing, glittering surface of the lagoon."

The geomorphological space and its influence in the urban formation processes are approached with a phenomenal understanding of natural environment by Norberg-Schulz. In that, the relationship between the two domains are not only based on formal qualities but also based on psychological functions ascribed to human

perception. His work is significant in terms of locating the geomorphological and natural qualities at the heart of analysis in the urban formation processes. As he (1984, p. 23) suggests; “A study of man-made place therefore ought to have a natural basis: it should take the relationship to the natural environment as its point of departure.”

2.3.4 Morphological and Functional Approach

The morphological analysis of urban space based on the geographical context is introduced by MRG Conzen. Grounded on the disciplinary field of geography, Conzen addressed the variations and the functional characterizations of the earth’s surface. The geographical totality is referred as “geosphere” by Conzen, having listed some aspects of its order. The accumulations in the geosphere, on the other hand, is referred as “region”, the space-definition of which is dependent on formal structure, functional system, and rhythmic or periodic nature. In other words, as structured by Conzen (2004, p. 27): “Thus, any region, like the geosphere of which it forms a concrete part, can be viewed under three distinct aspects, suggesting three corresponding research approaches: namely, the morphological, the functional, and the historical.” He further suggests a typological investigation into regions and urban systems as their integral part.

Conzen’s studies demonstrate that these approaches are utilized as recursive operations in different scales. The scales of investigation oscillate between the micro and mezzo level analysis of townscape, in terms of land utilization pattern, geographical town plan, and building fabric, and the macro level of analysis of urban systems as a part of regions, regional town patterns, town constellations.

Through a rather interscalar study of Havel Towns, Conzen (2007, p. 83) demonstrate the evolution of a settlement pattern on the course of River Havel in Germany. On the macro level, Havel region is predominantly denominated by the presence of River Havel. In that sense, a natural (or geomorphological) force does not only constitute a region in terms of its underlying formal attributes, but also a functional unity – facilitated by its navigable structure is provided for the settlement constellation established on the course of Havel.

A differentiated patterns of townscapes emerge on the mezzo and micro level analysis of the Havel Towns. Conzen emphasizes the role of geomorphological structure in the formation of urban space in terms of its potential to contribute to its character. In that, his remark on the components of townscape as an interplay of geomorphology and urban fabric is instructive:

> "The built-up character of the town, the townscape, consists of two basic elements: terrain and building forms. The one is the natural foundation, essentially unchanging over the centuries, the other changes very slowly – though in the context of the Havel towns quite significantly. Both elements together constitute the towns' physiognomy, or townscape. Considering that the majority of the Havel towns lie on flat or nearly flat valley floor sediments (river terraces), terrain plays a rather muted role in Havel townscapes. Only where diluvial terraces occur within the town plan do they contribute a special character" (Conzen, 2002, p. 87).

Following that, townscapes were differentiated into three types based on the visual quality experienced through the view. The *two dimensional town* type of visual experience is gathered from the towns laid on the stable basin floors of the river. The horizontal viewpoint and the vertical silhouette dominate the visual experience of geomorphologically two dimensional towns. The *three dimensional town* type of visual experience, on the other hand, is obtained from uphill or downhill townscapes of 'ladder towns'. A precedent to this category among Havel Towns is Rathenow "because the townscape is 'crowned' with a hill –or dome shaped built-up center, usually a piercing building structure" (Conzen, 2002, p. 87). An in between visual experience falls under the *intermediate type* as the last category.

2.4 Concluding Remarks

As to provide a spatial definition of geomorphological structure, how space and geomorphology is conceptualized separately pertaining to the disciplinary frameworks have been briefly looked into in this section. The structure of space is often defined through its enclosing and extending properties, boundary formation, and interscalar condition. The particular way of its enclosure and extension and the particular type of boundary formation define the character of a space. The diagrammatic quality of space is turned into place when it is experienced by people.

A spatial definition of geomorphology is possible through its physical configuration determined by natural forces. So, water cycle and tectonic cycle are two basic processes that denominate, that produce the two structural components of geomorphological space: solid structure and fluvial structure.

Elevation and depression, relief, slope, topography, concavity and convexity based on shape are the parameters that determine the spatial configuration of solid structure. Therefore, enclosure, extension, boundary formations and levels in the solid structure could be observed. Isolated hills of mountains centralize space, valleys direct and delimit space, and uniform fields manifest an extended spatial pattern. Vegetation and surface material adds to the spatial character of solid structure.

The other component, fluvial structure, morphologically function as to define and identify the water body based on flow pattern, flows at rest and flows in motion; to transform the surface relief physically based on the elevational segmentation such as tributaries on the upper course, trunk stream in the middle course, and distributaries in the lower course; and to define and give character to the adjoining land based on its enclosing and extending properties.

Fluvial structure also inherits temporal dynamism in transforming the surface relief and defining adjoining land. This is rather critical in the formation of urban space as we are familiar with the shifting status of Ephesus in history. And the shifts in the course of River Rhine and Neckar demonstrate the gravity of this condition.

Looking from a perspective of urbanism as to how geomorphological space was conceptualized, three different approaches could be observed.

Historically, ancient settlements were laid on flat plains with no significant landform structure, with subtle landform structure that were interwoven with the urban structure, and dominant landforms.

From a phenomenological perspective, the geomorphological space or natural environment as addressed by Norberg-Schulz functions as to provide orientation and identification in the built environment based on five basic modes of apprehension: natural forces as things, cosmic order, character, light, and temporal rhythms. The

last one is critical as we will observe it in the case of Ankara. Norberg-Schulz asserts that the spatial characteristics of natural environment plays a major role in the configuration of urban space.

Conzen's experiment in Havel Towns constitute the morphological and functional approach. He basically analyzes the settlement constellation formed along the River Havel. In macro level analysis the functional unity is emphasized by Havel's navigable structure. In the mezzo level analysis on Rathenow, the terrain structure and its contribution to the character of the city is put forward. In micro level analysis, the visual experience created through terrain structure as a three dimensional town or two dimensional town are mentioned.

CHAPTER 3

A CONCEPTUALIZATION ON GEOMORPHOLOGICAL SPACE

The previous section unfolds the structure of the geographical space by setting forth the structural components and spatial attributes of geomorphology, and the relationship between geomorphology and urban formation was briefly introduced. A certain type of geomorphological phenomenon referred as *calyx* and its correlation to urban formation processes will be elaborated in the remainder of this study. Therefore, the terminological use, the form, the spatial attributes, the structure, and the urban setting that the Calyx type denote in general will be elaborated in this section.

3.1 Terminological Definitions of Calyx

Etymologically, the term *Calyx*, or also known as *Calix* is originated from Latin, and from Greek *kálux* κάλυξ as a means of husk, case of a bud in late 17th century (Oxford Dictionary). Historically, it is seen that the word Calyx is used in an overarching domain of biological sciences. In this respect, the word has been used as a noun to identify the morphological parts or structures in botany, in zoology, and in human anatomy. It is also related to history, as well as art and architecture in later periods.

The initial reference that the word give relates to the specific anatomical component in botanical sciences. In this respect, the word is used as a term in a way to establish an association with “the sepals of a flower, typically forming a whorl that encloses the petals and forms a protective layer around a flower in bud” (Oxford Dictionary)

This former reference of the term is later appropriated in the zoological sciences as well as human anatomy as the research is advanced in terms of defining the morphological parts of the animal anatomy. In that, the Calyx is used as a collective term to identify cup-like cavities or structures. The specific instances for such cuplike structures could be given in three different species' anatomy: "a part of the pelvis of a mammalian kidney, the cavity in a calcareous coral skeleton that surrounds the polyp, the plated body of a crinoid excluding the stalk and arms" (Oxford Dictionary).

The reflections of the initial references to the calyx in the broader framework of biological sciences could be also observed in other domains. It is seen that the form of the calyx has been an influential figure for historical craft works in earlier ages. Two cases could be dwelled on in order to elaborate on the influence of calyx image in ancient history.

Firstly, a direct usage of the term is found in the classification of Greek kraters which are known to be as ornamented vessels used in religious ceremonies as a means to interfuse water into wine. A similar reference, originated from calyx, is given through the indirect use of the word through its derivative. This instance also establishing a historical association as the previous use of the term is 'chalice' referring to the vessel, or goblet as an instrument of Eucharist rituals (Merriam-Webster).

As the term potentially relates to the object and subject matters in broad fields of science by means of its flexible use, it has been mainly utilized in biology and zoology in terms of anatomical structure, and it has been referential to the historical craftworks gaining a spiritual meaning. However, with the turn of the centuries, the initial references/uses of the term have been abstracted. At that point, the word 'calyx' has been not only used as a noun to define something, but the word has gained the potential to be used as an adjective to define the formal characteristic of things. In that sense, 'calyx' has been an influential concept in particular instances of art and architectural works lately in 21st century.

Designed in 1951 by Lucienne Day, textile designer, Calyx fabric unfolds the calyx image in an abstracted fashion (Figure 22). The modern interpretation of calyx is

revealed as a sheer diagram of the formal attributes of calyx in Day's design as the functional attributes and the content are excluded from this abstraction.

Figure 22. Design of 'Calyx' fabric by Lucienne Day (www.robinandluciennedayfoundation.org)

A conceptual use of the term was attempted by PTW Architects with a spatial reference in the architectural design of Sydney Royal Botanic Gardens. Titled as The Calyx, the design conveys direct references with the content and the form of calyx previously elaborated in the biological sciences (Figure 23). The predefined program of the project as the botanical garden provides the preliminary reference to the calyx in terms of the content. The form of the structure, on the other hand, presents the characteristics of calyx form generating a corresponding spatial organization. In this spatial formation, a radiating center formation and a surface gravitation towards the center gathers the attention as diagrammatic quality. In that sense, Lucienne Day's abstraction corresponds to the diagram of The Calyx as it is further enhanced with a spatial reference in this structure.

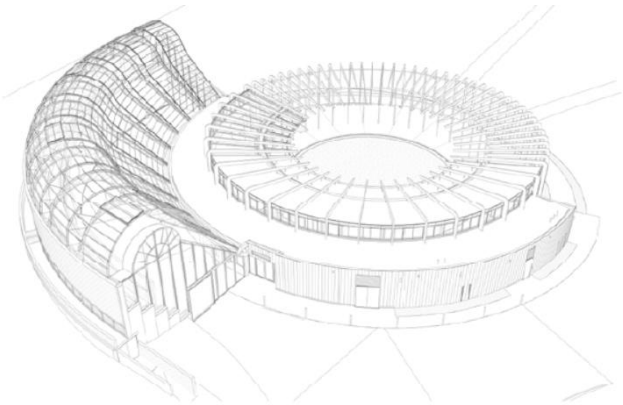


Figure 23. Architectural Project: Calyx by PTW Architects (http://www.ptw.com.au)

3.2 Calyx Type as a Geomorphological Pattern

What is gathered on the function of the calyx from analogies is that the calyx form gathers, contains, and accumulates. Evidently, it is observed that the use of the term as to denominate certain objects, or certain anatomical parts of human body and botanical organisms indicates a formal consistency. Therefore, the formal quality of the term facilitate for adoptions in defining the formally similar structures within different domains. In that sense, a geomorphological space structure is addressed by the use of the term "calyx" in the thesis.

The term Calyx has corresponding translations in different languages, although the English equivalents are rather problematic[6]. "Çanak" in Turkish, "Cuvette" in French and "Wanne" in German are considered as the counterparts of the terms. The term could be also addressed as a depression zone (*çöküntü alanı*) in terms of geological formation (Öngör, 1980, p. 34). The calyx form displays certain spatial characteristic as the type of landform pattern. İzbırak (1975, pp. 65-66) dwells on the formal attributes of Calyx as a geographical space:

- Calyx presents a concavity with respect to its environs. The central volume of the Calyx is determined by the edges of highest altitude as the tipping point if the Calyx is imagined to be fully filled with water. Related to that, most of Calyxes are rich of water bodies for their capacity to deposit water.
- The depth of the Calyx is expected to be lower than (at least even to) its width.
- The configuration of geomorphic units forms an enclosed boundary the focus of which is the base of the calyx. The base could appear as flat, undulating, hollow, or hillier and manifests centrality having a lower altitude relative to the surrounding areas.

[6] "The basin" is used as the English counterpart of the term having connotative problems. It refers to a more general territorial definition in the confines of geography, instead of formal attributes of a geomorphological composition.

- The level of enclosure and centrality is determined by the encircling mountains and hills as boundary formation. This generates gutter-like, circular, and indented types among the various types of Calyx.
- While grounding on the base and extending outward in an ascending profile, fluvial structure penetrate from boundaries through the base of the calyx. Such effect of fluvial elements on the composition of landform creates an opening towards the outside of the calyx surpassing the boundary. The openings gain longitudinal directionality to the closed formation of calyx. In that sense, stream valleys provide delimited and defined extension for the central plane of the calyx.
- A Calyx (*Çanak*) formation might aggregate in groups with multiple other calyxes varying in size and shape on large terrains. The geographical territories where calyxes are clustered in certain proximity is defined as "Calyx Region". The terms is addressed as "Wannenlandschaft" in German, and "Çanak Yöresi" in Turkish. Typical examples of calyx regions are particularly found in karstic areas. Deserts, or the terrain covered with ice caps also carry the characteristics of calyx regions.

Despite the fact that calyx pattern presents a distinctive diagram, the configuration and the scale of the geomorphological phenomena display varieties. The composition of the calyx form is governed predominantly by the fluvial pattern. The interwoven structure in the landform configuration is, therefore, observed saliently in typological variations of the calyx form.

The assemblage of geomorphic units through the mesh of fluvial structure that generate an over-partitioned landform pattern falls under the fractured type in calyx geomorphology. The fractured type manifest multi-directionality from the center of the calyx as it presents many openings avoiding a total seclusion. The geographical contexts of Ljubljana (Slovenia) and Bern (Switzerland) demonstrate such characteristics (Figure 24).

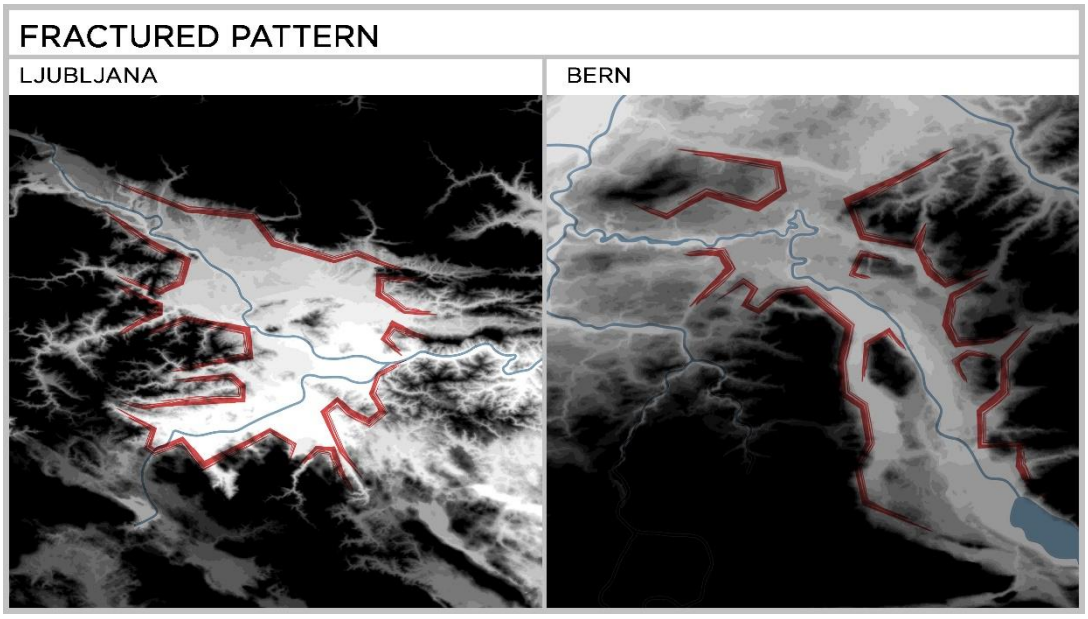


Figure 24. Fractured formation of calyx geomorphology

The scale of the phenomena displays variety in relation size of the base and enclosure of the formation. The confluence points as well as meanderings in the fluvial courses potentially generate a dilation enclosed by the solid structure. The dilated bases along the fluvial channels form niches. The calyx niches where Chaves (Portugal), Ourense (Spain), Millau (France) are laid exemplify such small scale formations (Figure 25).

A predominantly secluded calyx form, the base of which is formed on the route and at the junction of fluvial corridors demonstrate an enclosed pattern. In the enclosed type, the major fluvial corridors dominate the directionality and signify main openings of the calyx. The geomorphological settings of Granada (Spain) and Florence (Italy) demonstrate an enclosed type of calyx form (Figure 26).

The decreased level of enclosure, on the other hand, generate half-encircled river basins displaying a semi-closed pattern that is observed in the geography of Tirana (Albania), Basel (Switzerland), and Fukushima (Japan). (Figure 27). The configuration of solid structure within the base of the semi-enclosed calyx might generate sub-divisions within the enclosed type. The geography of Kabul (Afghanistan) and Ankara (Turkey) reflect the characteristic of sub-divided type as a semi-enclosed calyx geomorphology.

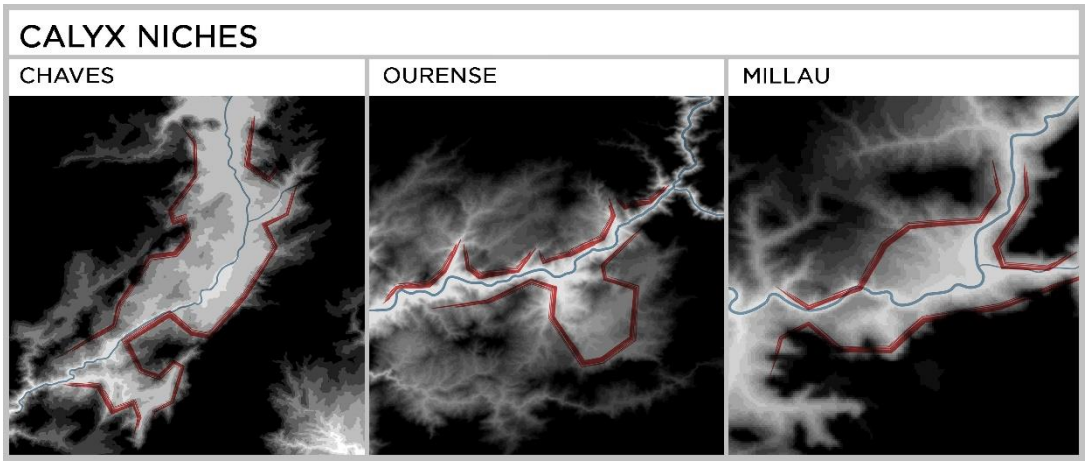


Figure 25. Calyx niche patterns

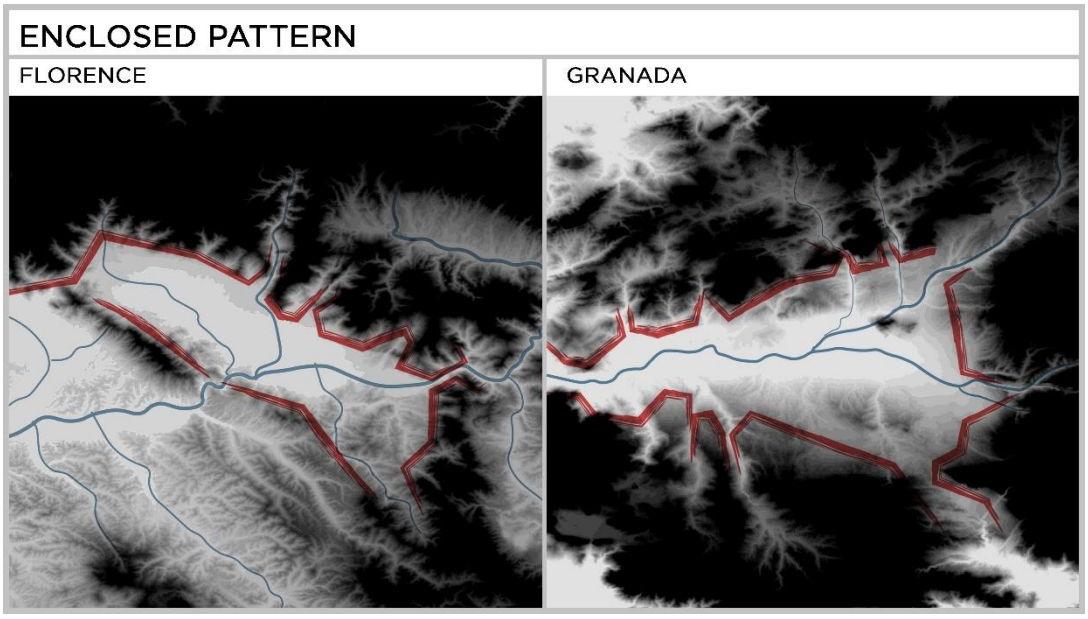


Figure 26. Enclosed formation of calyx geomorphology

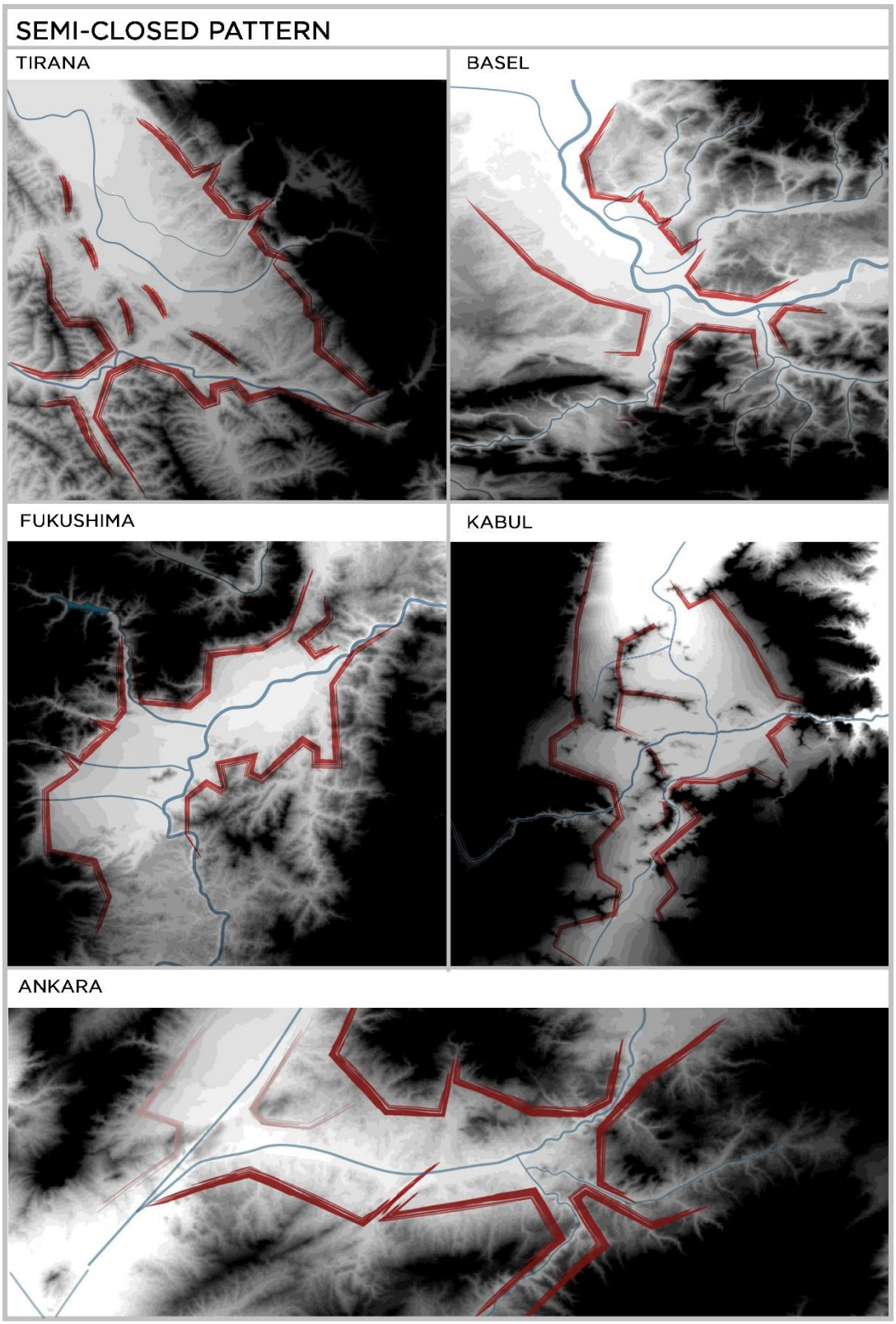


Figure 27. Semi-Closed formation of calyx geomorphology

The enclosed basins where fluvial elements form a mesh constitute an extended base for the calyx structure. The level of complexity in the fluvial mesh laid over the basin is higher than the calyx niches. Such large-scale formations set off a regional layout for the calyx typology. The basins where Florence, Tirana, and Granada are laid illustrate the scale correspondence of calyx regions.

3.3 Geomorphological Structure of Calyx

Calyx landform patterns contain diversified geomorphological components since the formation of a calyx structure is mainly governed by the incision of fluvial courses through elevated surfaces, or tectonic movements that produce a varied landform pattern. Some of the common geomorphic components of the structure of calyx are basin and valley floors, terrace, and plateau formations.

Valley floors, as the lowest section of the surface relief, lay on the both sides of leading fluvial channel. These areas are formed as pebbles, sands, silts, and clays agglomerate by the carrying forces of fluvial elements in the geological processes. Valley and basin floors harbors higher amount of ground and surface water. Due to presenting a low and stable profile in terms of elevation, floor areas do not constitute a topographical limitation for urban formation. On the other hand, low level of carrying capacity might set a limitation related to hazardous events. Basin floors shares similar geological characteristics with valley floors, although these areas constitute an extended surface segment in comparison (Erol, 1973, pp 6-7).

In the middle section of the calyx structure, terrace formations are found. A roughly flat area that is surrounded by the limiting properties of sloping surface relief on the upslope and downslope direction constitute the geographical description of terrace formations (Huggett, 2007). Terraces acquire low level of underground water in comparison with the floor formations, although running surface waters might be present on the hillslopes. Lower terraces provide suitable conditions for settlements as this segment is located at optimum proximity to the valley and basin floors with water sources as well as flatlands with higher drainage. On the other hand, certain degree of limitations arise for urban formation on higher terraces.

At the higher section of the calyx relief, plateau formations dominate the geomorphological structure. This layer of the structure could be defined as extensive flat area surrounded by lower lands and occasionally wedged by steep valleys (Huggett, 2007). Middle plateaus contain low level of ground water, whereas higher plateaus obtain relatively higher level of ground water. Plateaus provide average site conditions for urban formations, although valley incisions set limit to continuous extension of built environment (Erol, 1973, p. 14).

3.4 Calyx Towns

Urban form is not dependent on geomorphological structure in an absolute determinism, however, that geographical conditions imply limitations and conversions in the process of urban formation is widely accepted in planning literature. As a type of landform pattern, calyx geography sets forth its own peculiarities and limitations in the process of urban formation. In an attempt to explore the patterns of urban macroforms which are found in the calyx landform type, a series of towns are taken as instances in this part of the study.

To analyze the relationship between urban macroform and landform structure, the method of mapping as a means of visualization is utilized. The mapping process is conducted in a threefold stage. In the first stage, the landform composition and the geomorphological structure of the calyx towns are mapped. An approximate digital elevation model spatializing the gradation of valley and basin floors, lower and higher terraces, as well as lower and higher plateaus is projected at this stage of exploration. Additionally, major fluvial courses are highlighted in order to coincide the fluvial structure with the terrain structure.

As the second stage of the inquiry, the settlement mesh in the form of figure and ground abstraction is mapped later to be superimposed with the geomorphological structure. Blueprint of the built area, as the output of the second stage, included the physical form of the city as well as the network of flow systems. The visual production of maps, as a result, establishes a ground for evaluations and comparisons

based on the location, size, scale, pattern, and structure of calyx towns in the final stage.

It draws attention that the settlements located on the calyx niches are centered on the confluence points where valley floor is dilated. These are small towns the center of which laid on the major fluvial channels. The center of the town of Ourense (Figure 28), for instance, is laid where River Minho meanders on the basin floor and branches to River Barbaña. A large portion of the city expands radially on the basin floor, and on the valley floor of these fluvial system.

Figure 28. Macroform of Ourense within calyx

The center of the town of Millau, in a similar fashion, is located where Tarn River and the stream of La Dourbie confluences. The settlement expands towards the terraces of the calyx as the course of Tarn draws the contour of the settlement macroform. The town of Millau (Figure 29) sets an instance for the potential effect of fluvial structure as the delimiter on the macroform of cities.

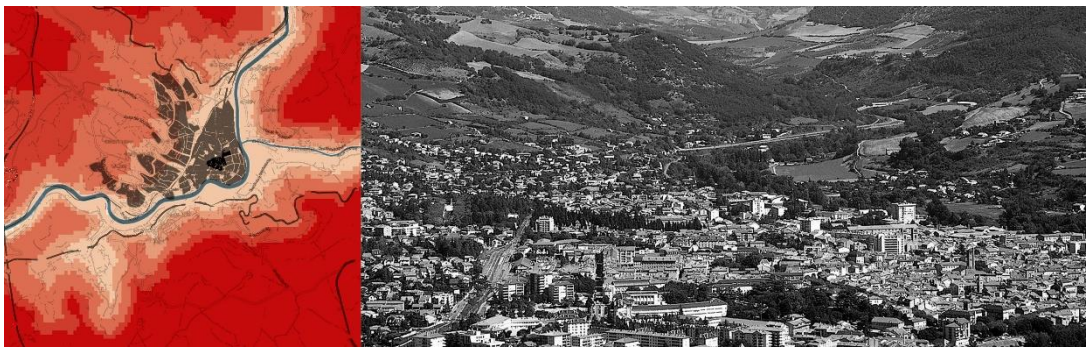


Figure 29. Macroform of Millau within calyx

A similar pattern draws the attention on the city of Chaves (Figure 30). The center of the city is laid adjacent to the River Tamega. The city expands on the base of the calyx towards northeastern lower terraces. The effect of fluvial elements on the built urban form as the boundary formation is explicitly observed in the city of Chaves.

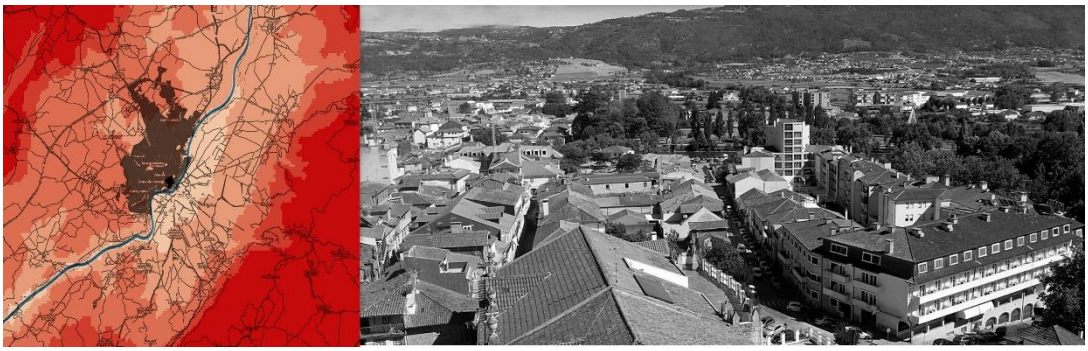


Figure 30. Macroform of Chaves within calyx

These three cities set an example for urban formations on the calyx niches in relatively similar scales, sizes, and relationships built on the calyx geography as well as the fluvial elements. In that sense, the urban formations of these cities as well as the landform structure provides a possibility to infer typological references.

The cities that are formed on the edge of the river basins unfolded in calyx geography indicate another typology. The city of Basel (Figure 31), for instance, is centered on the edge of the basin of River Rhine, where the river meanders. The calyptic landform structure and the junction of fluvial elements becomes a locus for the core of the city. The extensions of the city radiates on the direction of the stream valley floors that branch from River Rhine.

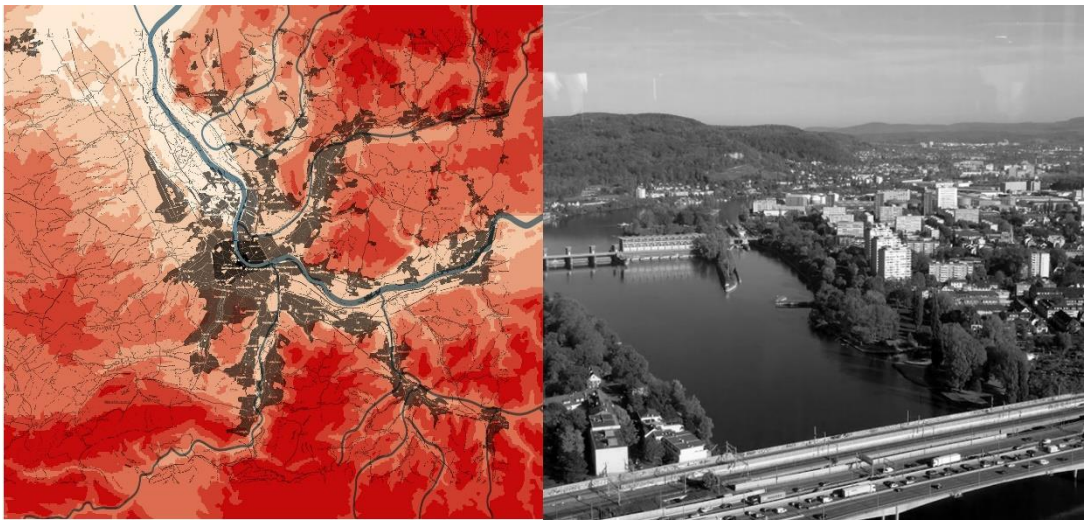


Figure 31. Macroform of Basel within calyx

A similar the pattern of growth on the edge of the calyx is observed in the case of Bern (Figure 32) as the city is located on a highly fragmented calyx. The historic core of the city is laid on the meander of River Aare. The major urban development radiates on the basin and on the terraces of the calyx. A leapfrog extension in the valley floor of the River Arno on the south, and in the basin on the north constitute the further macroform pattern of the city.

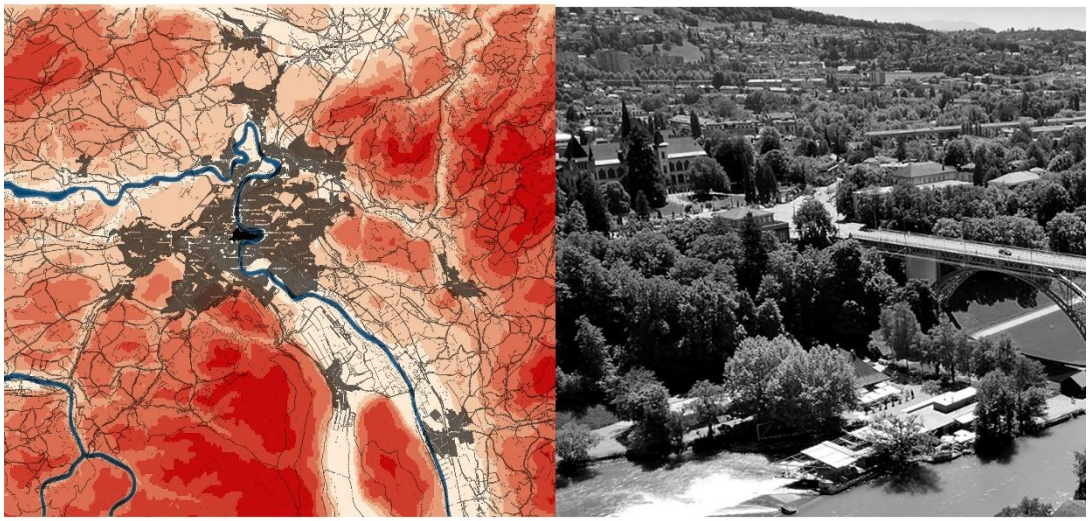


Figure 32. Macroform of Bern within calyx

Located on the edge of the River Tirana basin, the city of Tirana (Figure 33) falls under a similar category. However, a different macroform organisation is

distinguished in the case of Tirana. The historic core of the city is located on the lower terraces of the calyx, the urban growth is inclined towards the basin floor. The macroform analysis demonstrate that the city radiates on the terraces of the calyx from the core and linearly expands on the basin in the northwest direction. In that sense, the macroform pattern of Tirana displays a recognizable difference from Basel's macroform development, although both cities reside on semi-closed calyces as a geographical context.

Figure 33. Macroform of Tirana within calyx

The city of Granada (Figure 34) could be given as another instance of cities located on the edge of a calyx landform structure. Formed on the southeastern terraces that ascend from the basin floor of River Genil, the city faces towards an enclosed calyx formation. Unlike Basel, which expanded on the valley floors, or unlike Tirana, which expanded on the basin floor, the macroform of Granada is expanded on the lower and higher terraces of the calyx. It draws attention that the city extends in portions encircling the city in a certain proximity on the terraces of the calyx freeing the basin floor of River Genil. This pattern produces a segmentation on the macroform of the city. It is also remarkable that the mesh of small settlements laid on plateaus encircling the city in a distant proximity constitute another segment in a regional sense in the calyx.

Figure 34. Macroform of Granada within calyx

The city of Florence (Figure 35) is an intriguing example to the cities that are formed on the edge of calyx. Located on the southeastern terraces of the calyx, the core of the city is laid on the banks of the River Arno. The macroform of the city expands on the basin floor of the River Arno as well the lower terraces of the calyx. The structure of the calyx in the case of Florence indicate a limitation for urban growth resulting in the western extension on the macroform of the city.

Two other cities, namely Pistoia and Prato, are laid on the same enclosed calyx where the city of Florence is located. It is remarkable that River Arno furcates on two major streams that are called as Fiume Bisenzio and Torrente Ombrone. The valleys of these two streams together with the valley of River Arno constitute the major valley system which opens into the base of the calyx. The settlement pattern in the calyx depict that the openings of these major valleys into the basin become a locus for the cities of Florence, Prato, and Pistoia. The macroforms of these cities expand and merge on the basin with a loose grain of extensions that turns into a mesh in the regional level. The landform composition and the corresponding urban formations in this case generate a pattern and becomes an example for the calyx towns that constitute a region.

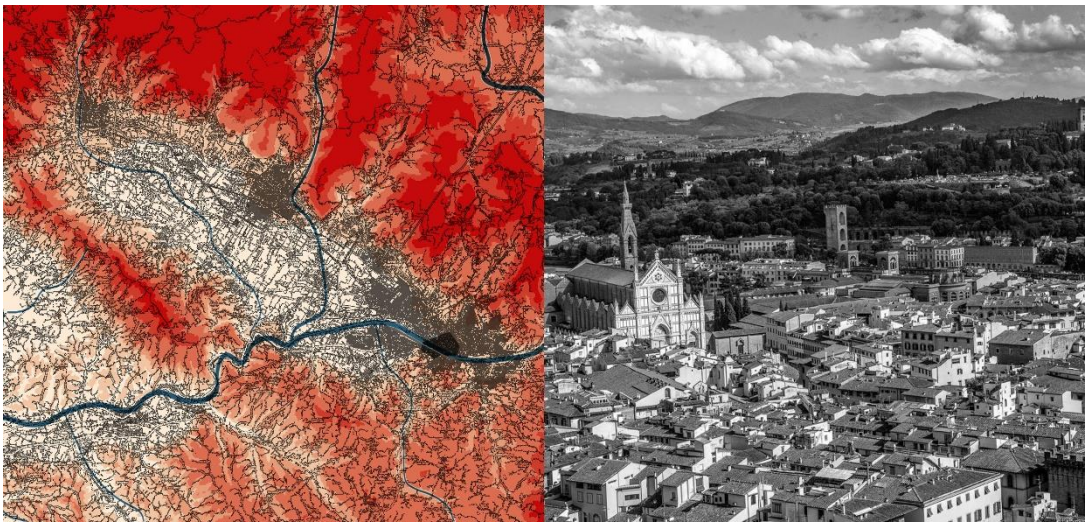


Figure 35. Macroform of Florence within calyx

The towns that are formed on the base of the calyx landform structure indicate a different pattern in terms of the macroform development. The city of Ljubljana (Figure 36), located on a highly fragmented calyx geography, is centered on the basin of River Ljubljanica. The expansion of the macroform is guided radially on the basin of Ljubljanica on the south, as well as on the basin of River Sava on the north. Due to the geomorphological structure, the macroform of the city is developed in two parteit condition. It is observed that a large proportion of the city is developed between two rivers. The further radiating extensions of the city are drawn on the terraces by encircling the remaining basin floors.

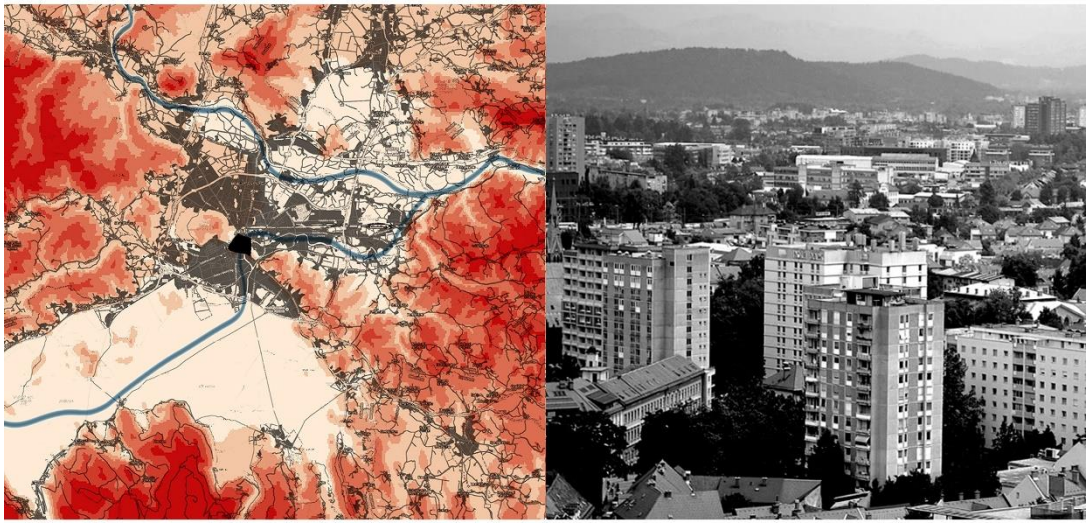


Figure 36. Macroform of Ljubljana within calyx

A further example to the calyx base-town model could be provided through the case of Fukushima City (Figure 37). The historic quarter of the city is laid on the basin floor where the Abukuma River and Arakawa River confluence. The macroform of the city expands radially on the river basin floor and on the lower terraces of the calyx. The macroform pattern is formed through the loose grain of urban development towards the fringes.

Figure 37. Macroform of Fukushima within calyx

The city of Kabul (Figure 38), the core of which is laid on the basin floor where the River of Kabul and the River of Paghman confluence, draws a similar pattern. As dwelled on in the previous section, the landform composition of Kabul constitute a sub-divided calyx formations. In line with this condition, the urban macroform of the city display a partite structure developed on the sub-calyxes. In that sense, the city expands radially on these calyxes and on the river basin floor. Accordingly, large proportion of the city grows on the basin of the Kabul River at the eastern sub-calyx, the other half of the urban growth takes place on the basin and terraces at the western sub-calyx, and a small proportion of the city expands on the terraces of northwestern sub-calyx.

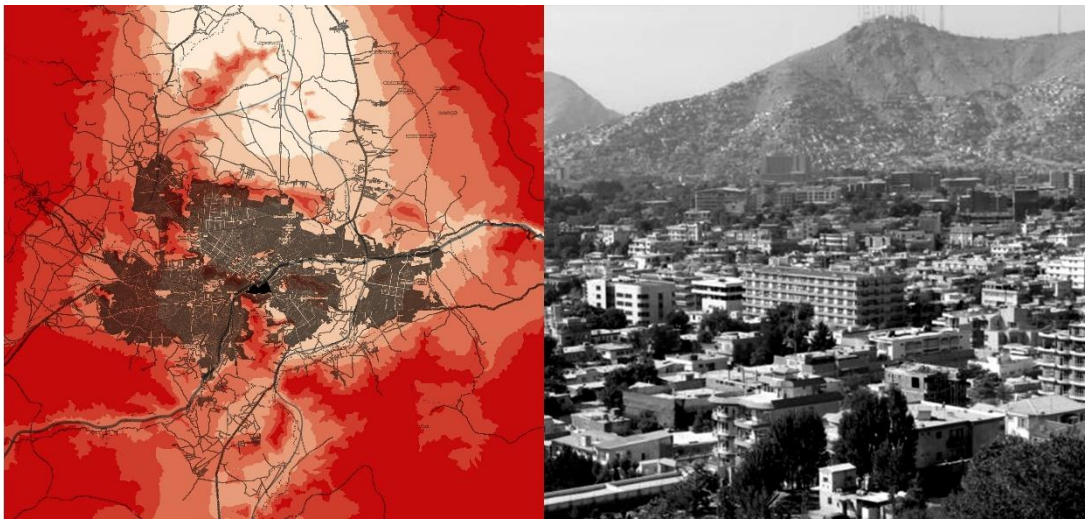


Figure 38. Macroform of Kabul within calyx

The city of Ankara, historically anchored at the hilltop delimited by the streams of İncesu and Bentderesi and later laid onto the basin of Ankara Stream, also denote sub-divided calyx pattern (Figure 39). The city expands radially outreaching the higher terraces in the inner calyx, whereas the growth is linearly directed parallel to the Ankara Stream on the outer calyx. Among the calyx towns that have been reviewed, Ankara presents a distinctive case in which the urban development is congested within the limits of calyx in its fullest capacity, and exceeded its boundaries at certain points. A detailed analysis of the calyx of Ankara and urban development on the inner calyx will be elaborated in the following sections.

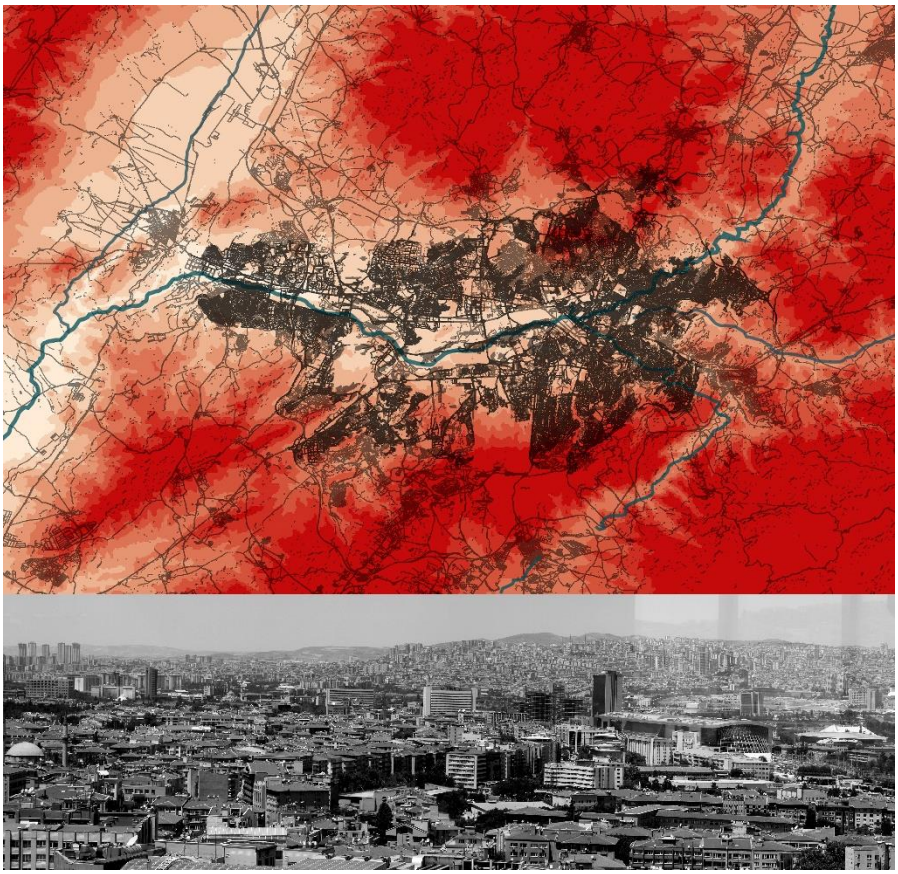


Figure 39. Macroform of Ankara within calyx

3.5 Evaluations and Concluding Remarks

A general inference gathered from the calyx towns is that the nucleus of urban formation is strongly interconnected with fluvial structure. The meanderings and confluence points on the dilated basins of streams become a locus for urban agglomerations. Therefore, it could be pointed that the fluvial structure and the corresponding landform units are highly effective for urban formation and growth of cities. It is rather explicit in the case of relatively small scale towns that are located on calyx niches such as Ourense, Millau, and Chaves. It could be also inferred that fluvial elements imply boundary condition for the growth of settlements in small size.

The size, scale, location, macroform, and settlement pattern of calyx towns display varieties in larger calyx geographies. In that sense, the variations in the location of

towns within a calyx landform structure indicate the parameter for the main categorization. In the first category, the towns that are located on the debouchment of valleys on the edge of calyx landform structure could be addressed. Three types of macroform pattern draw attention in this category. The case of Basel demonstrate an urban growth radiating through the directing and delimiting properties of stream valley corridors. The case of Tirana, on the other hand, exemplifies for the urban expansion towards the basin floor. This pattern of macroform growth is also predominant for the tripartite settlement ensemble on the calyx, to wit, Florence, Prado, and Pistoia laid in Arno basin. The Florentine case is significant in the sense that regional spatial relations could be set within multiple urban domains in the calyx geography, contrary to the cities that are dominant in the calyx. A rather different growth pattern is observed in the case of Granada, as the city physically grows on the terraces that constitute the periphery of the calyx consolidating the stream basin floor.

The second category comprises the towns that are laid on the base of the calyx where the network of fluvial elements are found on the basin floor. The macroform of these calyx towns radiate on the flat basin floor with loose grain of urban fabric such as Ljubljana or Fukushima. On the other hand, urban growth persists on higher terraces in fine grain of urban development as depicted in the case of Kabul. These set of examples also reflect that the inner structure of a calyx is highly influential in the formation and partitioning of macroform structure of cities. Unique landform compositions generating sub-calyxes as a part of the calyx in the cases of Ljubljana, Kabul, and Ankara set precedents.

It could be deduced from the set of examples that the spatial organization of calyx towns with the surrounding settlements coincide with the geomorphological qualities of calyx structure. It is prevalent that the spatial organization of Granada with the surrounding settlements is formed by the prevailing geomorphic structure. Furthermore, as previously discussed in the case of Florence, each urban domain in the tripartite settlement ensemble is nested on the openings of calyx. The base of the calyx, in this regard, is utilized as a ground for the prevailing fine mesh of strip development interconnecting the calyx towns.

It could be drawn from the exploration that, the urban development takes place on the basin or valley floors and reaches on the higher terraces to some extent in some cases. It is observed that small settlements and villages are located on the plateaus of calyx. The higher terraces, the plateaus and the hilltops set forth a limitation for the urban development. In that sense, these enclosing properties of calyx geography puts pressure on calyx towns leading them to grow on radiating through valley axes, or linear extensions towards the basin floors.

CHAPTER 4

CALYX AS THE GEOMORPHOLOGICAL SPACE OF ANKARA

> "This city is situated on one of two steep rocky hills, which rise up in the middle[7] of a plain, and between which a small stream flows to the westward, being one of the sources or feeders of the *Sangarius*."
>
> (W. I. Hamilton, 1837, p. 56)

4.1 Geographical Context of the Calyx in Macro Scale

A geomorphological enclave formed at the inner circles of Anatolian peninsula generate suitable grounds for settlement formation (Akçura, 1971, p. 9). A settlement mesh is laid inside of such enclave separated from the peripheries of the peninsula by a mountain belt. Ankara, along with the settlement systems that define provincial territory, is located on a plateau at the northern section of the enclave defined as Central Anatolia.

The plateau that characterizes the settlement ensemble of Ankara rises in-between Sakarya Basin on the west and Kızılırmak Basin on the east. Though the term plateau is mostly associated with a flat scheme, the plateau of Ankara presents intricate landform characteristics. The level differences in the plateau offers an idiosyncratic schema as a result of the interplay between heaves (highlands) and sediments (lowlands).

[7] "On the edge of a plain" would be a rather accurate description considering the location of the traditional hilltop settlement.

The spatial configuration of settlements in macro scale is shaped along interconnected valley and plain systems generated around water courses. This demonstrate that the formation of settlement pattern does not present a coincidental occurrence, on the contrary, it reflects a systematic composition based on the geomorphological qualities of terrain. To elaborate on such argument, the information on the two basins, Sakarya and Kızılırmak, on which Ankara is formed will be detailed.

4.1.1 Locating Ankara in Sakarya Basin through Kiepert Map

One of the initial images in which the geographical links that integrate the city of Ankara to greater Sakarya Basin is produced by a German cartographer, Heinrich Kiepert, between 1890 and 1892 (Figure 40). Descripted as "Continuation of the Angora Railroad", 1/250.000 scale the map defines the eastern edge as a part of a wider area covering western part of Asia Minor. Within this framework, Kiepert intends to inform about landform characteristics in terms of terrain conditions and water courses, settlements, and the route of the railway. The major scheme composed in reference with the fluvial system provides substantial information in deciphering the spatial organization of Sakarya Basin.

In this context, two major courses as extensional branches of Sakarya (*Sangarios*) River generate a terrestrial pattern in the plateau and create the regional layout. On the northwestern periphery, Kirmir Stream lays a basis for the settlements of Beypazarı (*Lagania*) and Ayaş (*Mnizos*), as well as forming Kirmir Basin where the settlement of Güdül is formed. Kirmir Stream turns into Hamam Stream on the northern outskirts substantiating the settlement of Kızılcahamam (*Yabanâbad*).

As the second arterial, Ankara (*Engüri*) Stream bifurcates from Sakarya River and merges Hatip (*Engürü*) Plain in the Sakarya Basin. It is noteworthy that the ancient Phyrigian settlement of Gordion is located at the junction where Ankara Stream joins to Sakarya River. The settlement is formed inside the crescent shape landform created through intersection of water courses. Later in this study, it will be pointed that the settlement of Angora is formed in a similar fashion.

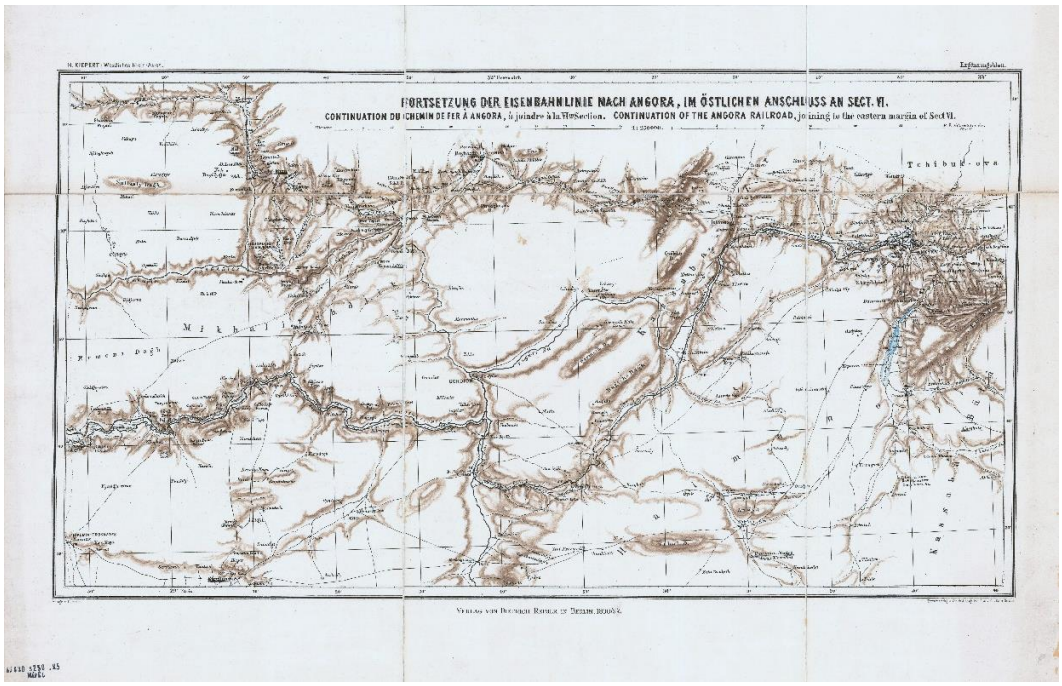


Figure 40. Kiepert Map, Vestliches Klein-Asien, Fortsetzung Der Eisenbahnlinie Nack Angora, Im Östlichen Anschluss Sect. VI (University of Chicago Digital Preservation Collection)

Towards northeast, Ankara Stream feeds the Engürü Plain where it is radially branched. One of the branches becomes Ova Stream within Kazan-Yenikent Plain where the settlement of Kazan is located. Towards the west, Çubuk Stream as a branch of Ankara Stream flows through Çubuk Plain where the settlement of Çubuk is located. More essentially, Ankara Stream bifurcated into Tabakhane Stream and İncesu Stream on the eastern edge of the Engürü Plain substantiates the core of the central settlement. In that macro scheme, it is seen that the core of Ankara is formed at the crossroad of four streams, Ankara, Çubuk, İncesu, and Tabakhane Stream.

It could be concluded from the descriptive analysis of the landform and settlement pattern in the provincial scale that there is a correlation between geographic locations in terms of landforms patterns and spatial distribution of settlements. The extensions of these stream valleys opens into adjacent calyxes; Mürted, Çubuk, Gölbaşı, situated at the radial extensions of Engürü Plain. This aggregate structure of synclinales form a calyx region (*çanak yöresi,* see Chap. 2) pivoted around the central calyx of Ankara (Figure 41).

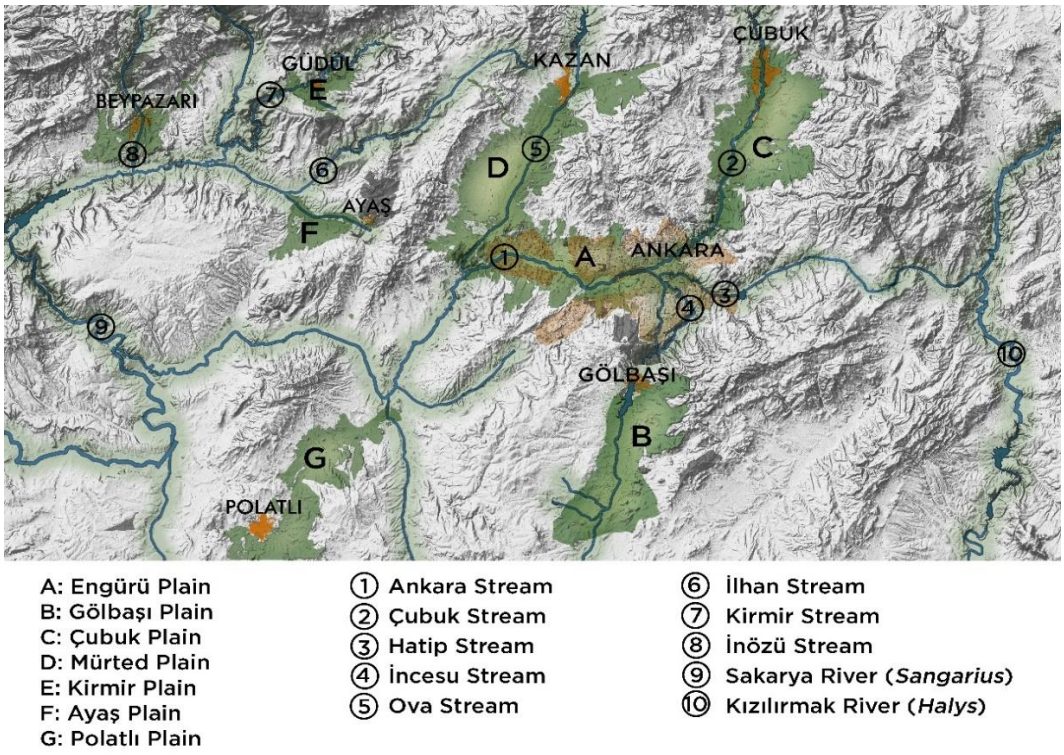


Figure 41. Settlement pattern, landforms, and calyx region

4.1.2 Recognizing Kızılırmak Basin through Maercker, Kannenberg, and Schaeffer Map

The fluvial pattern that composes the landform of Kızılırmak Basin could be deciphered in an old map created by German military officers, Maercker, and Kannenberg in 1893, and by Schaeffer in 1894 (Figure 42). Entitled as "Itinerary Recordings in the River Basin of Kızılırmak (Halys)", this 1/250.000 scale cartographic representation is based on the fluvial elements in the form of streams, creeks, rivers that branch from Kızılırmak River. Other components of geomorphology such as mountains, hilltops, caves, and plains are recognized in the map as a record. Not only natural elements that create the terrain but also man-made elements are also to be recognized in the cartographic image. The ruins of abandoned settlements, graveyards, mills, telegraph lines, and most essentially, the settlements which are located on the route of the water courses are inscribed by the authors along with the social structure of the settlements.

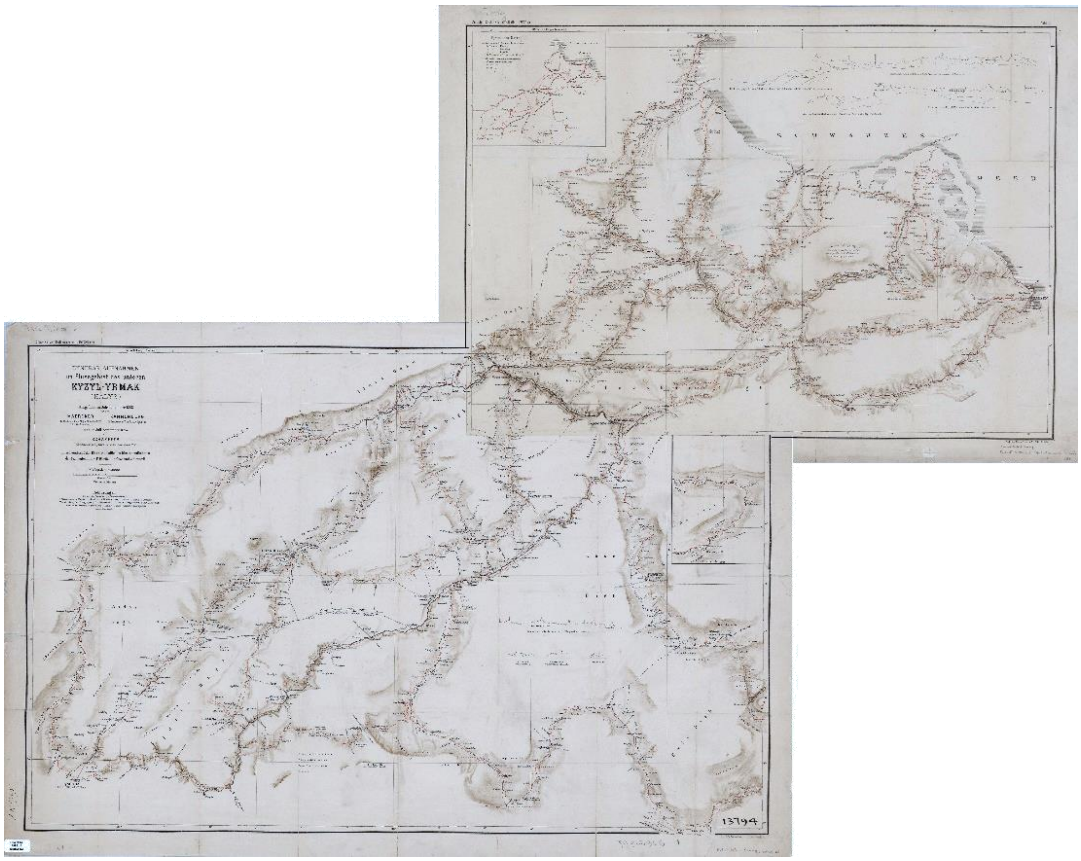


Figure 42. Maercker, Kannenberg and Schaeffer Map, Itinerar-Aufnahmen im Flussgebiet des unteren Kyzyk-Yrmak (Halys) (University of Chicago Digital Preservation Collection)

Simplified diagrams and sketches complementary to the major scheme gathers the attention in addition to the overall map where the main message is represented. The diagram demonstrates Kızılırmak River as the spine of the riverine system which forms the basis for the mesh of settlements in Anatolia until the Black Sea coast (Figure 43). On the other hand, the sketches drawn by the authors provide an information regarding the panorama of landscapes which were found significant. The rugged terrain formation as the characteristic of Anatolian panorama is the prior message carried through the sketches (Figure 44).

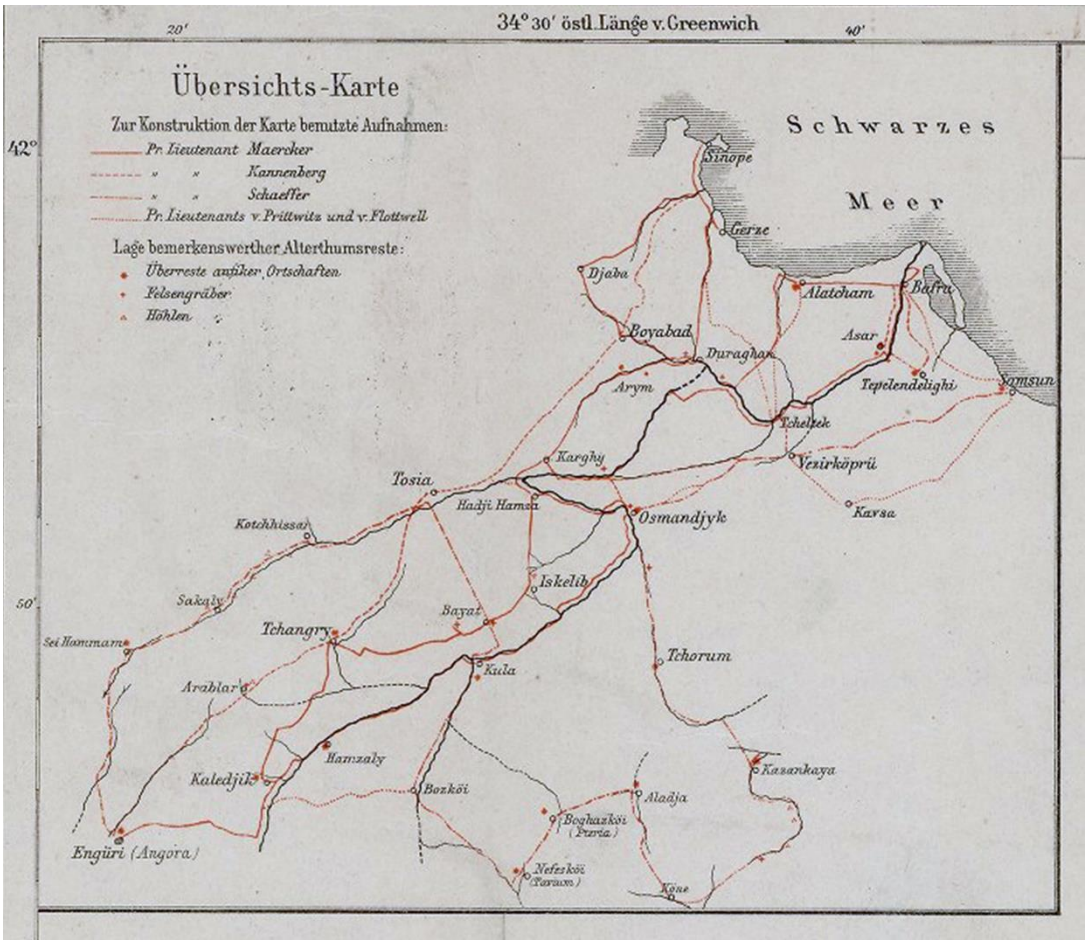


Figure 43. The diagram of Kızılırmak (Halys) settlement constellation produced by Maercker, Kannenberg and Schaeffer (University of Chicago Digital Preservation Collection)

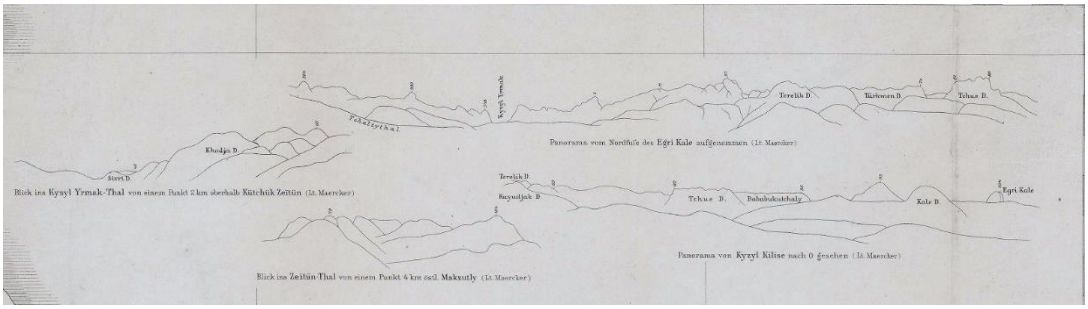


Figure 44. Characteristic terrain elevation drawings produced by Maercker, Kannenberg and Schaeffer (University of Chicago Digital Preservation Collection)

In the overall scheme, it is observed that Kızılırmak Stream feeds Tosya (*Docea*), İskilip (*Peium*), Çankırı (*Gangra*), Kalecik (*Blucium*) on the west, and Çorum,

Boğazköy (*Hattusa*), Nefesköy (*Tavium*) on the east in the central Anatolia. Moreover, the map depicts in detail how Ankara (*Angora, Ancyra, Engüri*) is merged within the stream valley settlement system. Engürü Plain is integrated within the grand Kızılırmak Basin through a tripartite stream valley structure radiating from the plain. The eastern linkage, Tabakhane Stream, bifurcates from Kızılırmak River on the lower ridges of Elmadağ Mountain. Flowing through Hatip valley, it intersects Ankara Stream on the northern edge of Engürü Plain. The northern linkage, Çubuk Stream, branched from Ankara Stream, flowing through Çubuk Plain cultivating Çubuk settlement, later joins to Han Stream and Çankırı Stream finally merging in the Kızılırmak River. The northwestern linkage, Ova Stream, diverts from Ankara Stream on the western edge of the plain, flows through Mürted Plain cultivating Kazan, Kızılcahamam, later joins Devrez Stream which merges in Kızılırmak River towards the north.

In conclusion, Maercker, Kannenberg, and Schaeffer Map reveals a significant information regarding the correlation between settlement pattern and landform. In an overall map, such interpretation could be followed in the visualization of the Anatolian settlements on the basis of stream valleys that stems from Kızılırmak River. Therefore, it could be inferred from this intriguing work that, settlement mesh in central Anatolia is the product of spatial organization of a stream valley civilization. Ankara, in this grand picture, is not isolated, but integrated through Hatip (or Tabakhane) Stream, Çubuk Stream, and Ova Stream within the system (Figure 45).

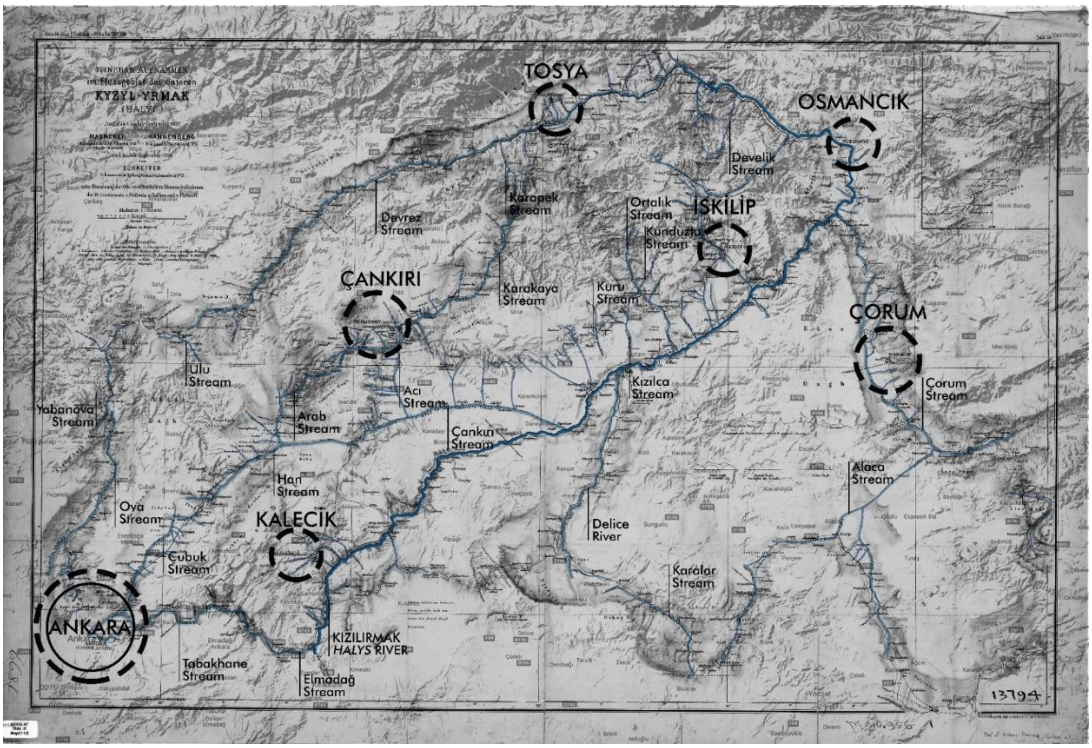


Figure 45. Maercker, Kannenberg, and Schaeffer Map depicting Ankara as an integral part of the settlement constellation evolved on the course of Kızılırmak (Halys) (University of Chicago Digital Preservation Collection)

4.1.3 Calyx of Ankara: A Node between Two Basins

The cartographic representations of Sakarya and Kızılırmak basins elaborated in previous sections reflect the role of the geomorphological and hydro morphological elements in the formation of settlement systems. Those also address how the settlement of Ankara is formed and integrated within the system in a defined frame of references. The interrelationship between these frames and how Ankara is positioned in this broader frame could be inferred from The Map of Asia Minor produced by John Arrowsmith to illustrate the journeys of W. I. Hamilton between the years of 1836-1837 (Figure 46). Arrowsmith illustrates the intermingled system of stream valley and settlements so that the geographical information of Anatolia could be conveyed. It could be inferred from this holistic frame that the fluvial juncture where Angora/Ancyra is located create a node between Kızılırmak and

Sakarya Basins. Engürü Stream forms a spine between two major rivers and exhibits nodality as it is branched on the base of the Engürü Plain.

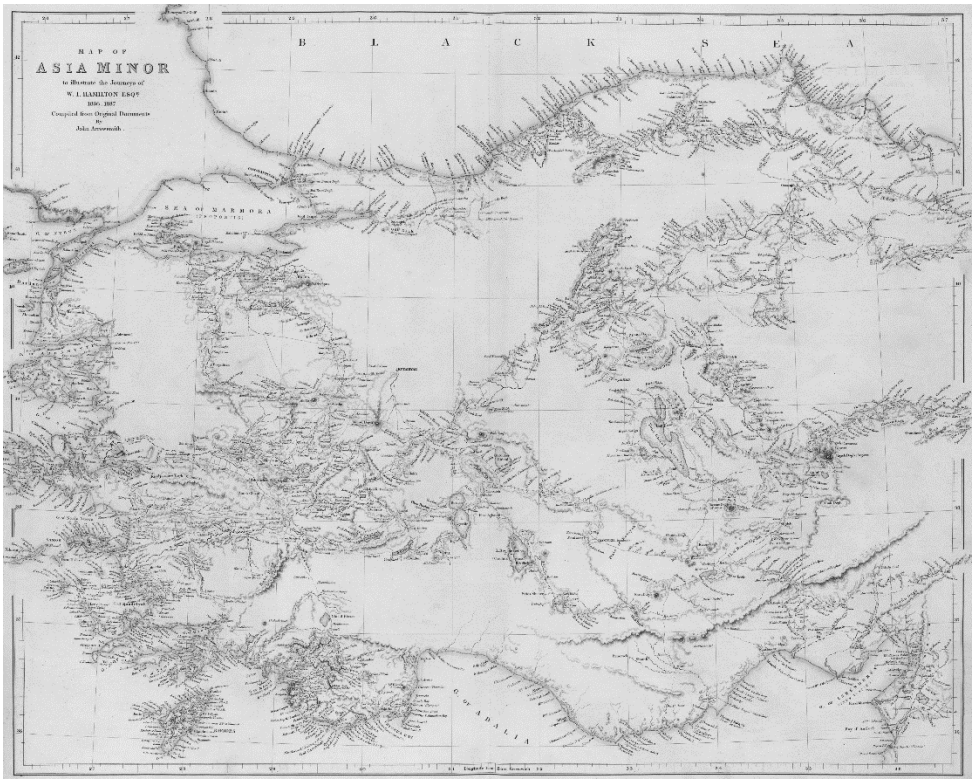


Figure 46. Arrowsmith Map depicting Ankara as a node between east and west on the Anatolian peninsula (Old Maps Online)

The maps facilitates two significant points to discover. On the one hand, an argument could be developed based on the relationship between water courses and settlement formations in purely physical terms. This could be substantiated through the geomorphological qualities of the terrain which provides suitability for the settlement formation in sediment areas. As a result, the fluvial route becomes an order on which settlements are formed and related to one another. In other words, fluvial patterns indicates strong correlations with settlement patterns.

This argument gains spatial quality to the water bodies as stream courses relate to the settlement in the sense that they form, divide, or encircle them. This means that the space created through water bodies becomes a locus for the events performed by people in different epochs enabling multitude of land use patterns to be emerged

through centuries. Further to engaging in the macroform of settlements in micro scale, the stream valley system connects settlements to each other in macro scale.

On the other hand, the authors selectively depicts the water courses as the network on which settlements are formed. In other words, the stream system is considered as an essential element as geographical narrative in cartographic writing. This indicates that riverine system embodies perceptual quality as it connotes with the syntax of a systematic structure.

The European settlement system is established on the syntax of river courses for variety of reasons. Navigability and trade appear as the major reasons above all. The Anatolian settlement system, in a similar manner, is based on the syntax of a stream system. Although the water courses of Anatolia are not navigable due to instable flow rates, the valley and plain landforms along their routes provide a fertile ground for settlement formation. Therefore, as reflected in itineraries and cartographic works of earlier geographers, the mesh of stream courses indicate a stream valley settlement system in an overlapped structure.

4.2 The Structure of the Calyx

As discussed previously in the scope of macro scale setting, the city of Ankara is formed at the eastern edge of the Engürü (Hatip) Plain. Originated on the hilltop enframed by two water courses, the geomorphology of Ankara indicates ‘calyx’ type surrounded by ridges. The geomorphological formation presents a nested landform pattern which could be referred as ‘Inner Calyx’ and ‘Outer Calyx’ (Figure 47).

4.2.1 Outer Calyx

At the center, The Citadel of Ankara forms a vanishing point for Inner Calyx. On the periphery, rugged terrain composes the boundaries of the Inner Calyx and forms a unique geography. To be more precise, Etlik and Keçiören Ridges as lower extentions of Memlik and Bağlum Peaks bases a hinge on the north, the ridges of İdris Mountain, and Hüseyin Gazi Peak as a part of the grand Elmadağ Mountain set a threshold on the east, Çankaya and Dikmen Ridges define the outer edges on the south. Tuluntaş,

İncek, and Taşpınar hills enclose the Inner Calyx on the southwestern periphery with a relatively lower elevation.

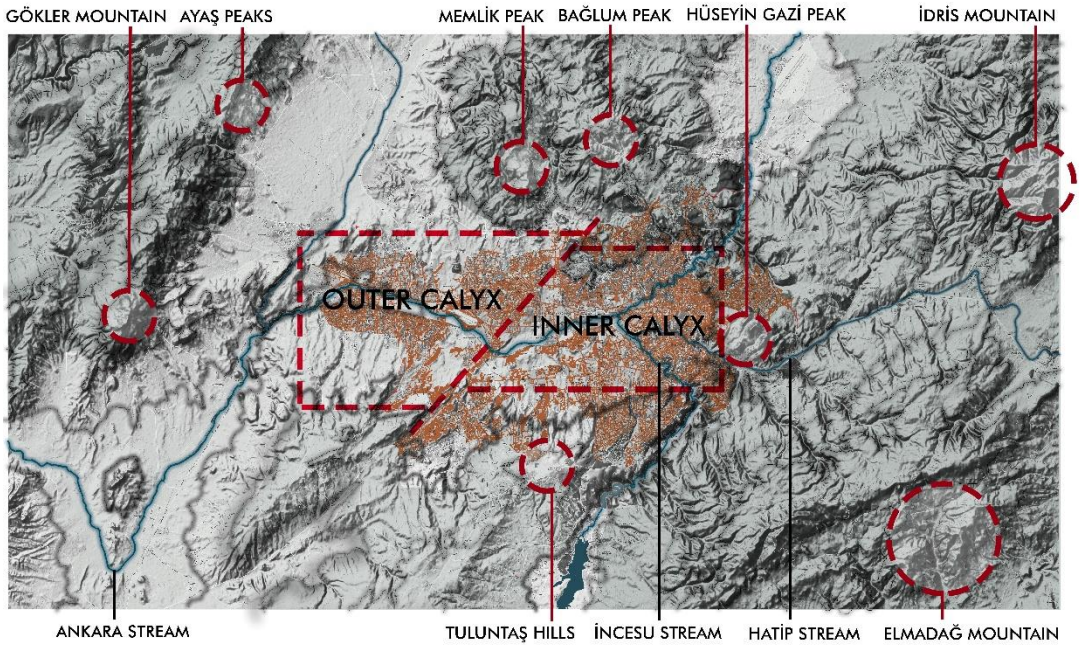


Figure 47. Geomorphological formation of Inner Calyx and Outer Calyx

The flatland of Engürü Plain that reaches towards the east engulfing Inner Calyx from the west side opening represents the Outer Calyx. In detail, the edges of Outer Calyx is defined by the Belören Peak on the north, Bucuk Peak on the northwest, Ayaş Peaks and Gökler Mountain on the west, Bey Mountain on the southwest. Merging with the periphery of Inner Calyx, the Outer Calyx demonstrates an integrated frame for the geography of Ankara. The cross-sectional schemes reveal the formal configuration and these enclosing properties of the calyx (Figure 48).

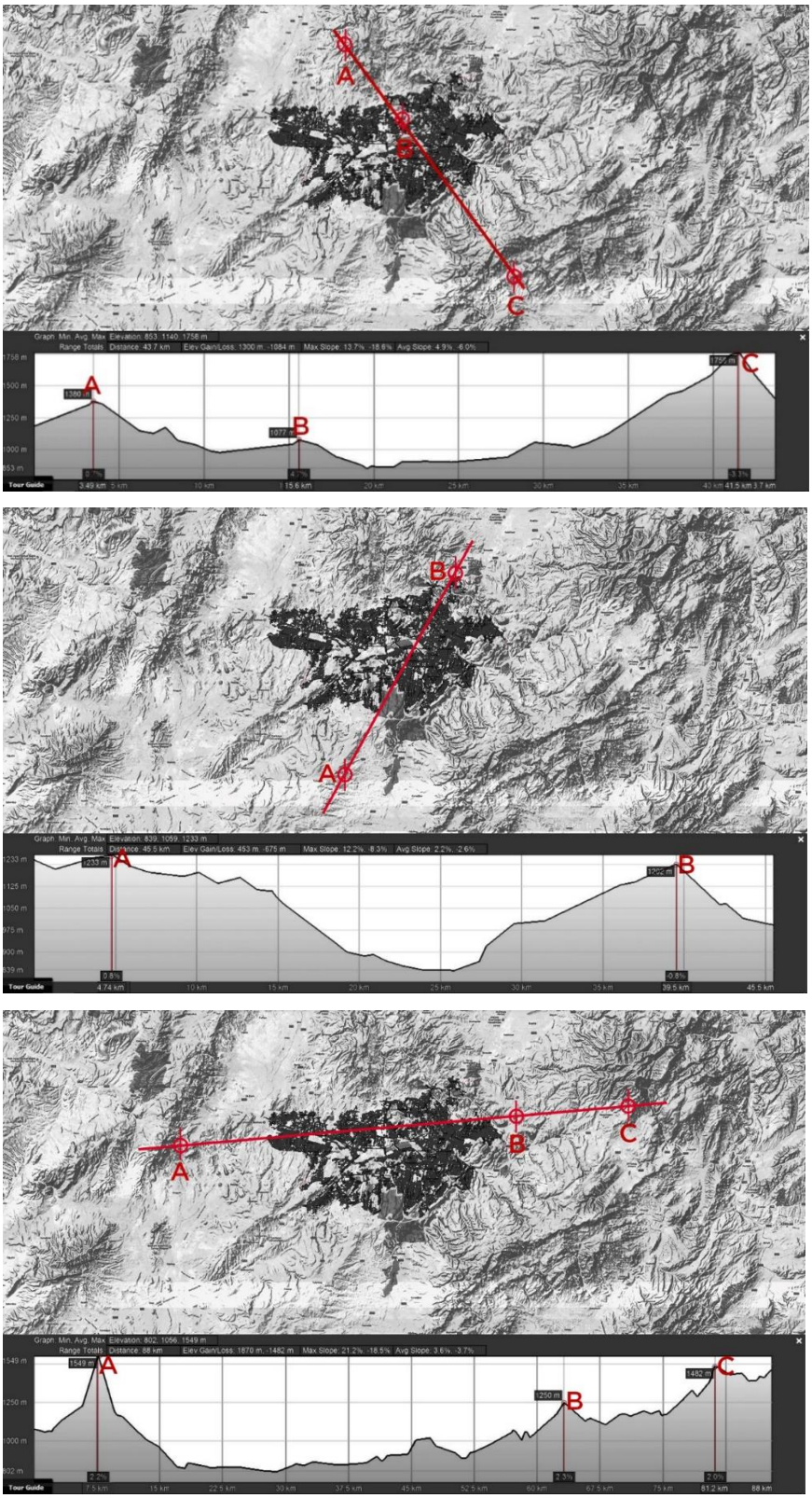


Figure 48. Cross-sectional representation of the calyx geomorphology of Ankara

The boundary formation of Inner Calyx, in other words, the division between the Inner and Outer Calyx is created by sequence of hills aligned in the northeast-southwest direction. The synclinal of the Ankara Stream forms a col, referred by Chaput (1930) as İstanbul Pass (*İstanbul Boğazı*) (Figure 49).

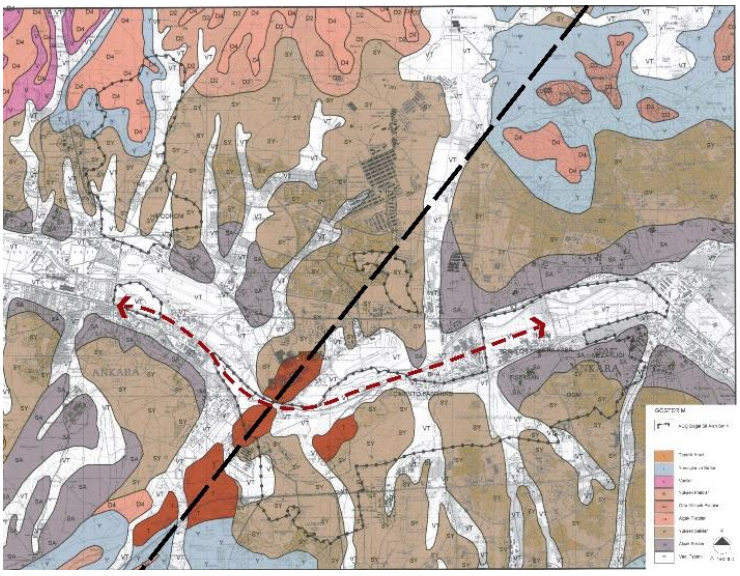


Figure 49. İstanbul Pass, İstanbul Boğazı, as an opening on the subdivision of inner and outer calyx (AOÇ Araştırma Raporu, 2006)

4.2.2 Inner Calyx

The geomorphological attributes of Ankara has been found significant for whom represented the city and the environs before Republican period, and for whom scientifically analyzed the physical form of the environment as well as the formation of the capital city after the Republic has been established. The recognition of geomorphological phenomena has been through the medium of cartography before modern systems of analysis and representation.

Amongst contributors of the geomorphological context of Ankara, von Vincke comes to forefront as the initial figure who laid out the detailed cartographic representation of geomorphological structure as well as the location of the settlement within such context. As reflected in engravings and travel journals that belong to the earlier ages, the unique landform of the Inner Calyx becomes an image of the city in terms of the

rugged terrain condition and the presence of water bodies. A cartographic representation of landforms that construct the Inner Calyx was produced by a Prussian Officer, Karl Friedrich von Vincke in 1846 (Figure 50). Entitled as "*Karte der Umgegend von Ankara* | The Map of Ankara Vicinity", 1/73.000 scale map simulates topographical conditions as well as the outline of the settlement. This technique of Vincke vitalizing the geomorphological structures in relation with the settlement formation emerges as a unique contribution in the spatial history of Ankara. Along with the drawing, Vincke inserts annotations which inform about the names of the landforms such as mountains, hills, valleys, streams, lakes; some of the place names; and land uses such as gardens, vineyards, farms. Essentially, Vincke gathers the attention on three substantial elements in the representation of Ankara; terrain structure, fluvial pattern, the settlement (Figure 51).

The cartographic narration unfolds terrain structure by dwelling on threshold areas created through mountains and hilltops on the periphery of the Inner Calyx. Kocadağ Mountain and Hisar Mountain are inscripted as northern boundaries, Sivri Peak and Hüseyin Gazi Peak are noted as eastern thresholds, Elmadağ Mountain is set as southeastern edge, Tulumtaş Hill is defined as southwestern edge. Vincke refers to the garden and vineyard formations on the hillsides as the interface between the periphery and the base of the Calyx. The northern ascent and the southern ascent of the Calyx are denominated with such formations by Vincke.

The irregular terrain structure depicted earlier in the sketches of Maercker, Kannenberg, and Schaeffer is also emphasized by von Vincke. The recurrent representations of the landform signal that rugged landform pattern constitute an idiosyncratic characteristic for the vicinity. The unique appearence of the Calyx was also recognized by Ernst Mamboury later to be touched upon in his work. Mamboury (1934, p. 46) suggests that a traveler who observes the surrounding sight from the top of the Ankara Citadel would easily grasp the landform of Ankara, even though he/she is not a skilled observer.

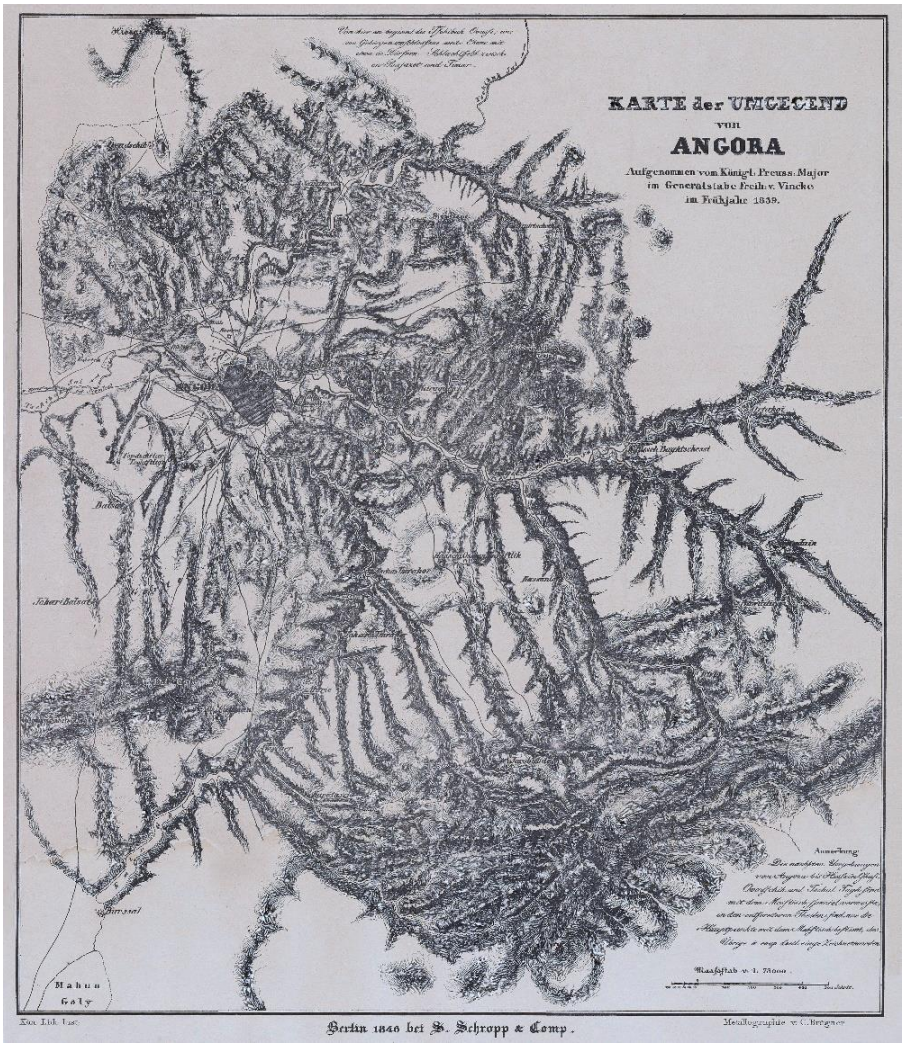


Figure 50. Vincke map as the earliest urban representation of Ankara in relation to the inner calyx geomorphology (University of Chicago Digital Preservation Collection)

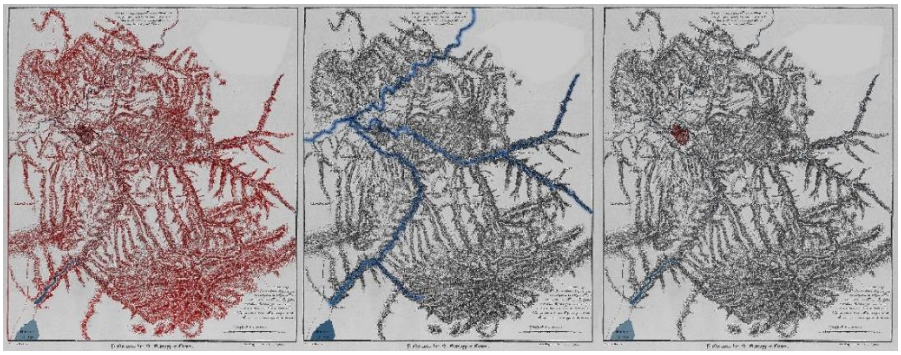


Figure 51. Compositional elements of Vincke Map; the solid structure, the fluvial structure, and the settlement

Scientific analyses and representations of the geomorphology of Ankara has been launched into as soon as the city was decided to be the locus of modern Republic. The task of conducting researches on geomorphological structure of the city was stimulated mainly by pragmatic concerns based on infrastructural and functional restructuring of a modern capital city. In that sense, the potentials and risks created by geomorphological context in the process of urban formation are explored. Estimations in the increase of urban population necessitated reformulation of water supply as the basic urban service. This problematic contributed to the investigation of hydrological systems prevailing in the vicinity. The explorations into geological systems, on the other hand, was entailed by the emerging functional reorganization as well as physical construction of the city in the modern era. These efforts to understand the geomorphological context of the city were the initial steps taken towards intervening in the environment in the process of creating and shaping urban space.

The preliminary researches have gained a pace in the first decades of Republic after the modern research institutions such as Ankara Higher Agriculture Institute are formed in Ankara. The research series originated at this institute elucidate the the geomorphological structure of the city in detail (Figure 52). The initial study which became a reference for the research series was conducted by Ernest Chaput and İbrahim Hakkı Akyol in 1930. The focus of the study is set on the observation and remarks on the circulation and utilization of the water in the environs of Ankara. Influenced by Chaput and Akyol's study, Wilhelm Salomon Calvi elaborated on the hydrological qualities of Ankara in his work that he conducted on 1936. Calvi roughly introduced the geomorphological quality of Ankara, and highlighted the significance of a systematical study on the terraces formations as denominating geological and geomorphological structure of the city in his study. The research problem remarked by Calvi has been the focus of the study later conducted by Nafiz İlgüz in 1940. İlgüz systematically analyzed the geological formation of Ankara, and conceptualized the geomorphological structure of the city based on its successive terrace formations pivoting around the city.

The research series conducted in Ankara Higher Education Institute approaches to the exploration of inner calyx from the disciplinary frameworks of geological and geomorphological sciences. An alternative approach was introduced by Oğuz Erol (1973) whose perspective is developed in a combinatory manner in his study on the geomorphological outlines of Ankara. Although Erol's focus in his research is on the geological formation and geomorphological units, he establishes a relationship between geomorphological structure, climatic conditions, agricultural production, and urban infrastructure. In that sense, Erol classifies geomorphology into units, unfolds the climatic conditions that are integral to the geomorphological units, dwells on the feasible land uses in corresponding levels of units, and discusses the land use implications that are current in Ankara at the time.

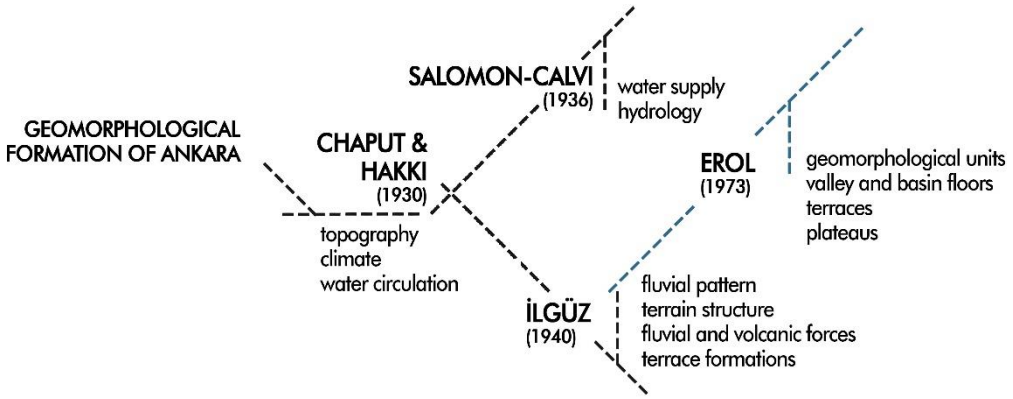


Figure 52. The precursors of scientific analysis of geomorphological structure of Ankara and the focuses of the sequential research series

The geomorphological narrative that constitute the major focus of these analyses are bi-structured: the hydrological systems unfolded in fluvial structure, the terrain systems unfolded in solid structure. Further elaborations on the geomorphological structure of Inner Calyx will be based upon such bi-structured analysis for the convenience.

4.2.3 Fluvial Pattern in the Inner Calyx

The fluvial scheme is composed in tripartite structure. Ankara Stream flowing through western opening of the plain defines the northern section of the Calyx along with Çubuk Stream as its extension towards the northeast. Çubuk Stream runs in a valley between volcaniccaly formed dacite blocks where Maldağ (910 m) and small settlement of Kalaba is located. On its direction towards north, the stream flows in a narrow and deep V-shaped valley formed as a result of fluvial erosion (İlgüz, 1940, p. 20).

Two arterial stream valleys wedge to Engürü Plain arching towards the base of the Calyx: Tabakhane Stream arcs from southeast following Hatip Valley, İncesu Stream arcs from northwest following İmrahor Valley. The nomenclature of Tabakhane Stream or Hatip Stream are used interchangeably along its route, adding Bentderesi Stream to these as approached to the settlement. The spring of Hatip Stream is located on the eastern part of village of Kızılca laid on the east of Hüseyingazi Hill. Passing through Kayaş and Mamak, Bentderesi Stream flows on the fluvially incised V-shaped valley (Hatip Valley) between the hills of Demirlenk (Timur Tepe, 1003 m) and Citadel (980 m). Bentderesi Stream later joins to Ankara Stream on the base of the calyx. İncesu Stream takes its source from Lake Eymir and follows a V-shaped valley known as İmrahor. Running on the valley between Seyrantepe (960 m) and Topraktepe (980 m), İncesu Stream reaches to the base of the calyx as it encircles the hillside of Citadel. The tributaries of İncesu and Hatip Stream are received majorly from Elmadağ. These two stream courses flowing separately on the south and east directions confluence on the plain and joins to Çubuk Stream after flowing approximately 500 meter to north.

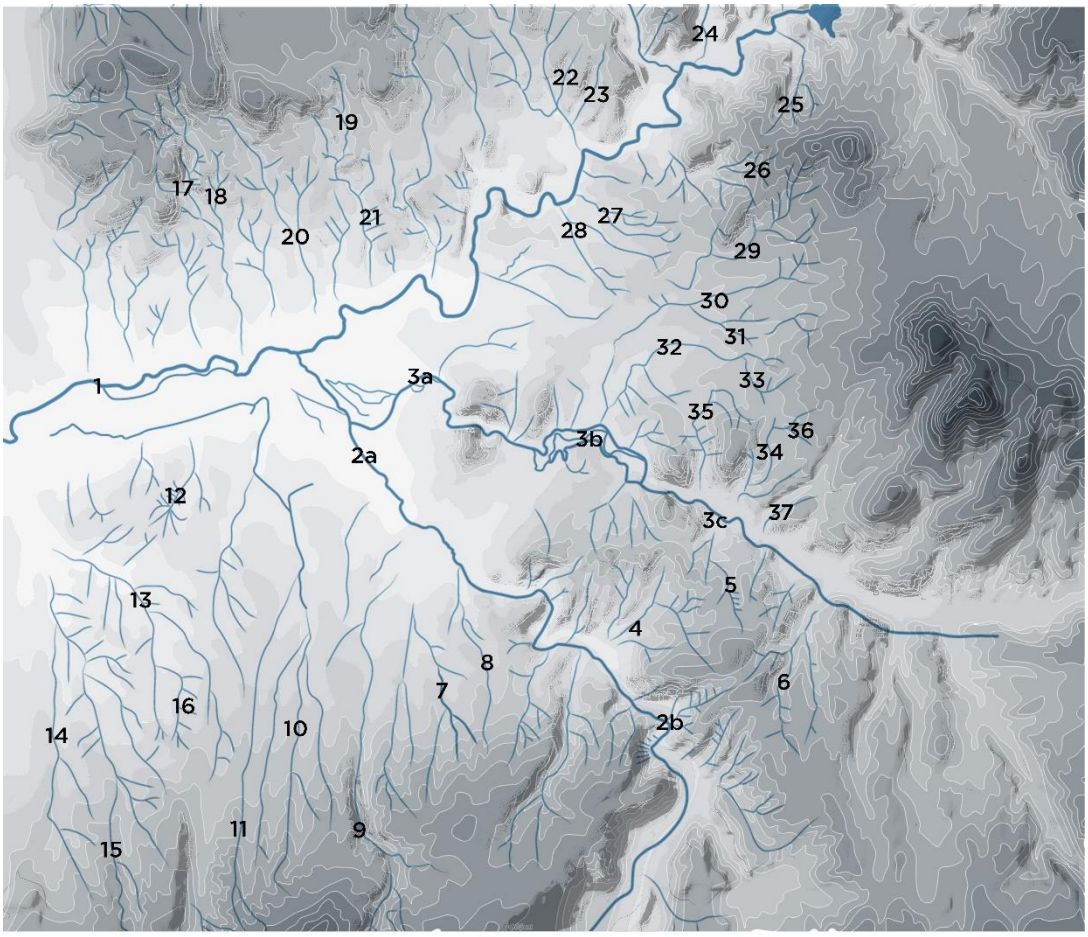
Originated at this intersection of Bentderesi, İncesu and Çubuk Streams, Ankara Stream flows all the way through Engürü Plain towards the western opening on its way to join Sakarya River. It could be schematized that Ankara and Çubuk Streams is constituted as integral parts of plain systems of Engürü and Çubuk Plain, whereas İncesu and Tabakhane Stream are integral to the valley systems of İmrahor and Hatip Valley. What seems intriguing in this frame is that the settlement of Angora is

anchored at the hilltop ditched by these fluvial systems as they intersect on the center of the Calyx. Vincke Map also depicts that fluvial courses flowing from the ridges or valleys descent along with the terrain towards the center and intersect on the base of the Calyx forming a nodality. It could be suggested that the split nature of the fluvial formation attains a unique character to the landscape of the city. It would be fair to address Mamboury (1934, p. 43) as he finds it intriguing that the city is located at the end of the basin created by Ankara Stream where three rivers are intersected (İncesu, Tabakhane, and Ankara Stream) flowing all the way through defiles and valleys to reach the Engürü Plain.

Apart from the tripartite major fluvial system underlining the base and openings of the calyx, a radial mesh of stream system corresponding to the calyx geomorphology denominates the fluvial pattern of the vicinity (Figure 53). These tributary system constitutes small stream branches springing on geomorphic localities where the elevation is higher and the land is incised due to the material structure of the terrain and the magnitude of fluvial erosion.

Densely situated inclined surfaces create a strata on the outer circles of the calyx, the geological composition of which permits high level of water absorption. This strata contains a plethora of groundwater reserve that is maintained by infiltration of rainfalls. Therefore, the inclined terrain not only indicates a stream system, but also denominates an aquifer network. The geomorphological structure, in that sense, forms a natural cistern at the peripheral environs of calyx (Chaput and Hakkı, 1930, p. 251).

The major and minor stream system on the calyx indicate that the grand geomorphology of the calyx was formed as a result of intense fluvial erosions. The dramatic differences in altitude on the course of fluvial channels is a concrete result of such geomorphological processes governed by fluvial structure. The fluctuations on the terrain create a gradually ascending scheme, which will be detailed on the following section.



1. Ankara Çubuk Çayı
2.a İncesu Deresi
2.b İmrahor Deresi
3.a Bent Deresi
3.b Hatip Çayı (Tabakhane Suyu)
3.c Mamak Deresi
4. Samanlık Deresi
5. Tuzlu Çayır Deresi
6. Davulcu Bağları Deresi
7. Kavaklı Dere
8. Küçük Esat Deresi
9. Dikmen Deresi
10. Kirazlı Dere
11. Cevizli Dere
12. Karanlık Dere
13. Kara Ova Deresi
14. Yalıncak Özü Deresi
15. Şarlak Deresi
16. Çukurambar Deresi
17. Meşe Deresi
18. Kurt İni Deresi
19. Kemikli Deresi
20. Ayvalı Deresi
21. İncirli Deresi
22. Kubbeli Dere
23. Toklu Dere
24. Gelbura Deresi
25. Kavaklı Deresi
26. Kanlı Dere
27. Ala Dere
28. Aktaş Dere
29. Karacakaya Deresi
30. Suluca Deresi
31. Köçek Deresi
32. Demirhendek Deresi
33. Bostan Deresi
34. Kakdibi Deresi
35. Harman Deresi
36. Mantarlık Deresi
37. Bağ Deresi

Figure 53. The stream system that constitute the fluvial structure of Ankara

4.2.4 Terrain Structure of the Inner Calyx

The layered formation denominates the peculiar identity of the terrain structure of calyx. These layers are arrayed in terms of tectonic processes and geological constituents in close correlation to altitude values. The unique layered landform structure of the calyx emerges as remnants of tectonic formations that are driven by fluvial forces as well as volcanic events that last on the interval of million years. The previous section dwells onto the major force that form the terrain structure and unfolds the physical components of the system. This section will take a turn on the attributes of the terrain itself that is formed by various forces.

The terrain conditions of calyx, in the end, presents a layered site, the contours of which are far fractured and incised; on the circles of an extensive calcareous strata found in Elmadağ, İdris Mountain, and Çal Mountain, drawing very near into Çankaya, the center of the city[8] (Chaput and Hakkı, 1930, p. 245).

The lowest layer of the incised and fractured strata is laid on the depression surrounding the Ankara Stream. The eastern part of the depression presents a closed form, whereas the western part of the lowest level resembles to “a depression ditch”. Distinctively cascaded terrace formations (Figure 54) ascend from the base of the depression. The lowest terrace has 20 meter or 30 meter altitude from the stream. A second terrace is found in the 50 meter or 70 meter altitude. The third and the most distinctive terrace formation is observed approximately in 100 meter altitude. (Salomon-Calvi, 1936, p. 10).

[8] At that point, the visualization of Vincke is provided with an elaborated background based on geomorphological formations.

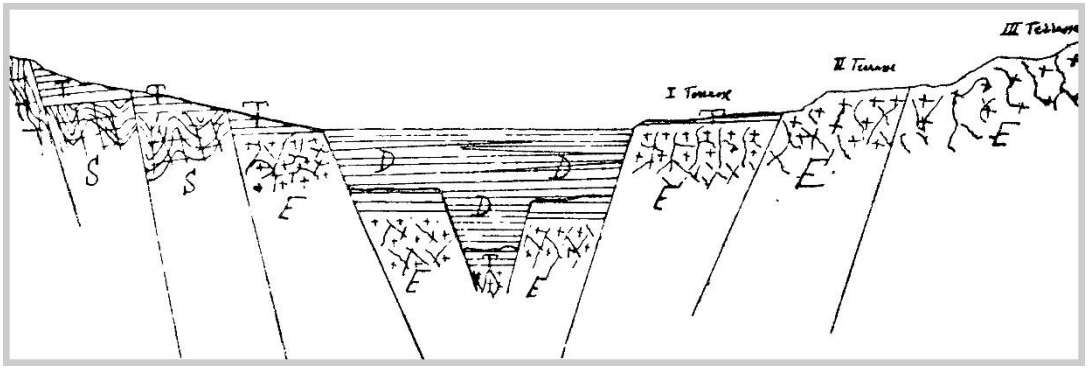


Figure 54. The cascaded terrace formation and its geological constituents. In this scheme; S: old cobblestone (*eski yassı taşlar*); E: Eruptive stones, andesite, dacite (*indifai taşlar, ankarataşı*); T: Tertiary stones; D: Diluvium and alluvium (*tufan çöküntüleri*), the left denotes the north while the right denotes the south (Salomon-Calvi, 1937)

The cascaded terrace formations as spatial references to the layered geomorphological structure of calyx has been the corpus of the research conducted by İlgüz. He emphasized the significance of geomorphological investigations in the rapidly urbanizing cities, such as Ankara considering the critical turn occurred at the time. Furthermore, he stated that cascaded terrace formations surrounding the large planes form distinctive and unique landform patterns as the common geomorphological characteristic of central Anatolia in a broader scale. He problematizes his concise analysis on Ankara vicinity as a part of this bigger picture.

The area of İlgüz's investigation is delimited on the northern parts of Etlik, Keçiören, Solfasol, on the eastern part of Mamak, on the southern parts of İmrahor, Çankaya, on the western parts of Yalıncak and Macunköy. His frame of reference also defines the limits of Inner Calyx. The terrace formations in his analysis are divided into three categories as south, east, and north in relation with their location. In each category, the terrace formations are grouped according to the formation processes, whether incised by the streams, or volcanically formed[9].

In that sense, the fluvial structure's force in shaping the geomorphological space elaborated in the Chapter 1 gains a concrete meaning in the work of İlgüz. The spatial

[9] Although divided into two groups for a degree of clarity, İlgüz noted that fluvial structure and changes in the fluvial structure are effected by tectonic movements.

representation of terraces drawn by İlgüz as a rough sketch is reproduced on the topographical base map in the scope of this section, so that the interplay of terrain structure and the geomorphological formations pinpointed by İlgüz could be established explicitly (Figure 55).

The southern terraces are laid starting from the western hillsides of İmrahor valley extending towards the İstanbul pass nearby the cement plant located on the western part of the calyx. The terrain is shaped by six cascaded terraces on the southern part; the lowest four (1, 2, 3, 4) terraces are formed by fluvial incisions, whereas the highest two terraces (5, 6) are tectonically formed. The eastern terraces are laid between Çubuk and Hatip Stream. The lowest two terraces formed parallel to Çubuk Stream are fluvially incised (1, 2), whereas the ascending four terraces (3, 4, 5, 6) are formed as a result of tectonic movements. A series of cascaded terraces are distinguished at the northern part of the vicinity. The lowest two terraces elongated parallel to Ankara Stream (1, 2), along with the fragmented terraces (3, 4) are formed as a result of fluvial forces. Gradually ascending five terraces (2, 3, 4, 5, 6) are tectonically formed, although a small portion of the lowest tectonic terrace is hardly distinguishable.

Although İlgüz's research elucidate the geomorphological structure of the city, his analysis does not reflect on how this structure forms a base for urban processes. In that sense, Erol's analysis into geomorphological units establishes the way that the attributes of geomorphological units perform as potentials and threats in the urbanization process. The land-use structure of Ankara at the time is also evaluated as a part of the analysis conducted by Erol.

As a basis, Erol lays out a spatial representation of geomorphological strata of Ankara and surrounding area (Figure 56). The map demonstrating the layered structure of geomorphological formation of Ankara, explicitly depicts the calyx geography that the city is laid out. It is also depicted that the outer calyx is linked with two other calyxes, namely Mürted Plain and Çubuk Plain, on the north. Furthermore, the role of fluvial structure in the formation of geomorphological layers, as well as calyx landform is demonstrated in this representation.

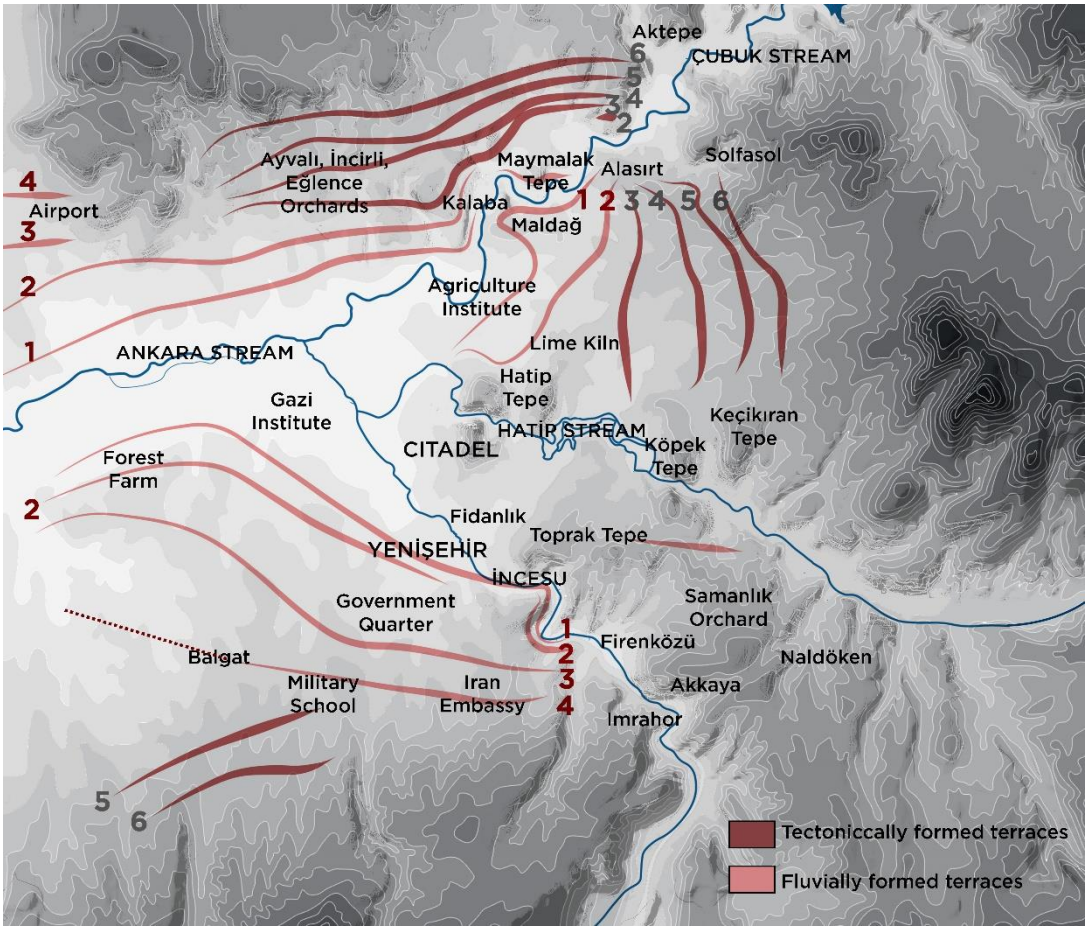


Figure 55. The reproduced map of İlgüz depicting the tectonically formed and fluvially formed cascaded terraces along with the place inscriptions belonging to 1940

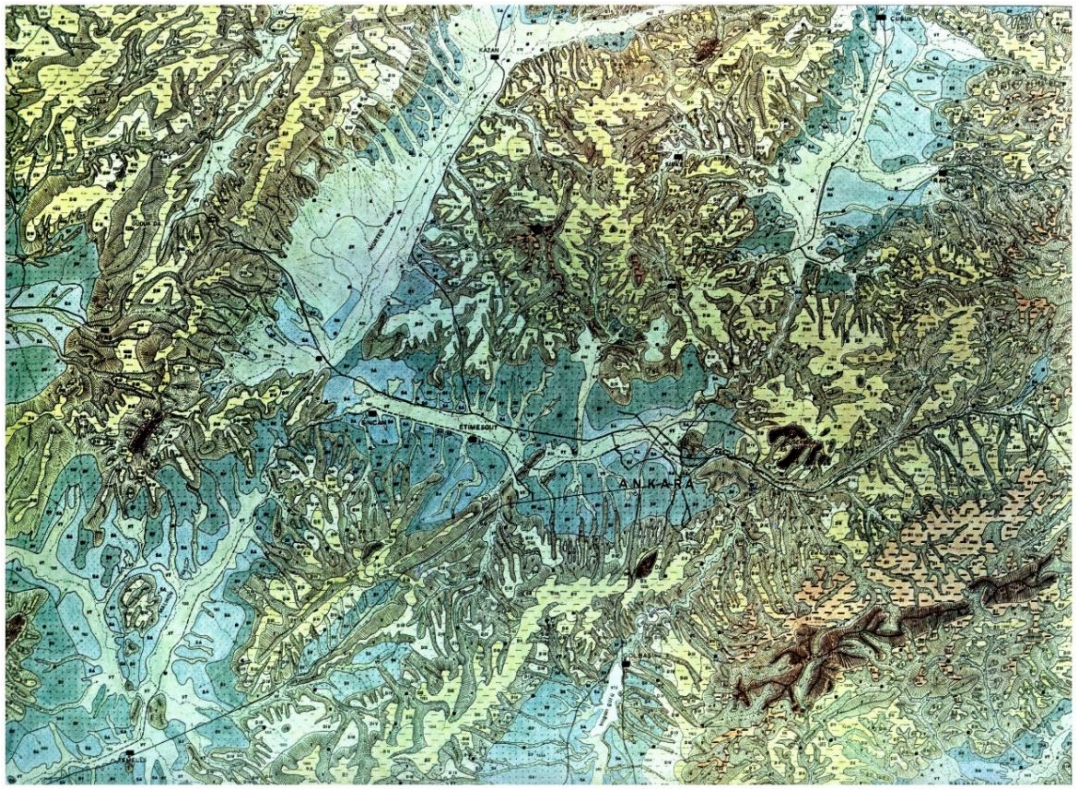


Figure 56. Geomorphological map of Ankara (Erol, 1973)

In this scheme, the bottom strata of geomorphological outline is defined as valley and basin floors. Valley floors consist of fluvial pebble, sand and clays composing alluvial flats extending on the course of fluvial structure without dissection. Basin floors are laid on the bottom of plains in a relatively widened condition. The material composition of valley and basin floors have a high water permeability, resulting in abundance in terms of groundwater.

An intermediary formation of dejection cones are laid between the lower and higher levels of geomorphological structure. Dejection cones are formed as a result of fluvial sedimentation on the debouchment of valleys where the fluvial course reaches a flat plain. The alluvial cones and fans are slightly elevated towards the valley and the elevation is lowered towards the flat surface of plain.

The geomorphological formation of cascaded terraces that were dwelled on previously are divided into two in this scheme. Lower terraces are dissected by small valleys less than 30 meters. The lower terrace systems are cascaded on the interval

between 5 to 25 meter elevations. Higher terraces, on the other hand, are frequently dissected by approximately 30-80 meter deep valleys. The higher terrace systems are cascaded on the interval between 45 to 110 meter elevations.

Groundwater level in the lower terraces is relatively lower than the valley and basin floors at this segment of the terrain. However, some water sources are formed as a result of infiltration of water into the pebbled surface. The higher terraces indicate a degree of richness for groundwater level on the flat surfaces of terraces, and on the base of dissected valleys.

The upper strata of geomorphological outlines are defined as plateaus levelled on the interval of 1000 to 1500 meter elevation. Lower plateaus are dissected by deep and steep valleys running parallel to each other that extend from mountains towards the basin floor. This formation generate narrowly elongated ridge series, the top of which are rather flat surfaces. While lower plateaus are designated as the enclosing outliners of the basin edges, middle plateaus are considered as the transitory segments between basin floor and mountainside.

Higher plateaus are formed on the flat surfaces surrounding mountainsides or on the high col areas laid between mountains. The firm geological composition of higher plateaus in the form of massive calcareous rocks results in formation of individual peaks or low cascades. Çaldağ and Naldöken Peaks located on the southern periphery of Ankara set examples to such formations. Volcanic terrain formations on the higher sections of the geomorphological structure become manifest on the segment of higher plateaus. The firm lava masses on the volcanic terrain also generate individual hills on the higher plateaus in a similar fashion with calcareous masses. Hüseyingazi Mountain and some individual hills located on the northeastern part exemplify such volcanic formations.

Due to the capacity to reserve groundwater between calcareous blocks and cracks of lava masses and higher rates of rainfall, higher plateaus contain rich amount of groundwater. The base of valley formations that dissect plateaus also contain

abundance of water centered along the valley, although the water sources are scattered on the hillsides between plateaus surfaces and valley floors.

The highest plateaus are formed of erosional plateaus surfaces that are located in close proximity to mountain summits. These formations are found only on the highest sections of Elmadağ and İdris Mountains. The level of groundwater is high due to high rainfall and snowfall rates and capacity of calcareous blocks to retain water. However, it is noted that these sources are found in close proximity and yet in scattered condition.

The terrain elevation produced by Erol (Figure 57) depicts the terraced formation of geomorphological structure. The erosional surfaces as shaped by the fluvial forces, and the depositional surfaces are depicted in this scheme.

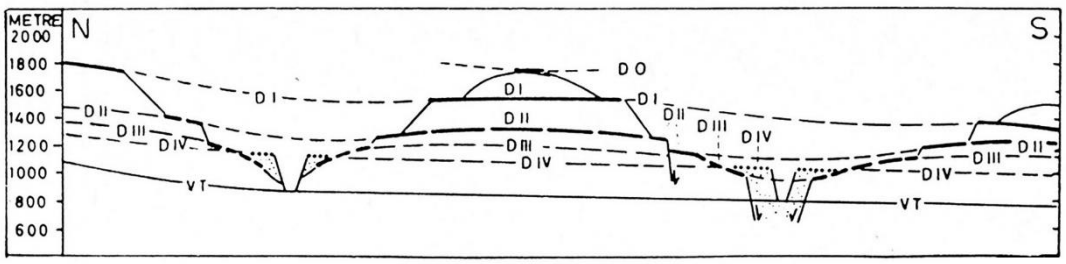


Figure 57. The diagram of erosional and depositional surfaces of Ankara (Erol, 1973)

4.2.5 The Center of the Calyx

A hilltop ensemble as concretization of geomorphological *genius loci* are laid at the center of the calyx (Figure 58). Timurtepe located on the north and the hill of Citadel located on the south forms a deep V-shaped valley as the lower parts of the terrain was eroded by the fluvial forces. Hıdırlık Tepe, as another hilltop formation becomes the eastern extension of Timurtepe.

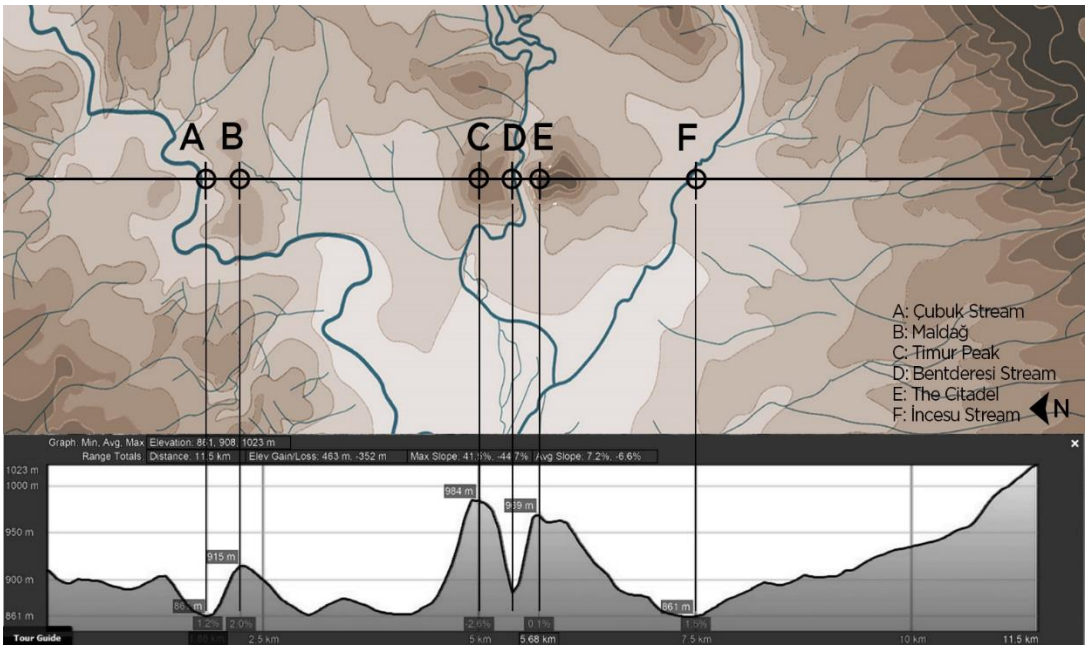


Figure 58. The elevational scheme of the eruptive hilltop formation and the at the center of the calyx and the erosional surfaces shaped by fluvial structure

The eruptive hill of The Citadel manifest a steep terrain adjacent to Bentderesi (Figure 50). The moderate profile of the terrain towards the basin floor is shaped by five cascaded terraces (İlgüz, 1940). The highest terrace (980 m) is encircled by inner city wall across the south of Timurtepe. This terrace is successively followed by another terrace (960 m) expanding on the south and west where the secondary rampart is built. An intermediary step (940) is laid on the descending terrain that interlinks the terraces above and below. Beneath this terrace, another cascade (900 m) expands on the south and east direction. Eventually, the lowest terrace (860 - 870 m) ranges between two streams, to wit, İncesu Stream on the south and Bentderesi Stream on the north. The outer city wall encircles the lowest terrace as it is also deduced from Vincke Map.

4.3 Concluding Remarks

For a deeper analysis, macro and mezzo scale context, and micro scale structure of the calyx as the geomorphological space of Ankara have been briefly dwelled on in this section. Starting with Kiepert Map, the calyx of Ankara is demonstrated as a part of Sakarya Basin on the eastern extension through Ankara stream. Maercker, Kannenberg, and Schaeffer Map, on the other hand, represents calyx of Ankara as a part of Kızılırmak Basin on the southwestern extension of the settlement

constellation. In the Arrowsmith Map, it is finally depicted that calyx of Ankara forms a node between Sakarya and Kızılırmak Basins. The Map that I prepared demonstrates the stream system and settlement patterns laid in calyxes. A geomorphological formation of a "calyx region" is also apparent with the agglomeration of Mürted, Çubuk, Gölbaşı calyxes, consolidating the nodal position of calyx of Ankara.

In mezzo scale, the cross-sectional analysis depicts the synclinal of calyx, the depositional terrain and enclosing properties of tectonic formations. As mentioned earlier, the calyx of Ankara is subdivided diagonally by range of hills as Inner Calyx and Outer Calyx. These two calyxes opens to one another and gains longitudinal direction via Istanbul pass/İstanbul Boğazı. The deposition of Ankara Stream creates this pass. The enclosing property of the range and the pass is evident on the maps.

A detailed analysis on the fluvial and terrain structure in micro scale could be conducted through a series of works as the earliest scientific analyses of geomorphological structure after the republic was founded. In terms of fluvial structure, three trunk streams on the lower course and more than thirty tributaries on the upper course could be found. The tributaries function as to feed the trunk streams on the valley floors as well as the basin.

In terms of terrain structure, it is observed that the calyx of Ankara is formed as cascaded terraces as the remnant of fluvial and tectonic events. The lower terraces are fluvially formed whereas the higher terraces are tectonically formed by surrounding mountains.

The center of calyx gains a unique characteristic with the presence of eruptive hilltop ensemble and erosional surfaces as natural ditches on the environs which could be seen from the cross-sectional analysis. One of these hilltops becomes an anchor for urban formation

CHAPTER 5

URBAN FORMATION PROCESS OF ANKARA IN GEOMORPHOLOGICAL SPACE OF CALYX

The territorial enclave located in the core of the grand peninsula identified as Central Anatolia is spatially composed of a series of settlements that are formed where the geomorphological conditions are found advantageous. On the one hand, the lower levels of the terrain ensured the geomorphological suitability for accessibility, on the other, the higher levels of terrain provided strategic sites for military defense and more suitable climatic characteristics that enhances agricultural production and living conditions.

5.1 The Settlement Anchored in the Calyx: Angora

The Crossroad Function

The lower levels of this territorial enclave has become a locus for historical routes on the course of which the settlement formation is favored. The valley and basin floors established a geomorphological basis for the network of historic routes. The geomorphological configuration of paths and passages has structured the basis of historical itineraries as well as the settlement mesh laid upon it. Especially, major caravan routes interconnecting the west to the east trespassing the northern and southern peripheries of Central Anatolia within the grand peninsula had thrived the settlement system laid nearby. Furthermore, the facilities provided in these settlements had maintained the vitality of the historic routes. In that, crossroad condition provided a strategical significance for commercial and the political events.

Although the center of gravity of major routes had shifted to the Aegean Coast in the period of the ancient Greece, or to the Bosporus in the Hellenistic Era, the routes that passes Central Anatolia persisted their significance to a certain degree (Akçura, 1971, p. 11). It could be deduced from the reciprocal relationship of transportation routes and settlement formation that one of the major parameters of urban formation in the history is the crossroad condition structured by the geomorphological configuration. Within this framework, the geomorphological context of Ankara could be interpreted as a manifestation of a crossroad geography.

One of the ancient routes of the Central Anatolia navigate through Beypazarı and Polatlı directions on the west and through the course of Delice Stream on the east on their way to Kayseri. This route had become the major itinerary of The Royal Road which interconnects the Aegean Sea to the Indian Ocean trespassing the Anatolia. (Figure 59). Therefore, the geographical character of Ankara as a crossroad dates back as early as the laying out of The Royal Road as a major trade route under the tutelage of Persian Empire (5th Century BC). The radiating extensions of The Royal Road consolidating the crossroad function lead in two directions on the north: one of them follows the path through Gangra (Çankırı), and the other passes through the ancient city of Flaviopolis. The route to Amasya on the northeast, and the route to Konya passing the Çaltepe mound on the south could be added to these extensions (Akçura, 1971, p. 11).

The Eruptive Hill

The eruptive hilltop ensemble on the core of the calyx is another prevailing geomorphological configuration governing the urban formation and consolidating the strategic significance of the settlement. The hilltop formation on which the Citadel is laid ensured the control over the basin as the hilltop was naturally diked by the fluvial forces ascending approximately 130 meter from ground. In that sense, the Citadel has been the locus of urbanity considering the fact that military functions was a preliminary factor for the urban formation in earlier ages. After all, The Citadel has been actively in use until the 20th century.

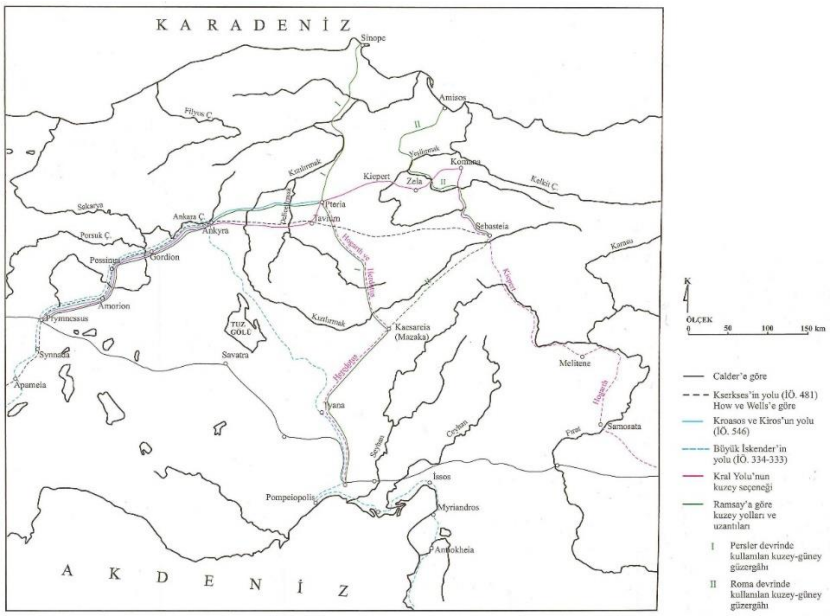


Figure 59. The route of the Royal Road and the critical location of Ankara (Aydın, et al., 2005)

The crossroad geomorphology substantiated through the valley and basin floors and the eruptive hilltop formation at the center have been the integral components of the Calyx. In fact, the long ranging spatial history of Ankara in the Calyx is based on the tension between the hilltop and the basin. The grand context of The Anatolian Peninsula played a stimulating role to create such tension. One of the identifying geographical attribute is that Anatolia functions as an intercontinental crossover. Anatolia has witnessed major migration waves oscillating between east and west. The settlement of Ankara, in that context, exceeded on the basin beyond the Citadel in the times of stability and prosperity, or withdraw into the Citadel functioning as shelter in defense position at the times of disorder (Akçura, 1971, p. 15).

The historical knowledge on the settlement formation of Ankara remains limited. Archeological evidences support the fact that the vicinity of Ankara was inhabited as early as the Paleolithic era. Some historians suggest that Hittites were the earliest inhabitants of The Citadel as it was strategically too critical to overpass. The Hittite Empire was collapsed as the Phrygians sovereignty became dominant in the Asia Minor. Unlike Hittites, there is an abundance of archeological evidence that demonstrate Phrygians, whose governing city was laid in Gordium, established

settlements on The Calyx. In fact, the ruins of Phrygian settlements have become a geomorphological unit in the form of tumuli. The series of tumuli formations are still located on the basin floor and lower terraces of the Calyx between Çankaya and Atatürk Forest Farm (Mamboury, 1934, p. 61).

The routes that navigate through Central Anatolia were actively operated as the northern extension for expanding imperial control of Persians as well as the eastern extension for Hellenistic Empire. The crossroad function of The Calyx had been persisted whether the sovereign civilizations had kept control, or they had been overthrown by the invasions. The strategical vitality of Ankara was perpetuated as Alexander the Great conquered Anatolia and encamped in Gordium on his military expedition to İran.

5.2 The Roman Period – The Tension between The Citadel and the Basin

The eruptive hill at the center of The Calyx was consolidated as the locus of urban formation in the era of Galatians when Ankara, which was then known as Ancyra, was set as the capital city. The *bouleuterion*, *gymnasium*, and *odeon* structures laid over the city are interpreted as major evidences to the autonomous character of Ankara. Furthermore, the crossroad function interconnecting far-distant geographies led to formation of cosmopolitan social structure in the city become evident in Galatian era (Aydın et al., 2005, pp. 83-84). The overly fractured and disjointed political structure of Anatolia and the instability caused by invasions reinforced the military position of The Citadel until the Roman period.

The annexation of Galatia within the imperial boundaries of Roman Empire had been a beginning of a prosperous era. On the one hand, the spatial organization of Ankara represented ideals of Roman imperial system within the Anatolia, on the other, it is designated as a governing center procuring the unity in the peninsula. The spatial means to establish Ankara as a Roman city with central functions necessitated the integration of the city within the grand Roman road system. The crossroad function of the calyx had been reiterated and concretized with the provided infrastructure, acknowledged as advanced in the era. The settlement also developed central role of

governing, military, and commercial activities as the cause and effect of the crossroad function.

The Roman road system hierarchically radiates towards the Roman settlements in two levels. The first level covers the settlements located in close-range on the natural route of valleys such as Iuliopolis (Çayırhan), Krateia/Flaviopolis (Gerede), Gangra (Çankırı), Tavium (Büyüknefes), Parnassos (Kaman), ve Pessinus (Ballıhisar). The second level covers the transnational connections at the time such as Nikaea (İznik), Nikomedia (İzmit), Byzantion/Konstantinopolis (İstanbul) on the northwest, Herakleia Pontika (Ereğli), Amisus (Sinop and Samsun) on the north, Sebasteia (Amasya and Sivas) on the east, Kaesareia (Kayseri), Arkhelais Kolonia (Aksaray), Tyana (Kemerhisar) and Cilicia passes on the southeast, Ikonium (Konya) on the south, Sagalassos and Attaleia (Antalya) on the southwest, Ephesos (Efes), Smyrna (İzmir), Pergamum (Bergama) on the west (Aydın et al., 2005, p. 97). It is clear in this scheme that the Calyx forms a strategic focality where the radial extensions of ancient Roman settlements towards the Central Anatolia within and across provincial boundaries intersect (Figure 60).

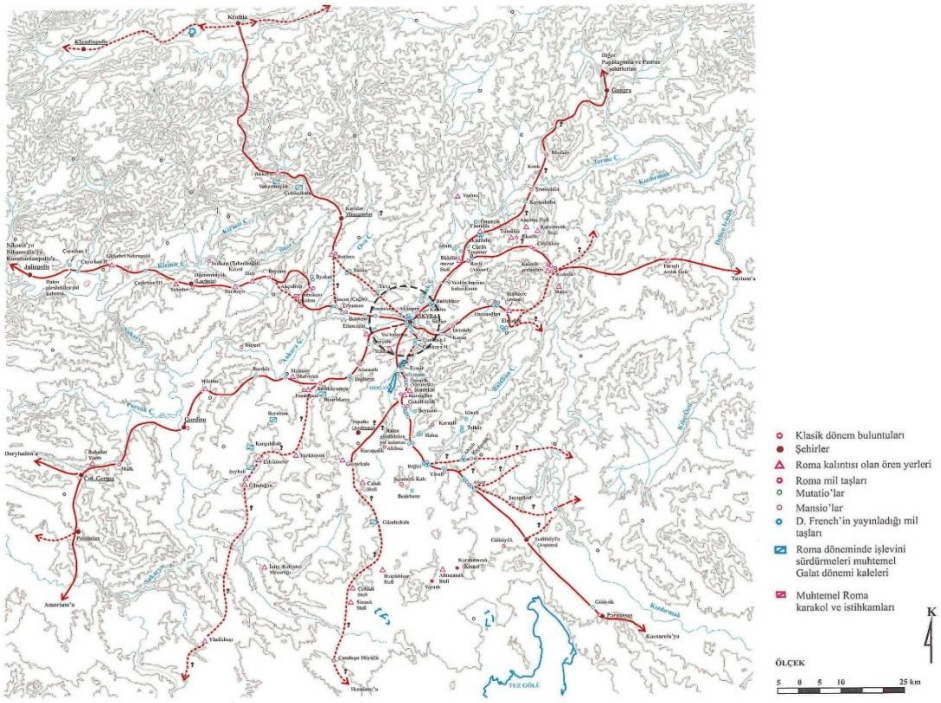


Figure 60. The Roman Road system and the nodal position of Ankara (Aydın, et al., 2005)

The urban structures and the spatial organization of Ancyra also reflect the governing role of the settlement as a Roman hub in the Anatolian peninsula. Unlike Galatian Ancyra safeguarded on the top of the Citadel inside the city walls, the Roman Ancyra gravitated towards the basin. Therefore, the tension between the hilltop and the basin becomes evident in the urban formation. The settlement layout indicate a northwestern axiality where the civic structures were aligned (Figure 61). In that, the archeological evidence suggests that the city was pivoted around the hilltop of acropolis where The Temple of Augustus was located.

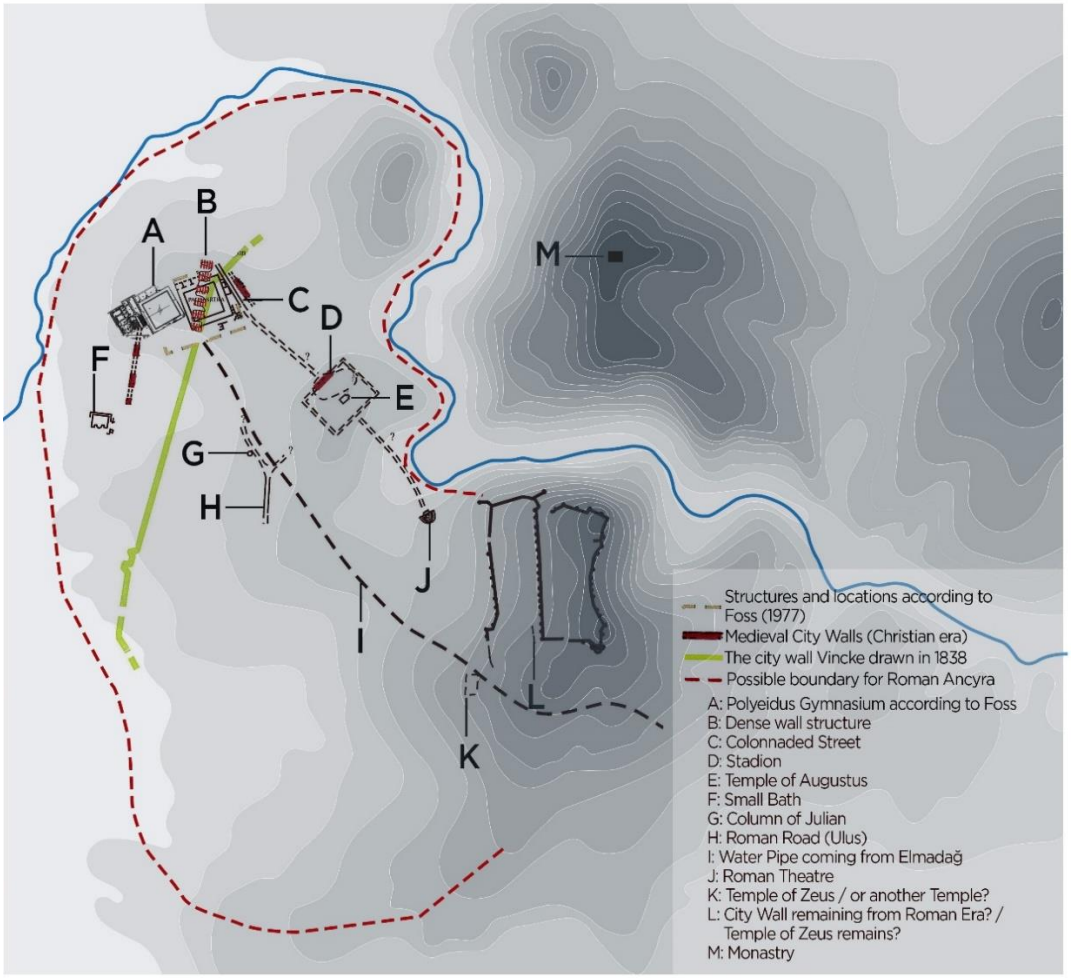


Figure 61. Roman Ancyra settlement layout (reproduced from Aydın, et al., 2005)

The Roman Theatre, located on the southeastern end of the axis, was integrated with the Hatip Valley. The orientation of the theatre was possibly based on the climatic advantage of the valley in the hot and arid seasons of the year (Bayburtluoğlu, as cited in Aydın et al., 2005, p. 90). The situating of the theatre is well-integrated to terrain in relation with the topographical condition. It was also claimed that there is an organic relationship between the theatre and the Bentderesi Stream (Tamur, 2012). Such argument was based on the remains of the antique pools situated on both sides of the stage, which were considered to be utilized during the water-related festivities.

The Roman Bath, located on the northwestern end of the axis was an edge for the settlement as down north was marshland. This building complex provides valuable information considering the civic life and social apprehension of the environment in the Roman world. More strikingly, the articulation of the territorial infrastructure system to operate the Roman Bath demonstrate how the urban formation was unfolded within the geomorphological context of the Calyx (Figure 62).

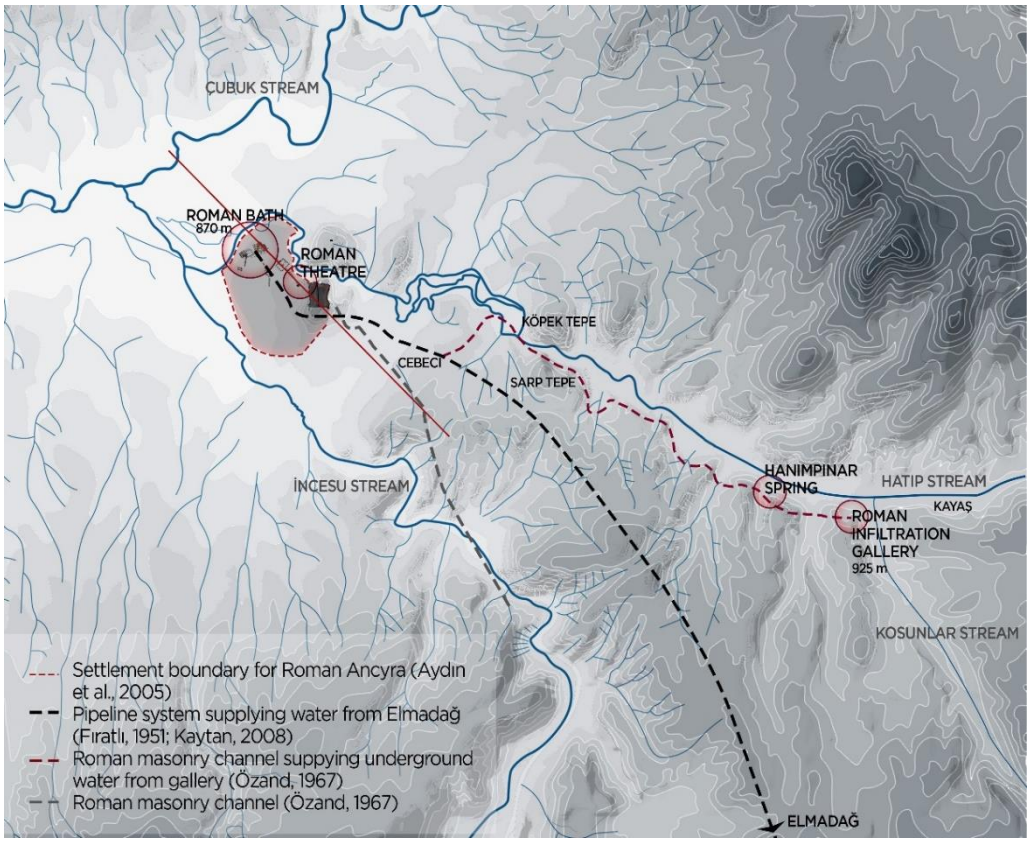


Figure 62. Roman Ancyra and water supply system in the calyx setting

The utility of the surrounding streams of İncesu, Hatip Stream and Çubuk Stream for water supply to the settlement and to the Roman Bath was very negligible. This was due to first; the poor quality in the surface waters, and second; the technical problem of transmitting water to higher altitudes as the settlement was laid on the hilltop. (Hodge, as cited in Kaytan, 2008, p. 11). Additionally, the water supply to run the large scale bath complexes was generally allocated through aqueducts taking their source from springs instead of wells or cisterns (Kaytan, 2008, p. 11).

At this end, it is safe to argue the two partite structure of the water supply system in guidance of the archeological findings. On the one hand, the pipeline system bringing water from the springs of Elmadağ constitute the major source for water supply system. The geomorphological and climatic attributes of Elmadağ corroborates the water supply scheme. As stated by Kaytan (2008, p. 12);

> "The most possible place for water supply seems to be Elmadağ due to a couple of reasons. Firstly, Elmadağ is rich in a reliable quantity of water sources in the form of groundwater, springs, and surface streams. Because of its high but not so steep structure, Elmadağ is the most important one among the high mountains around Ankara as far as the underground water potential is concerned (Özand 1967, p. 29). As Elmadağ receives more precipitation in the form of snow than Ankara, most of the melting snow on the slopes seeps down to the ground through the cracked formation and contributes to the long groundwater flows (Calvi 1936, p.18). Secondly, its altitude is higher than the city to provide enough level and as important as this, it is the closest one among the aforementioned mountains to the city."

The archeological remains demonstrate that the tracks of the pipeline system constituted soft limestone and terra-cotta pipes in some parts. The aqueduct system was originated at Elmapınarı (at the northern side of the Elmadağ) and proceeded towards Naldöken Tepe, Samanlık Yards, Balkeriz Yards, and Cebeci (Fıratlı, as cited in Kaytan, 2008, p. 36). Following this route, the collected water was distributed to the higher sections of the settlement as well as the Roman Bath.

On the other hand, the Roman water infiltration gallery situated in Kayaş constitute an alternative source for water supply system (Chaput and Hakkı, 1930; Fıratlı, 1951; Kaytan, 2008). The infiltration gallery was designed to collect underground water from Kayaş Valley (a segment of Hatip Valley) and Kosunlar Valley. The gallery

was located at 925 meter altitude in the form of a tunnel which was 25-30 meter wide sunken 7-8 meter below the ground level. In addition, Hanımpınar Spring, located approximately 2-3 kilometer away on the east of the infiltration gallery, was also utilized as a water source on the Kayaş Valley.

The inclined terrain structure of the valley was utilized to transmit collected water through an underground pipeline. This 10 kilometer long masonry channel follows the natural course of the valley starting from the infiltration gallery and passing by Hanımpınar Spring. This channel is considered to supply water for the lower parts of the city as a complementary to Elmadağ channel. Moreover, it is noted that the water required to operate the Roman Bath was compensated from infiltration gallery along with Hanımpınarı Spring. The rationale behind this was based on the elevation differences as well as the natural path of the valley that leads to the Roman Bath establishing a suitable ground for setting up the masonry channel (Özand, as cited in Kaytan, 2008, p. 42).

5.3 The Ottoman Period - Retreat to the Citadel

The crossroad function of Ankara persisted in Seljukid and Ottoman era interlinking the coast sides to inner Anatolia, the Black Sea to the Mediterranean Sea, and the Balkans to the Mesopotamia. The sovereignty over this crossroad city was closely correlated with the sovereignty over Anatolian peninsula. This fact played a critical part in the Battle of Ankara when Tamerlane acted to conquer politically disintegrated Anatolia (Aydın et al., 2005, p. 145).

The crossroad geography did not only facilitate for military strategy, but also served as a node for passengers who were immersed in commercial activities as well as external affairs. The recordings of these passengers provide a basis to discuss the spatial organization of Ankara encompassing the period between 16th to 19th centuries under the Ottoman hegemony.

The spatial structure of the core and the periphery of the settlement display distinctive characteristics. Similar with the previous periods, the settlement was pivoted around the core of the Calyx, the Citadel, yet with an eastern extension added in this era. The core of the city was comprised of two different zones within the city walls as the

Lower Town and the Upper Town (Aydın et al. 2005, p. 150). The Upper Town was developed inside the inner walls of the Citadel and the close vicinity. The recordings of German voyager Dernschwam indicates that the Upper Town consisted of a bazaar (Mahmut Paşa Bedesteni), an Armenian church, a mosque (Alaeddin Camii), a Muslim cemetery, and surrounding walls. The urban fabric of inside of the Citadel was formed of mud-brick dwellings composing narrow and partly unpaved streets.

The Lower Town, on the other hand, encompasses the neighborhoods laid between the inner and the outer city walls. Some significant structures that this part of the city consisted of are Julian Column, Temple of Augustus, Hacı Bayram Mosque, and a Greek church. The Lower Town is delimited by naturally created threshold of the valley on the north, and outer city walls on the south. Although the Lower Town is enframed by the stream valley and the wall, it is connected to the adjacent hilltop through a number of bridges. Amongst these, a narrow platform with three towers made up of big stones which was assumed to be a Roman dam on the stream enables for the major transition between two hills (Yüksek, 1953, pp. 254-55).

The city that extended beyond the hill in Roman era retreated towards the Citadel (Figure 63). The transformation of an area outside the city walls where dwellings were laid in earlier periods to a cemetery field supports this view (Toruk, 2008, p. 239). The withdrawal to the Citadel could be deduced from the fact that the Roman Bath and other Roman ruins were left outside of the outer city walls in the records of 1839 (Texier, as cited in Sülüner, 2014, p. 17).

Although its defensive function retained dominant during political destabilizations, Ankara persisted to be a node of commerce and production based on craftsmanship in the Ottoman era. Urban fabric and activities were shaped as a result of the spatial requirement of this economic structuring (Akçura, 1971, p. 18). Urban formation revolved around three focal market places, to wit, *Atpazarı*, *Koyunpazarı*, and *Samanpazarı* located on the southern hill of the Citadel. Some other market places were located on different axes that lead from Samanpazarı to the Citadel.

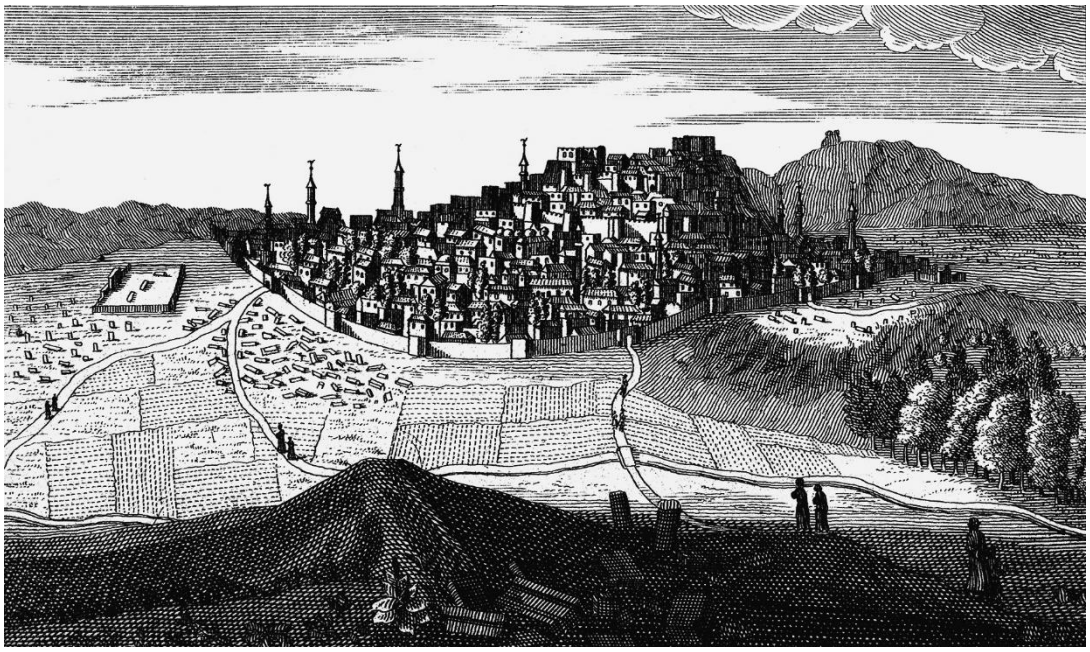


Figure 63. Engraving of Ankara by Joseph Pitton de Tournefort, 1690s (Aydın et al., 2005)

Shoe sellers, coppersmiths, ironsmiths were respectively located on these axes from east to west. Leather workmanship, on the other hand, was located on the hill, traditionally called as *Tabakhane*, adjacent to the meander of Bentderesi Stream at the north of the Citadel. Tabakhane Stream was also integrated in the mohair production processes. The allocation of leather and mohair warehouses along the Bentderesi Stream was intentional as the stream water of Bentderesi was integral to the manufacturing processes.

5.3.1 Valley Floors and Fluvial System: Downstream and Upstream Orientation

While the urban formation was concentrated on the hilltop of the Citadel, the valley floors were reserved for agricultural production. A series of gardens were located on the axis of the Hatip Stream. The meandering part of the stream on the east of the settlement was allocated for some of these gardens, one of them known as *Demirli Bahçe*. The northwestern part of the Citadel called as *Kazıkiçi Bostanları*, where the canyonic valley opens into the basin with a secondary meander, constituted large proportion of agricultural fields around the city.

The streams were not only integral to the agricultural or artisanal production processes, but also they served as a locus for social events. These divergent activities were allocated on different segments of the stream axes implied as “upstream” and “downstream”. This duality is indeed a spatial conceptualization based on the flow direction of stream water, and a spatial differentiation based on the degree of sanitation. The concepts of upstream and downstream also facilitate for orientation in space (Figure 64).

The spring, in that sense, indicates purity, hence the flow coming from the spring is addressed as upstream. In that case, considering the fact that Hatip Stream flows from east to west and İncesu Stream flows from south to north, the east and the south indicated upstream; whereas the north indicated downstream. Parallel to that, the upstream was appropriated for social gatherings since the downstream became soiled as being integrated to formerly mentioned artisanal production processes.

Among the social gatherings that took place on the upstream, the laundry work was far more associated with the purity and sanitation. The riverbanks of İncesu Stream in close-range to *Fidanlık* on the south of the Citadel were appreciated as a place for collective activity of laundering. In addition to that, the canyonic part of the Hatip Valley on the northwest served for this purpose as remaining intact by artisanal workshops until Tabakhane Mosque (Aydın et al, 2005, p. 281). Furthermore, the upstream of Hatip Valley was a place for ablution for the children, as well as a place to ablute the beasts of burden. Some seasonal or annual rituals, such as the coming of spring, also took place on the banks of Hatip Stream. Moreover, the gardens and orchards located in the axis of Hatip Stream facilitated for picnics and daily walks outside the Citadel.

The industrial activities within which the stream water was utilized as infrastructure were acknowledged as a source of contamination and impurity on the fluvial course. The locations of such activities informs about the direction of downstream. In that, the western segment of Hatip Valley on the north of the Citadel was allocated for leather workmanship and mohair fabrication. The environs of İncesu Stream surrounding the Citadel on the west reaching Akköprü on the north was covered by

marshlands, evidently creating a threshold since the Roman Ancyra. The place on the environs of Akköprü, where İncesu Stream merged with Hatip Stream, was allocated for abattoir. As a result, the northern course of the İncesu Stream and the western course of the Hatip Stream indicated downstream where social gatherings were negated.

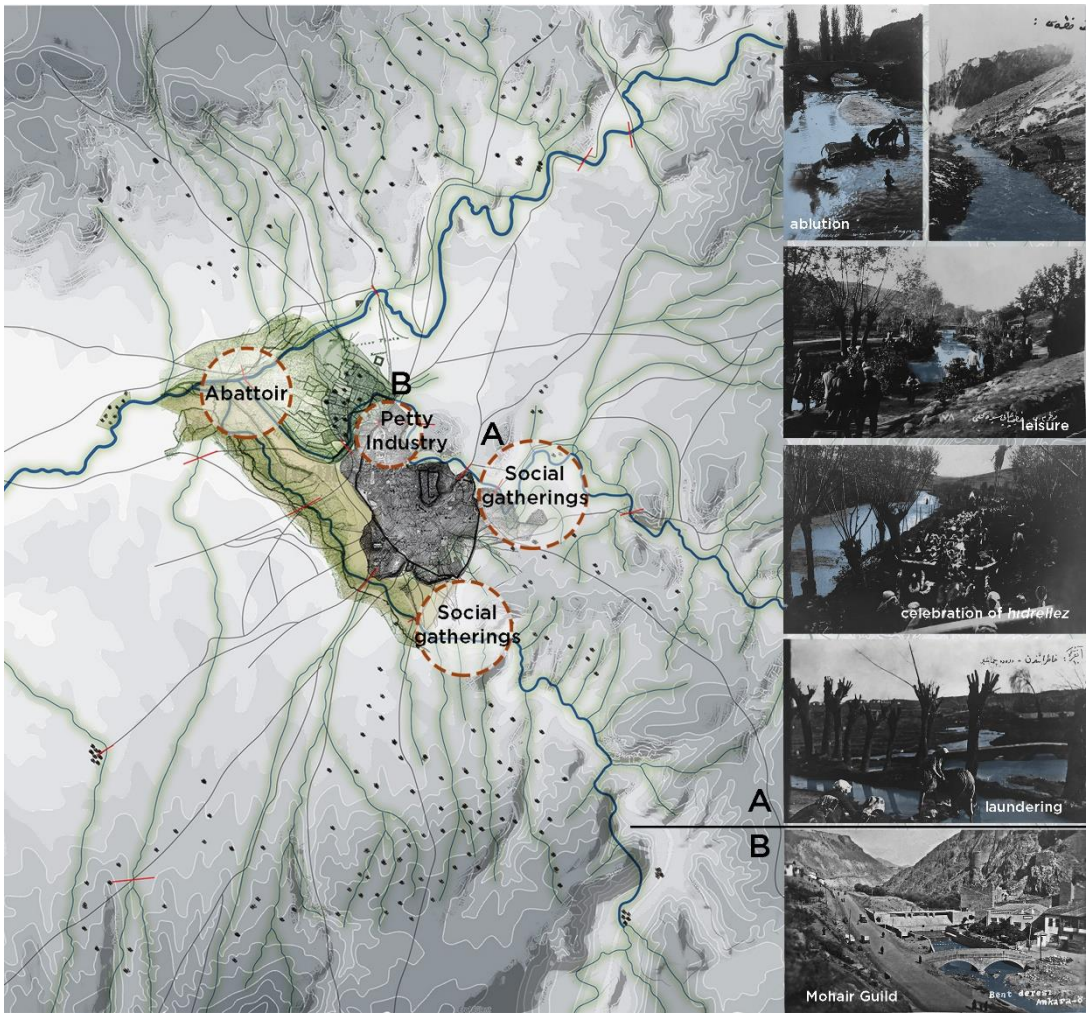


Figure 64. Upstream and downstream orientation in the urban activities based on the flow direction of fluvial system

5.3.2 Terraces: Rhythmic Orientation and Identification

As it was elaborated in the previous Chapter, the periphery of the Calyx is composed of a terraced terrain formation higher in altitude in an ascending order. Indeed, the Calyx is formed through the inclined surfaces of terraces encircling the basin. As the major characteristic, the terraces do not present a gentle surface, on the contrary, a highly irregular surface structure is present due to the forces that shape the terrain; aquifers and tributeries as the feeders of the main stream sources on the basin. In close correlation with that, the terraces are exposed to cold summer winds that create cool microclimatic zones. This unique geomorphological structure[10] and the climatic attributes of terraces formed a basis for *vineyard* ecology generating a distinctive spatial organization (Figure 65).

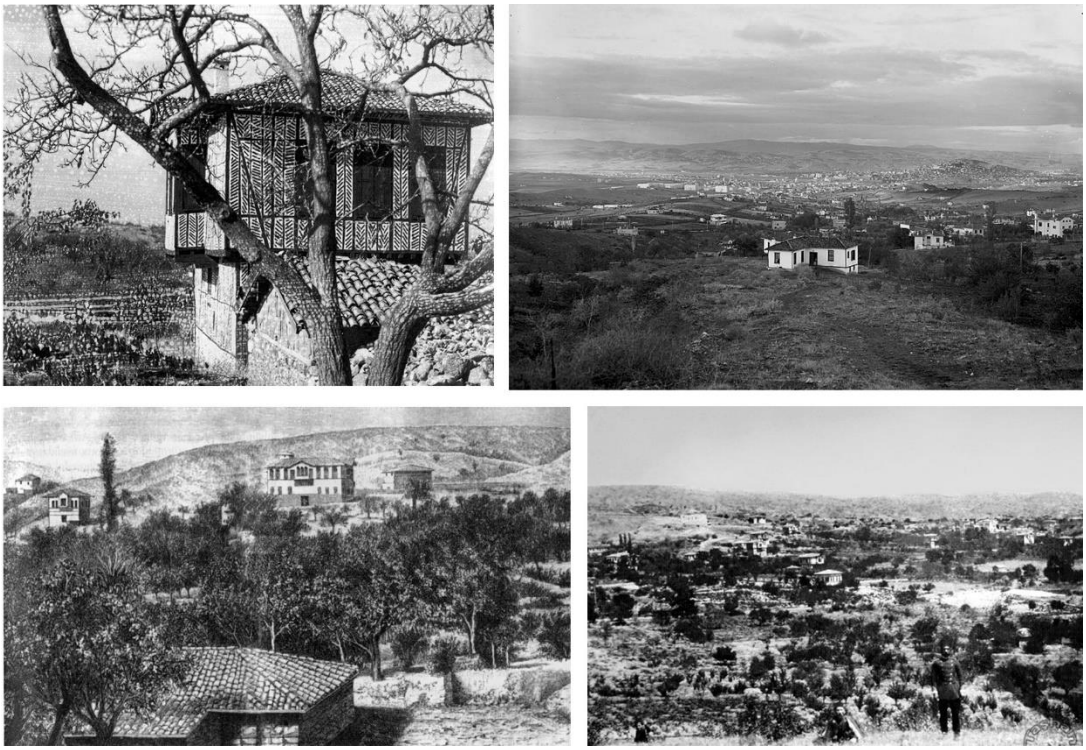


Figure 65. Selected photographs reflect the distinctive spatial quality of vineyard houses and settlements (Günay, personal archive)

[10] It should be noted that the soil structure is equally significant in order to facilitate for vineyard ecology. In that, the calcerous strata of Ankara establishes a convenient ground for such *vineyard* formations.

As a mode of agricultural production and a generator of spatial organization, the roots of *Vineyard* culture in the environs of Ankara dates back to 10th century BC (Toygar and Toygar, 2005). Although the information on whereabouts of *vineyard* areas is highly limited before the Ottoman era, the archeological excavation of *Etiyokuşu*[11] introduced prior evidences of vineyard houses dated back to Roman era. A villa with large compartments unearthed on a hill facing Çubuk Stream points to a *vineyard* environment around the vicinity dated back to 3rd century AD. The governor of the Roman Ancyra, Maximus, and his preacher associate Libanius were also accounted to dwell in a vineyard district outside the Citadel in the times of prosperity (Aydın et al, 2005, p. 96).

The journals of whom visited Ankara in the Otoman era informs about the vineyard localities situated outside the outer city walls in the northern and southern terraces (Lennep, 1864, p. 53). The earliest representation depicting the scale and the location of vineyard settlement was produced by von Vincke. The scheme demonstrates the northern and southern terraces as covered by vineyard dwellings (see Figure 50). Further to that, the number of orchards was noted as 297, and the total number of vineyards and gardens was noted as 9655 in the official sources at the end of the 19th century (Ankara Vilayet Salnamesi, 1900).

The vineyard localities were clustered in groups on the northwest, northeast, east, south, and southeast directions (Figure 66). In that scheme;

- Kurtini, İğnelidere, Ayvalı and Etlik (Aşağı ve Yukarı Eğlence) Bağları constituted the northwestern cluster
- İncirli, Ayvalık, Keçiören, Aktepe, Hacıkadın, Kalaba Bağları constituted the northeastern cluster along with Mecidiye and Solfasol Bağları as the eastern segment located on the basin of Çubuk Stream
- Karacakaya Bağları constituted a small unit on the foothill of the Hüseyingazi Mountain

[11] Etiyokuşu excavation was conducted between Kalaba and Solfasol with a distance of 5 km from the city center.

- Samanlık and Balkeriz Bağları constituted the eastern cluster inbetween the İncesu Stream and Hatip Stream
- Frenközü, Seyran, Esat, Kavaklıdere, Bülbülderesi, Çankaya, and Ayrancı Bağları constituted the southern cluster
- Dikmen, Araplar Deresi, Cevizlidere, Övezlik, Yukarı ve Aşağı Öveç, Balgat Çaltaklı, and Söğütözü Bağları formed the southwestern cluster.

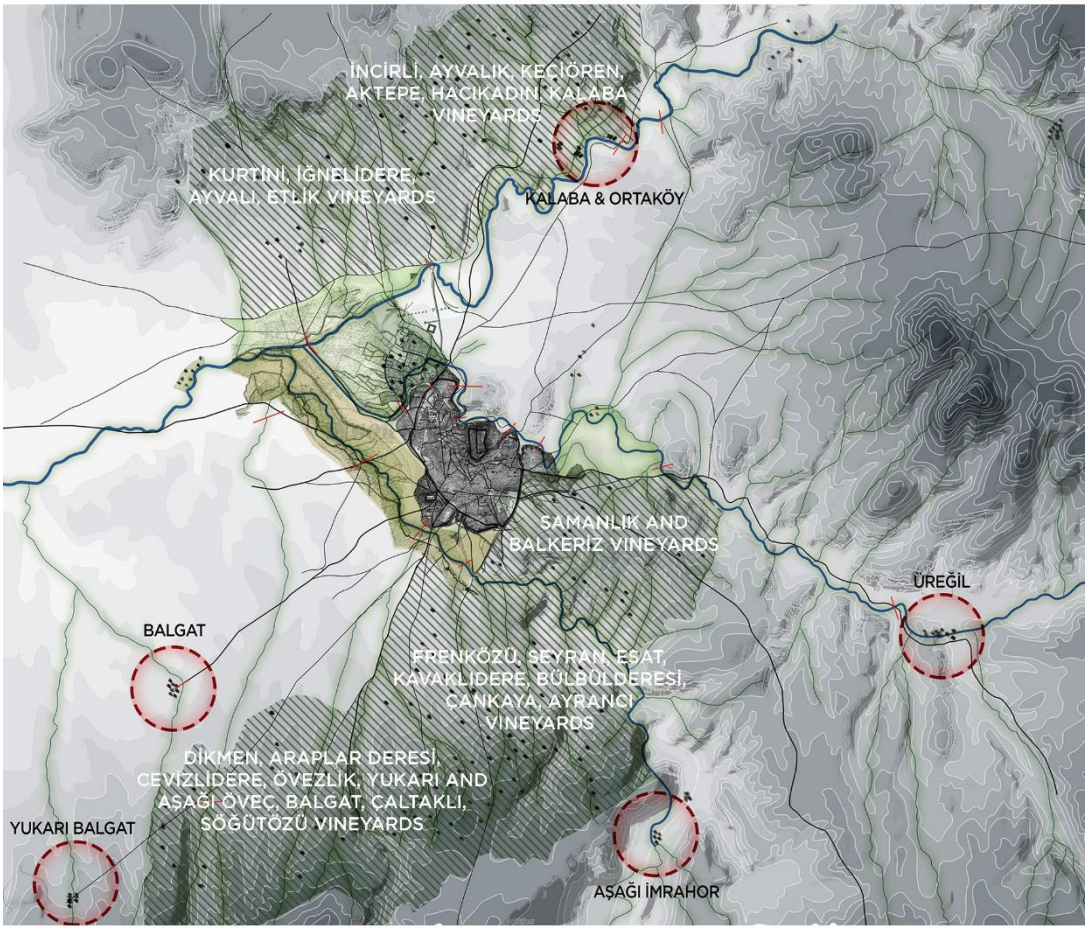


Figure 66. The vineyard clusters on the lower and higher terraces pivoted around the Citadel and outlying settlements on the extension of terraces

Although vineyard clusters were situated outside the city walls on the terraces surrounding the settlement, they constituted the complementary segment of the city. The close correlation of the city and the vineyard clusters were dependent on seasonal cycles based on the sowing and the vintage time. The first cycle to move into vineyard houses used to start with the coming of spring at the end of february. The first days

of spring used to indicate the time for maintanence of vineyard houses, as well as plantation and sowing of vineyard fields. Since most of the vineyard houses were owned by the urban dwellers who inhabit in the Citadel, a seasonal flow of population towards the vineyard areas would be observed during the cycles. Moreover, the first cycle used to indicate the time to involve in the maintenance and plantation for seasonal workers who inhabit in the neighbouring settlements (Toygar and Toyar, 2005, pp. 87-93). Therefore, the population from the Citadel as well as the villages of close distances used to flux having the vineyard areas at the focus.

As Perrot (as cited in Toygar and Toygar, 2005, pp. 52-53) noted in 1861, vineyard houses would not be suitable to dwell in spring and summer since vineyard fields were open to direct sun rays lacking shade. Large houses of the Citadel with high ceilings would provide more convenient environment for warmer times of the year. Moreover, considering the transportation means of the time, to travel via horses or donkeys would make it even harder to commute between the Citadel and the vineyard districts on a daily basis for the local workers. Thereafter, the Citadel was preferred for spending the summer until the autumn.

The second cycle used to start with the harvesting of the crops on the time interval after the summer when vintages grow ripe, and before they mould with the first rains of autumn (Toygar and Toygar, 2005, p. 88). Therefore, this '*gazel vakti*' used to denominate the end of august as the beginning of the cycle to move into the vineyard houses during the vintage season. On the other hand, the time to move back to the Citadel used to start after the vintages and other crops were processed and stored for winter. The seasonal cycle demonstrates that the periphery of the city were not utilized solely for agricultural production, but it meant a place to dwell for the inhabitants of the Citadel at certain times times of the year.

The seasonal cycle has become a daily cycle when the carriage was introduced as a means of commute in the 19th century. The old inhabitants of the Citadel turned into permanent inhabitants of vineyard houses, reducing their dependence on the Citadel to a daily commute. This also resulted in the expansion of vineyard clusters and formation of new ones as wealthy inhabitants built vineyard houses outside the city.

The geomorphological structure of the calyx facilitated the vineyard clusters to be formed in distinct localities having north and south as the two poles of the city. This spatial fragmentation coincides with a fragmented social structure over the vineyard clusters on the periphery of the calyx, although an overly integrated social structure dominated the Citadel. Within that scheme, the vineyard houses of wealthy Greek merchants were located on the eastern and northern clusters. The upper north and the northwest were populated by wealthy Armenian mohair merchants. The southern vineyard clusters on the foothills of Çankaya (Çengikaya) were populated by Turkish and Catholic bourgeois side by side. The Jewish population, on the other hand, were the least to have a vineyard house (Toygar and Toygar, 2005, pp. 52-53).

The territoriality of ethnical groups in the vineyard clusters also resulted in the formation of an architectural typology based on ethnicity. Traditional two storey houses with timber frame became dominant on the southern clusters, whereas Armenian stonemasonry produced an alternative typology for architectural elements.

The social structure of the vineyard clusters were not only based on ethnicity, but also it depended on the economic status. The wealthier classes inhabited the vineyard houses located at the higher terraces, where the microclimatic conditions are more favourable as opposed to the lower terraces. Furthermore, the scenic view of the Calyx was a parameter for wealthier classes to own a vineyard house from higher terraces. Vineyard houses were also rented by wealthy visitors who had business to attend within the confines of the city, whereas others lodged in the Citadel (Toygar and Toygar, 2005, p. 58).

Having a vineyard house outside the city meant far more than agricultural production and indication of status. It was considered as a matter of identification. The saying among the local inhabitants underpins the meaning of vineyard culture: “If you do not own a house in the Citadel and a vineyard house, you are not from Ankara” (Toygar and Toygar, 2005, p. 58).

5.3.4 Urban Structure in the Calyx

The urban structure demonstrates a concentric pattern parallel with the geomorphologic structure of the calyx (Figure 67). The map produced by von Vincke and the written documents highlights the components of such concentric structure. The settlement pattern demonstrate concentric urban structure. Each segment demonstrate a distinctive pattern in terms of the utilization of the land, the physical formation of the fabric, as well as the socio-spatial structure. In that sense, the Citadel forms the nucleus as it is laid on the hilltop at the center of the Calyx. The stream valleys forms the secondary segment of the structure by encircling the hilltop. The tertiary segment is composed of the vineyard territories on the terraces of the calyx. Small outlying settlements such as Kalaba, Balgat, Yukarı Balgat, Aşağı İmrahor, and Üreğil are located on the outer segment of the urban structure.

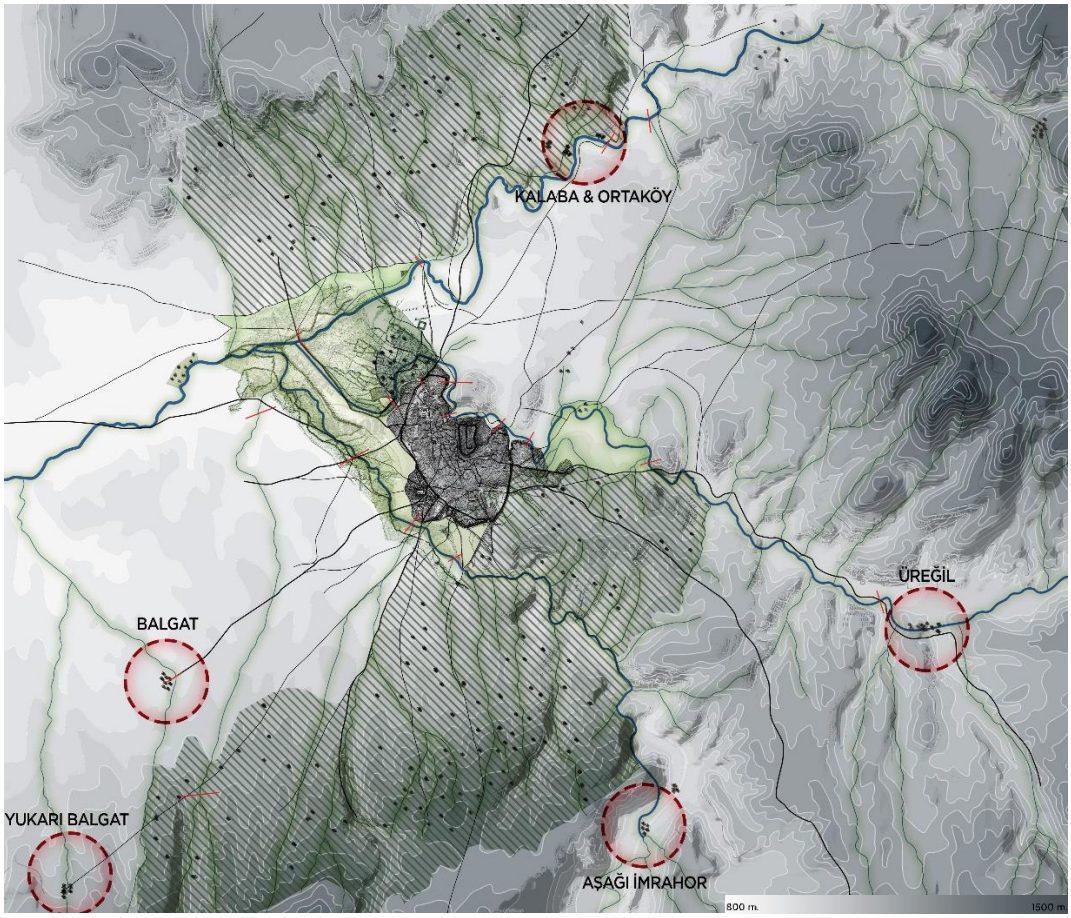


Figure 67. Ankara after the mids of 19th century; the hilltop settlement, the agricultural fields, vineyard areas on the terraces, and surrounding villages

5.4 The Republican Period

The turn of the 20th century has been a critical breaking point for Ankara in every possible aspect as the governing functions of social, economic, and far significantly spatial structure of Anatolia were agglomerated in the city by the protagonists of the independence. Not only Ankara has been a locus of command center during the years of war, but also the city was appropriated as a capital city in the building of a new regime and a new nation.

The geographical superiority of the city was critical for the former process in the two-phased role that Ankara played for construction of Republic. The safeguarded location of the city within the peninsula on the coasts of which the sea power was taken out of control and coastal zones were invaded played a part in relocation of the capital to a territory that has a superior defense capacity. Not only the vicinity of Ankara was a safeguarded zone during the War of Independence, but also the city was well-connected to the front lines securing a central position (Akçura,1971, p. 22). In other words, the city was geographically distant, thus secured enough from military turmoil yet close enough to the frontiers for governing the War of Independence. The crossroad function of geomorphology were recalled by the founders of the Republic in terms of harbouring the power of controlling Anatolian Peninsula in Ankara ever since the Galatians. The central position of Ankara in the overall transportation network and the railroad system of Anatolia amplifies the crossroad function[12] via the spatial means that have been critical in the control of a territory at the time.

The former phase of military defence, therefore, was highly driven by the geographical convenience of the city. In the latter phase of constructing the Republic, on the other hand, the capital function of the city necessitated a transformation in return in rather minute yet highly characteristic urban structure that corresponded to the features of Calyx geomorphology. Such transformation could be traced from the

[12] Such integral scheme that manifest the nodal position of Ankara is evident on the earlier spatial representations of Anatolia, which were dwelled on in the previous section by means of Kiepert Map, Maercker, Kannenberg and Shaeffer Map, as well as Arrowsmith Map.

written sources of whom experienced the city before and after the radical shift. As Akcan (2012, pp. 30-31) puts into words:

> "Nineteenth-century travelers depicted Ankara as a poor, "melancholic and unkempt" settlement. Descriptions of the city from the 1930s, in contrast, stated over and over again that the republican revolution was building a totally new, modern, and grandiose Turkish town from scratch on the same land."

As stated by Akcan (2012, pp. 30-31), Ankara had a subdued character until the city was designated as the locus of revolution. Akçura (1971, p. 28) reiterates this statement, as he dwells on the condition of the city when it was attributed with a grand vision. In that regard, suffered from a major fire, the physical environment of the city was highly damaged. The quality of the urban environment was overshadowed by dusty air in summer, and by muddy streets in winter. Further to that, a large portion of the city was covered by marshland which results in maleria epidemic over the city.

From this point onward, thereafter, how the new state of Republic approached to the Calyx by means of urban formation, as well as how the urban structure in the Calyx reshaped by this formation will be elaborated.

5.4.1 The Initial Reconfiguration of Urban Structure in the Calyx: Lörcher's Plan

As soon as the Republican regime was introduced and the governing position of Ankara was secured in the revolutionary process, the spatial programs and the projects, required to concretize this new regime, were initiated. The major agenda that the Republican state developed in terms of spatial planning of the city was (Şenyapılı, 1985, pp. 19-20);

- To create a functional governmental quarter as a spatial manifestation of modern, sublime, and consistent Republic,
- To supply for the increasing housing demand from arising number of urban population,
- To enhance the infrastructural capacity which would substantiate the housing development,

- To locate the modern institutions that would embody and perpetuate the visions of Republic.

The spatial requirements stipulated by the Republic brought along the discussion of where to locate and how to configure the ultimate urban development in relation to the pre-existing urban structure. At that juncture, the two poles that the discussion revolved around was either harbouring the emerging functions in the Old Town and facilitating for a concentric urban development around the Citadel, or creating a new town for the new urban functions. The discussion oscillated between the opponents of creating a new town, who suggested that it would be unfair to develop a new center with the taxes collected from inhabitants of Old Town without making any amends for this part of the city. The proponents, on the other hand, asserted that the expropriation rates would be much higher on the Old Town besides the technical concerns and limited availability for further urban growth as well as infrastructure (Tankut, 1990, p. 33; Şenyapılı, 1985, pp. 20; Cengizkan, 2004, p. 57). Furthermore, creating a new center was adventegeous in terms of increasing the capital on the safe of Şehremaneti, since the land-rent would be much higher than the expropriation value as per Law No 583[13] (Tankut, 1990, p. 33).

Consolidating the Old Town as the center of the Republic was also ideologically frown upon besides the technical and practical concerns. The traditional and culturalist formation of Old Town was contradicting with the idealized modern life of national bourgeoisie. It was found excessively conflicting to construct a national modernity from and within the core of small Ottoman town (Tankut, 1990, p. 31).

At the juncture of conflicting ideals on Ankara's future urban formation, the first master plan of Ankara was commissioned to Carl Christoph Lörcher, counting on his expertise on envisioning a modern and well-appointed urban environment. Favouring a New Town to be formed on the basin floor as the major decision, Lörcher's design strategy is composed of two parteit structure: The Station Quarter as the extension of the Old Town, and the New Town. These two parts are developed along two different

[13] Adopted on March 25, 1925, the Law No 583 stipulates for an extensive expropiation of the urban land.

axes as spatial means to introduce the future urban formation on the basin floor. The spatial repository informing about the context of Ankara that was available to Lörcher was in fact highly limited. The fundamental basis upon which the master plan of the capital's future will be rendered was Şehremaneti Map which dated to 1924.

5.4.1.1 The Old Town and The Citadel as Monument

The first part of the Lörcher's plan focuses on the integration of pre-existing station to Old Town at the Citadel (Figure 68). Lörcher's approach towards the geomorphologic unit of hilltop, where the Old Town was formed, is unfolded in this design scheme. The hilltop was referred as a monument with a visual quality that would govern the physical and visual orientation for the rest of the urban formation down on the basin floor. Attributed as "the Beautiful Citadel", Lörcher emphasizes his aim of radially pivoting the western extension taking the Citadel on the focus in the report that is complementary to the plan. Moreover, he explains that the configuration of urban spaces both in terms of the urban development and open spaces was oriented to include the Beautiful Citadel to the urban panorama from every possible vantage point.

This strategy laid in the core of the design was concretized through the formation of two axes, İstasyon Avenue and Cumhuriyet Avenue, that radiated from the Station and merged the Station Quarter with the Old Town. Furthermore, the visual relationship between Opera building and the Citadel, between Ulus Square and the Citadel, as well as between "Millet Bahçesi" and terraces of the Citadel where Hacı Bayram and Temple of August was located, was procured by the physical formation of the urban environment (Cengizkan, 2004, p. 85).

Besides attaining a visual and physical focality embodied within the Citadel, Lörcher attributed a functional quality in the governance of new regime by situating the modern institutions of Republic on the terraces of the hilltop. As stated by Evered (2008, p. 334), "He carefully drew on the old sections of the city as he proceeded, paying particular attention to what he described as the beautiful castle. In proceeding in this manner, the presence of the Citadel was to serve as a focal point and as a basis for the city's emergent symbolisms – both Anatolian and Kemalist."

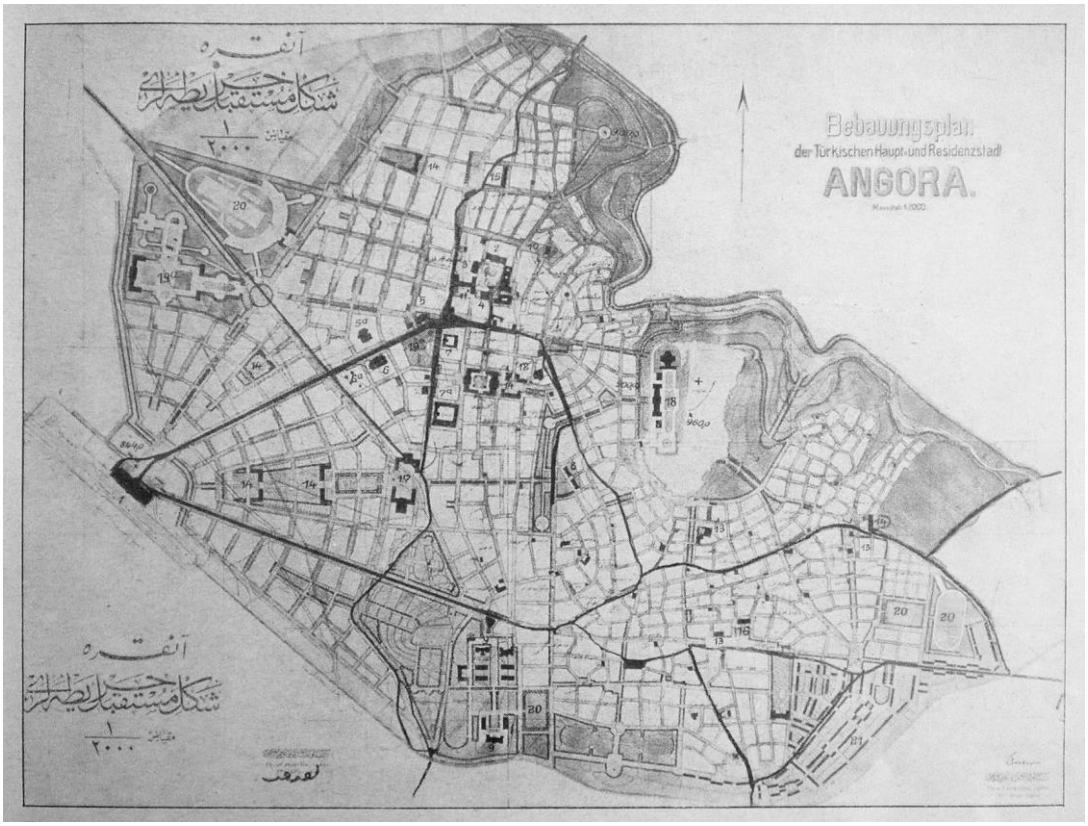


Figure 68. Old Town and the Station Quarter in Lörcher Plan (Uluiş, 2015)

5.4.1.2 The Crossroad City and The Station

It is clear that not only the Citadel was attributed a major value in the first part of the design scheme, but also the Station was appropriated as a nucleus, the extensions of which was well-integrated to the Old Town. The approach of Lörcher would not be perplexing since such design scheme locating the Station at the heart in the formation of urban environment is a common Eurocentric tendency in urban planning. Yet, Lörcher unfolds the geographical angle in the configuration of such nodality rather than taking it granted as an urban cliche. In that regard, he stated in the plan report that the city of Angora would be in fact a crossroad location where four railroad connection (İstanbul-Vineyarddad and Angora-Sivas-Samsun) junctures as soon as the north-south extension is finished. The geographical characteristic of Ankara recognized ever since the Phrigians was translated into a design scheme with the means of nineteenth century urbanism by Lörcher.

Other than geographical reading of the context, the basis for inclination towards expanding and merging the city on the direction of Station was already laid as an emerging trend as soon as the İstanbul-Vineyarddat railway connection had been realized in 1889. The urban development was autochthonously gravitated towards the western and southern slopes of the Citadel. However, the marshland situated along the İncesu Stream formed a threshold for the further development towards the Station and the south (Şenyapılı, 1985, p. 7). At that point, Lörcher put forward a grand strategy embodied within the scope of grandiose vision that the Republican state was after. The strategy was crystallized by means of spatial formation on the axes of "green" spaces enlacing the physical structure of the city.

5.4.1.3 Fluvial Structure and the Sequence of "Green Spaces"

The physical condition of Ankara was not correponding to the requirements that of a city which was attributed with the ideals of creating a modern Republic. In that sense, reformative approach[14] governing the urban planning profession in Germany at the time, which was also inherently adopted by Lörcher, coincided with the need of creating a modern, hygienic, and well-equipped spatial organization that amplifies the visions of the Republic. This resulted in a strategical organisation of open spaces in the scope of the plan for the first time as a critical decision in the spatial planning history. In geomorphological terms, the stream valleys and corridors formed the spatial basis on which the general "sequence of green spaces" strategy was laid upon. The design implications that were localized in a two partite structure could be set forth as follows:

1. Axis of Bentderesi Stream

   The character of the valley of Bentderesi, which has designated a boundary for the urban development on the northeastern section of the Citadel, was

[14] That the reform concept that dominated the German urban planning profession and theory could be found in Burat (2008, p. 26): "The German planning approaches were formed through an accumulation of ideas revolving around the reform concept. This idea, that replacing the old with the new, hygienic, aesthetic and modern would uplift the spirit and morale of the weary and tired masses and reshape their behavior and culture is a reflection of the environmental determinism dominant in the period."

perpetuated. Kazıkiçi Vegetable Gardens where agricultural production was carried on the northwestern edge of the Valley was secured as allotment gardens in order to maintain urban inhabitants' relationship with the agricultural facilities (Cengizkan, 2004, p. 47). Defining the northern limit of the city ponds, allotment gardens and urban gardens, as well as parks are aligned on the continuing valley (Cengizkan, 2004, p. 84)

2. Axis of İncesu Stream

Defining the perimeter of the eastern edge of New Town (which will be dwelled on in the following part), the course of İncesu Stream forms a spine for open space stripes as it passes through nursery (Fidanlık) and the New Town. İncesu Stream spearates the Old Town from New Town as it intersects with the major axis of the city, and it defines the western periphery of the city. At that section, Lörcher integrates the stream in the design of the Station Square as it is monumentalized in the form of a natural pond at the center of the square. Finally, the axes of İncesu and Bentderesi Stream confluences on the urban park at the northwestern periphery of the city and flows towards Ankara Stream.

The critical design implication on the axis of İncesu Stream was the operation of draining the marshland around the stream so that the large proportion of the Station Quarter as well as "the green system" could be realized. The bold proposal of transforming a swamp land into a habitable land was also supported on the circles of Republican administratives. The financial dimension of realizing such project (in terms of expropriating the marshland around Station) was found feasible and worthwhile for the sake of the public health by Ali Rıza, the financial auditor of the time (Cengizkan, 2004, p. 52). Eventually, 40.000 square meter marshland around the Station, and 20.000 square meter marshland on the Atatürk Forest Farm were drained in 1925[15] (Şenyapılı, 1985, p. 26). This implication is considered as one of the major urban planning achievements realised in the era

[15] The exproriation was implemented in accordance with Law No 583: *Ankara'da İnşası Mukarrer Yeni Mahalle için Muktezi Yerler ile Bataklık ve Mergazi Arazinin Şehremanetince İstimlakı Hakkında Kanun* (Cengizkan, 2004, p. 217).

(Tankut, 1990, p. 32). Bozdoğan (2001, p. 78) dwells on the ideological ends of utilizing marshland as the spatial ground where modern urban structure is laid:

> "Scientific methods of farming, the planting of an evergreen forest in the middle of the arid Anatolian plateau, and modern irrigation techniques were patriotic themes in the 1930s. They represented the idealized acts of taming the wilderness, mastering nature, and ultimately reclaiming the land as national property."

Swampland regeneration was indeed a major theme even before the turn of the 20th century. Taking the nature under control was the major operation that has been exercised during the formation of many capital cities. The political center of the United States was built on the marshy ground adjacent to the Potomak River and its eastern brach was transformed into the political center of the United States. Commissioned to Major Pierre L'Enfant in 1791, the design of Washington D.C. necessitated a major intervention on the geography. Similarly, the marshland of Le Marais (literal translation of swamp in French) on the adjacent of the Seine River was drained to locate La Place Royale and the mansions of aristocrats as planned by Henry IV in 17th century. Having counterpart implications at elsewhere in differing time segments, it could be deduced from Bozdoğan (2001, p. 78) draining the swamp areas motivated the urban projects of 20th century nation-states ranging from Agro Pontina marshes in Italy to *İncesu Bataklığı* (İncesu Swamp) in Ankara, Turkey.

While configuring the macroform of the capital through the organization of built environment and open spaces, Lörcher introduced certain design approaches that influenced the future urban formation in close correlation with the stream system as the geomorphological units of the city. The key concerns of the plan that informs about Lörcher's structural, functional, and ideological principles could be listed as follows:

- The stream valleys and corridors delimited the city by means of forming an urban periphery where the agricultural and recreational uses are allocated. In that sense, the stream valleys formed an interface as the transition between

traditionally acknowledged rural structure and urban areas as the manifestation of modern Republic.

- The systematic and consistent design of open spaces in sequences was favored in the overall scheme. As Lörcher stated in the plan report, it would be highly unlikely to generate a holistic open space structure without a systematical design proposal. He also denotes that the major task of a well-equipped urban planner to design a hierarchical open space structure like vessels connecting the core quarters to periphery (Cengizkan, 2004, p. 84). The geomorphic formations of valley and stream system, in that regard, are attributed a major value as a spine for such hierarchical system of open spaces.
- On the functional ends, the open space structure were considered substantial in sustaining hygienic conditions for healthy environments in the modern city. Designed to embody recreational facilities, open spaces were instrumentalized to respond to the needs of a modern generation.
- Creation of open spaces as the extension of public realm was ideologically appreciated in terms of liberating the oppressed character of women in the society. As stated by Bozdoğan (2001, p. 79), "the presence of women in these public places was in itself a celebrated theme, 'a gendering of the modern' underscoring the Kemalists' pride in having liberated Turkish women from the oppressive seclusion of tradition."

5.4.1.4 The New Town

The second part of the Lörcher's plan unfolds the location as well as the spatial configuration of the New Town (Figure 69). The spatial organisation of the New Town was elongated on the second axis, equally significant as the Station axis, which also was oriented in a similar fashion towards the hilltop on top of which the Citadel was rising. On the other hand, situating the New Town in connection with the Old Town and the Station Quarter was substantially determined by the fact that Presidential Palace, the governing nucleus of the Republic, was located on the terrace of Çankaya. Therefore, the Governmental Complex (*Regierungsstadt*) as well as

residential quarters designated the spatial program of the New Town. Kezer (2010, p. 43) dwells on the dynamics behind the formation of New Town in Lörcher's plan;

"Lörcher's proposal comprised two parts. While the aforementioned designs pertained to areas in or near Ankara's existing fabric, his plan also had to respond to the inexorable push for southbound expansion that had gained momentum as the repulican elite rushed to take up residence near Atatürk's home in Çankaya."

Besides the functionally loaded urban fabric, Lörcher proposed open-space program integral to the formation of New Town. The valley of İncesu Stream defined the eastern limit of the city in the form of urban park *Stadtpark*, coalescing with the National-Park on the hilltop of Kocatepe. The stream becomes a spine of green strips penetrating through the urban form at the section where it passes through residential quarters. Lörcher attributes equal importance to the major axis of the New Town and İncesu Stream in terms of the coalescing power over connecting the Old Town and the New Town.

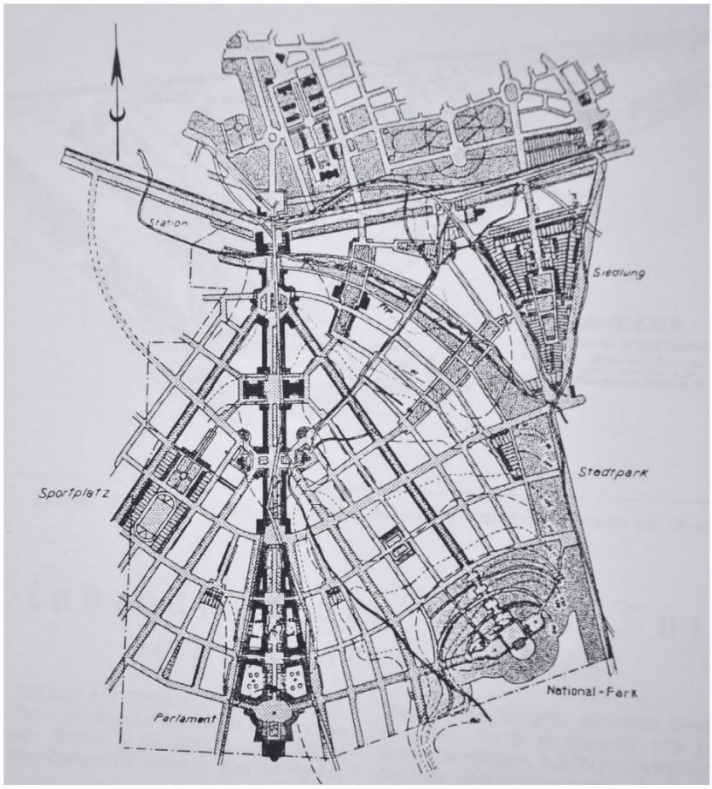


Figure 69. The New Town in Lörcher Plan (Uluiş, 2015)

The reproduced plan of Lörcher (Figure 70) in the context of Calyx demonstrate that the city was expanded on the basin floor of İncesu Stream in strong visual and physical connection with the Citadel. The radially developed Station Quarter is limited by the course of İncesu Stream. The extension of New Town is elongated towards the terraces neighboring with Frenközü (*Türközü*), Seyran, Esat, Kavaklıdere, Bülbülderesi, and Çankaya vineyard clusters.

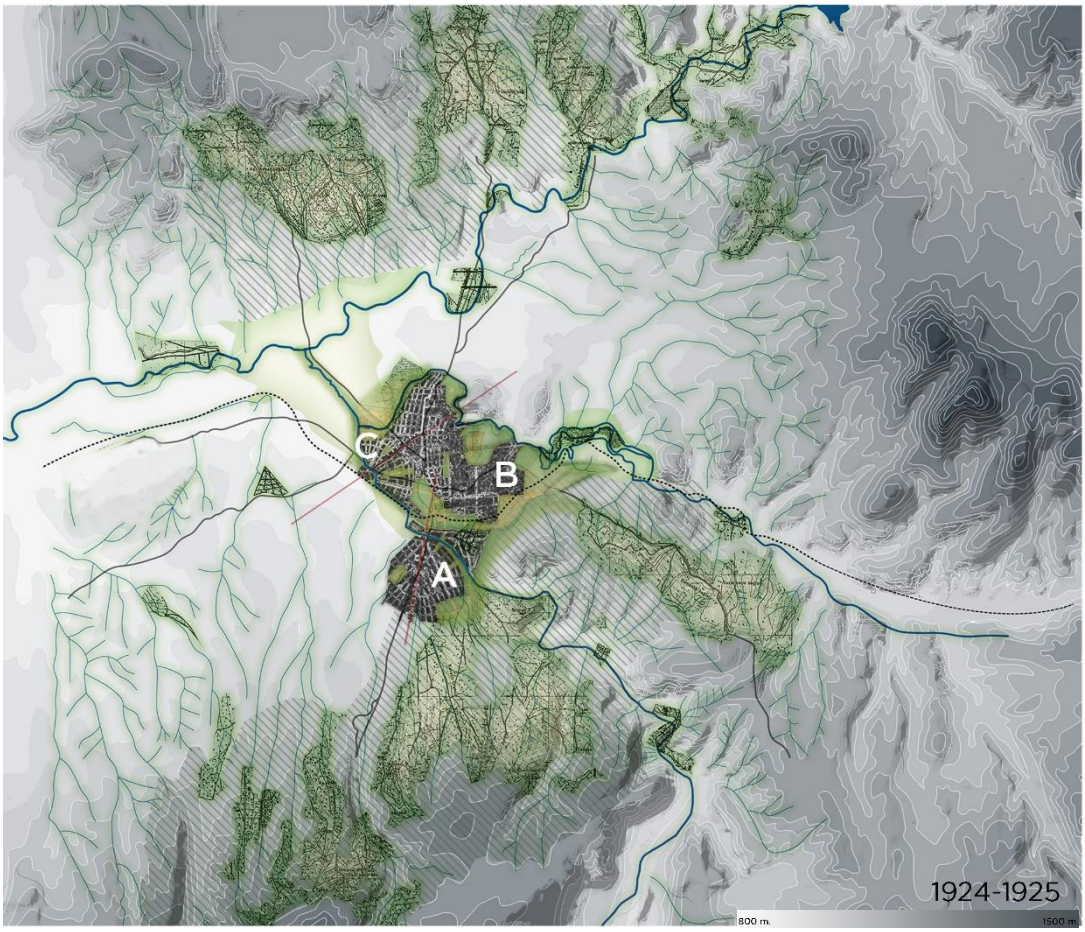


Figure 70. Lörcher's design scheme that was structured on the two major axes; one leading from the Citadel (B) to the Station Quarter (C), the other leading to the New Town (A).

It is also noteworth that the end of the axis of New Town on the south finds the Presidential Palace situated on the terrace of Çankaya. Regarding the fact that orienting the new urban center was the evident consequence of the Presidential Palace being located at southern slopes of Çankara long before the plan was prepared, one

could not help but wonder how urban form would shuffle if the residence was to be situated on the northern terraces[16].

Lörcher's planning and design decisions as well as implication process of the design inform about the conception of geomorphological units in urban planning practice dominant in the epoch. In that sense, the inclined terrain condition present in the hilltop of Citadel was conceived as "threshold" rather than reference for urbanism as it was the case before. On the other hand, the threshold condition on the frontier of the marshland of İncesu was reversed as a part of the extensive spatial program.

Interestingly, Lörcher is seemingly indifferent to vineyard clusters as the peripherial component of the urban structure on the terraces of Calyx. This could conceivably stem from the limited scope of the basic planning repository (base map, cadastral plan, etc.) that was available to Lörcher at the time, although a grand scale spatial representation of Calyx was drawn by Baron Friedrich von Vincke earlier in 1846 (see Chapter 3 for details), the fellow citizen of Lörcher. Beyond the technical inadequacies, it might be the case that Lörcher did not feel the urge to dwell on to the vineyard clusters both since the terraces was exempted from planning boundaries and the urban expansion on the terraces was beyond imagining regarding the former state of the settlement.

5.4.2 Implementation of Lörcher's Plan: Leaping on the Calyx Floor

The initial formation of urban space in concordance with the Lörcher Plan could be followed in 1/25.000 scale map of Ankara prepared by Müdafaa-i Milliye Vekaleti in 1928 (Figure 71). Apart from the micro-scale details on the land-use pattern and physical structures, the map demonstrated the incremental and fragmented development on the basin floor delimited by the terraces (Figure 72). In that regard, the Old Town, the Station partitioned from the Old Town by the marshland of İncesu, and a new type of housing (*Evkaf/Memurin Evleri*) constitute the fragments of urban macroform evolving at the time. Moreover, the formation of an axis (later to be

[16] In Toygar and Toygar (2005), it is claimed that the conversion of a vineyard house located on the northern terraces of Etlik into the residence of Mustafa Kemal was proposed at first, however Çankaya was favoured as the location of Presidential Palace later.

recognized as Atatürk Boulevard) on the tangent of the Citadel elongated between the north and the south terraces becomes evident for the first time in that scheme. The urban fabric was shaped through micro-scale building level implications in reference to this newly forming north-south axis, rather than zonal development within the municipal demarcation[17] (Şenyapılı, 1985, p. 35).

Vegetable gardens on the northern meander (*Kazıkiçi Bostanları*) and on the eastern meander of Hatip Stream, a nursery (*Fidanlık*) on İncesu Stream, newly forming forest farm are recognisable parts in the partial structure of agricultural areas. A refined representation of vineyard clusters could also be found on the map.

5.4.3 Urban Expansion on the Calyx: Jansen's Plan

The ongoing challenge of consolidating the urban formation of the capital persisted in the following years. Although some parts of the design scheme of Lörcher started to shape the urban space, his plan was found both economically unfeasible and spatially inadequate for the increasing demand for housing (Akcan, 2012, p. 32). A new urban plan, harvested from an international competition, was decided to steer the future formation of urban space. Consequently, three prominent architects –Léon Jaussely, Joseph Brix[18] and Hermann Jansen, were invited to participate in the competition. The contestants were hosted in Ankara in 1927 and were asked to submit their proposals in 1928.

The design brief handed to the contestants highlighted the significance of the Citadel, and required from participants to locate the hilltop of Citadel into the core of the design, to secure the prevailing view of the Citadel (a large open space formation at the center was required to achieve so), and to integrate Bentderesi valley in the design by creating ponds, gardens, etc. on its course.

[17] The demarcation of municipal boundaries was exercised in 1926, after the Lörcher finalized the plan. The delimitation was drawn in reference to the topography, covering relatively large area despite the fact that the traditional settlement was limted on the hilltop and the western streching of the settlement towards Station was very recent (Şenyapılı, 1985, p. 33).

[18] Since urban plan prepared by Joseph Brix is unavailable, his approach in the Calyx will not be dwelled on.

Figure 71. The urban formation after the Lörcher Plan, fragmented developments of New Town (A) and Station (B) (reproduced from 1928 Map of General Directorate of Mapping)

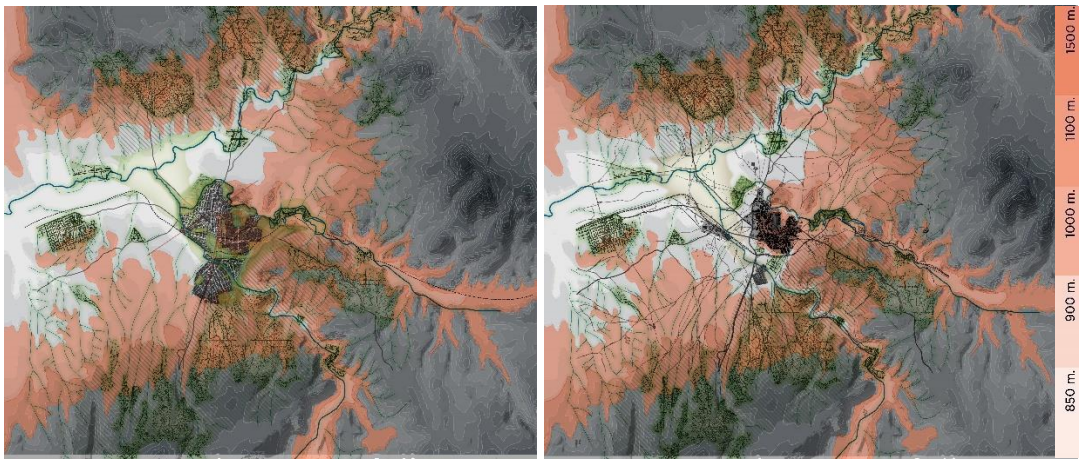


Figure 72. Lörcher Plan and the growth of the city on the basin floor

The design scheme was also required to be flexible in terms of urban expansion directed towards south and west (Cengizkan, 2004, p. 211). These major considerations in the consolidation of the Citadel and its integration to the new town aside, as Tankut (1990, pp. 42-45) also elaborates, the design brief is structured in a fragmented manner regarding the partial and ambiguous requirements in the restructuring of old town, in the relation of the city with the station, in the form and configuration of urban fabric within the new town, and functional utilization of the land.

Regarding the design and planning principle brought by the design brief, Jansen and Jaussely manifested two different, even conflicting approaches in their design proposal. Jaussely's scheme (Figure 73) favored the old town to be exposed major interventions at all costs. He considered the fluctuant terrain of the city as a limitation, the climatic condition as a shortcoming, and the geological structure (especially soil structure) as a drawback (Akcan, 1990, pp. 32-33).

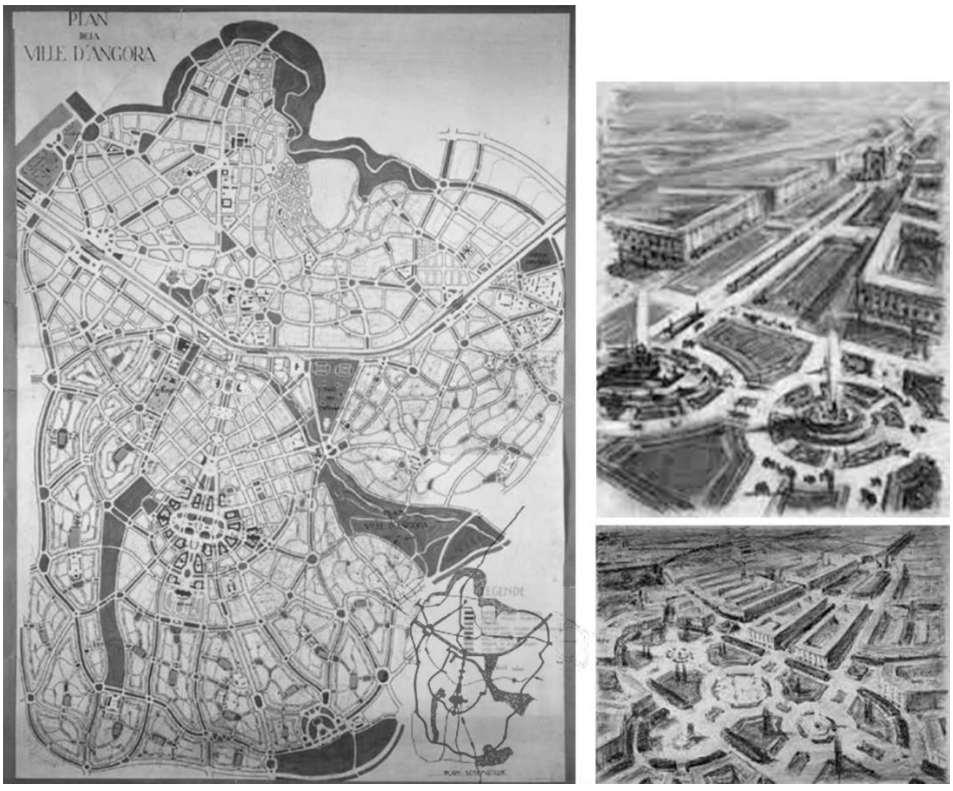


Figure 73. The urban development plan and drawings of Jaussely (Delacourt, 2007; Günay personal archive)

Having such list of inadequicies based on the geomorphological structure of the city in mind, Jaussely suggested a grandiose design scheme with wide streets, large boulevards, ring avenues, monumentally decorated open spaces and public plazas which later to be found as ostentatious and financially excessive. The urban form was configured in two-partite structure of "closed system" –in the formation of the core and "open system" –in the formation of the periphery: the former constituted the densely formed 19th century European urban environment, whereas the the latter consisted the loosely organised built environment of *banlieue* (Akcan, 1990, pp. 33)

The design principles adopted by Jaussely reflect the Hausmannian wave that dominated the theory and practice of urbanism in 19th century, France. Although he suggests the reconstruction of the Old Town in a flamboyant manner, his approach towards securing the stream valleys in the form of extensive green spaces indicates a sensibility. The formulation of closed system in the basin floor and open system on the lower terraces refers to an urban form that corresponds to different segments in the geomorphological structure. However, the layout of the plan is seemingly restricted missing the opportunity to refer to the vineyard clusters, and their relation to the radical changes on the urban structure. It is rather interesting regarding the prize-winning performance of Jaussely at the design competition of Barcelona organized in 1905, as he pursued the ways of merging *Eixample*, the recently developed section of the city, with the outlying towns[19]. Further to that, his discourse on large-scale design of cities was even more consolidated through the 1910 Berlin, and 1919 Paris competitions long before the Ankara competition was set (Figure 74).

Rather than a design insensitivity, this could also be seen as a technical problem due to lack of comprehensive base maps, or the limited scope of the design brief. Although Jaussely's Plan set forths a spatial vision with certain design qualities in mezzo scale, it is nevertheless partially responding to the overall geomorphological structure of Calyx and its components as they were not yet transformed through design consciousness at this stage.

[19] Jaussely's Barcelona Plan is especially successful in terms of relating the geomorphological setting and the settlement structure.

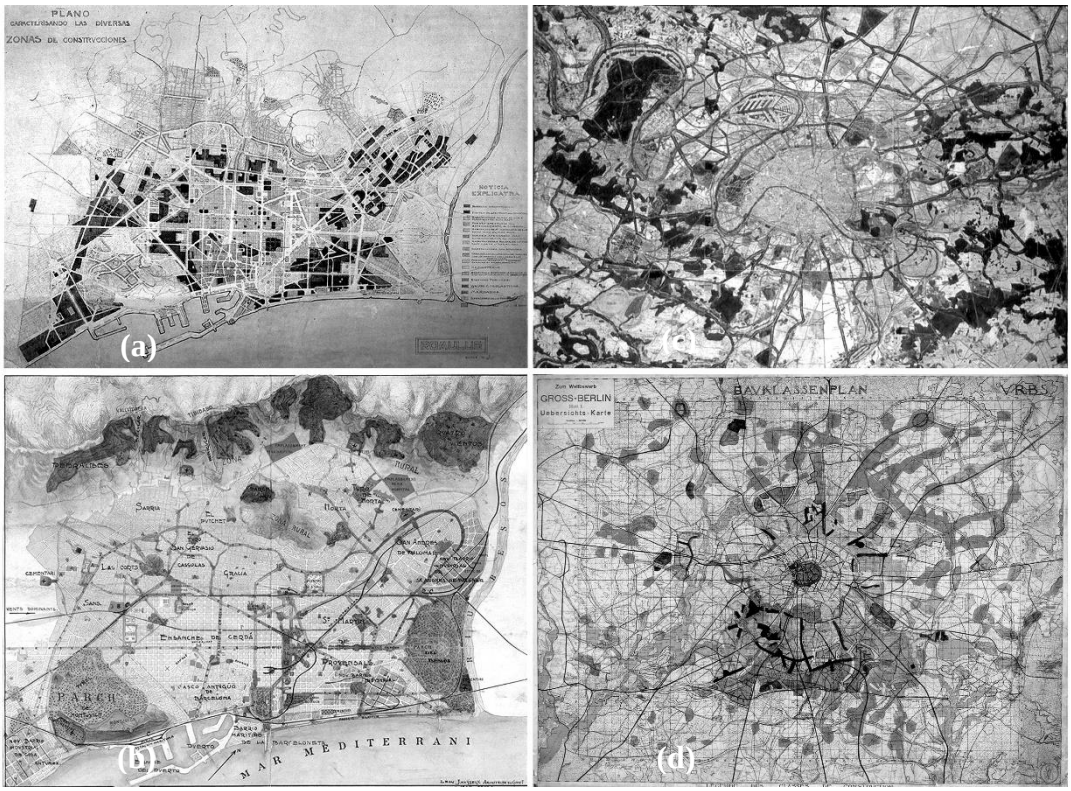


Figure 74. 1905 Barcelona (a) and (b); 1919 Paris (c) and 1910 Berlin (d) urban development plans of Jaussely (Agueda, 2017)

Hermann Jansen, followed a similar track with Jaussely in terms of enhancing large-scale design experiences. In fact, he was the winner of the first prize in Greater Berlin competition held in 1910, as he competed against Jaussely. Among the master plan works[20] he produced, his work on Berlin (Figure 75) is the manifestation of garden city movement, which Akcan (2012, p. 41) suggested that later he carried out the same approach in the context of Ankara.

[20] He is also known for developing master plans for German cities, Cologne, Trier, Nürnberg; as well as other European cities, Bergen, Bielitz, Lodz, Prague, Madrid, Bratislava.

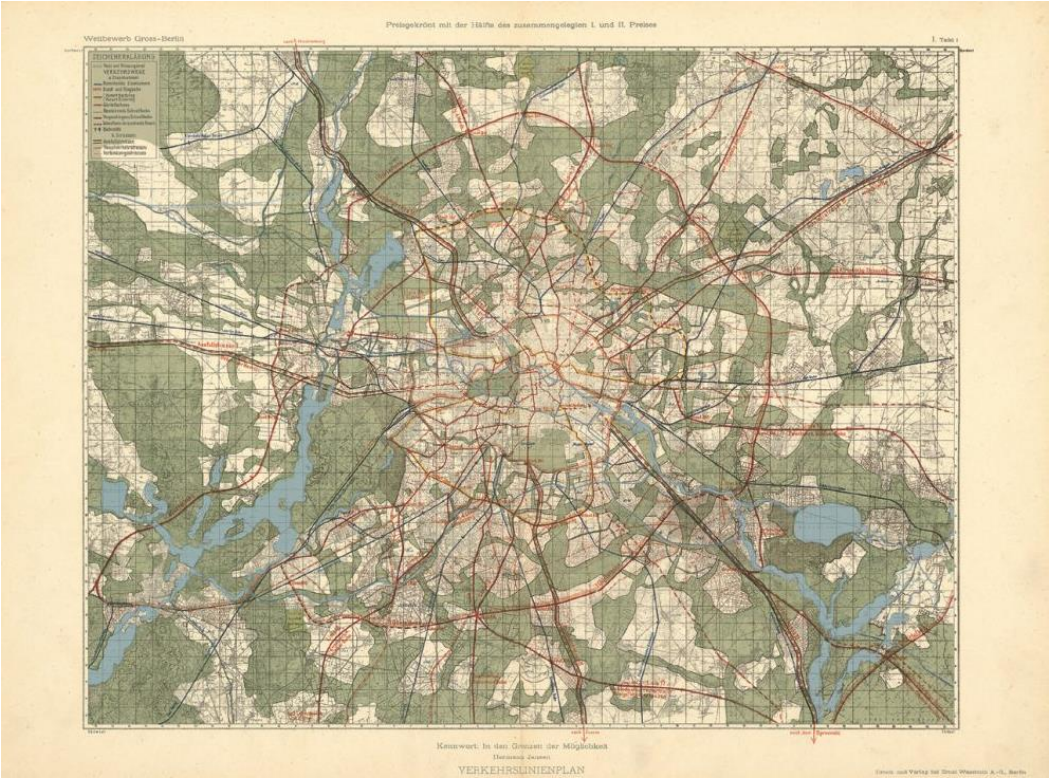


Figure 75. Jansen's Berlin Proposal 1910, In den Grenzen der Möglichkeit, (Inventer le Grand Paris)

The tentative design scheme of Jansen was more down-to-earth and optimistic about the construction of a capital within the limits of possibility (Figure 76). This resulted in the jury's selection of Jansen's proposal as the winner of competition. The basic principles that governed the Jansen's plan could be listed briefly as follows:

- Taking the Citadel at the core of the design was given utmost attention. Urban aesthetics, that was also a concern in the Lörcher's plan, was aimed to be achieved with reference to the Citadel, identified as "the crown of the city" (Jansen, 1937). In Akcan (1990, p. 33), Jansen's admiration was described as; "Jansen, on the other hand, invested a highly symbolic significance in Ankara's Citadel and the traditional houses of the old city, comparing them to Rome's Capitoline Hill and Pergamon's Acropolis."

  In order to emphasize the Citadel's presence, he suggested reorganizations in the circulation system, urban fabric, and open-space structure. In that, the visual connection to the Citadel was pursued in the configuration of the road

system, seven different plazas was proposed on the environs of the hilltop with a direct vision of the Citadel, a large park was located on the foothill of the hilltop (Şenyapılı, 1985, p. 37).

- Narrow and topographically conforming road system was proposed as the key strategy for the low-budget urban economics.
- Sanitary conditions as a must of modern urban environment was secured by the provision of green spaces (*grünflächen, freiflächen*), sport fields, playgroundsforming an open-space structure.
- The functional segregation of urban uses was favoured in the overal plan.
- Low height/less dense urban form was suggested in the form of maximum three-storey buildings, attached or detached, having a front or rear garden, instead of 19th century European monumentality.

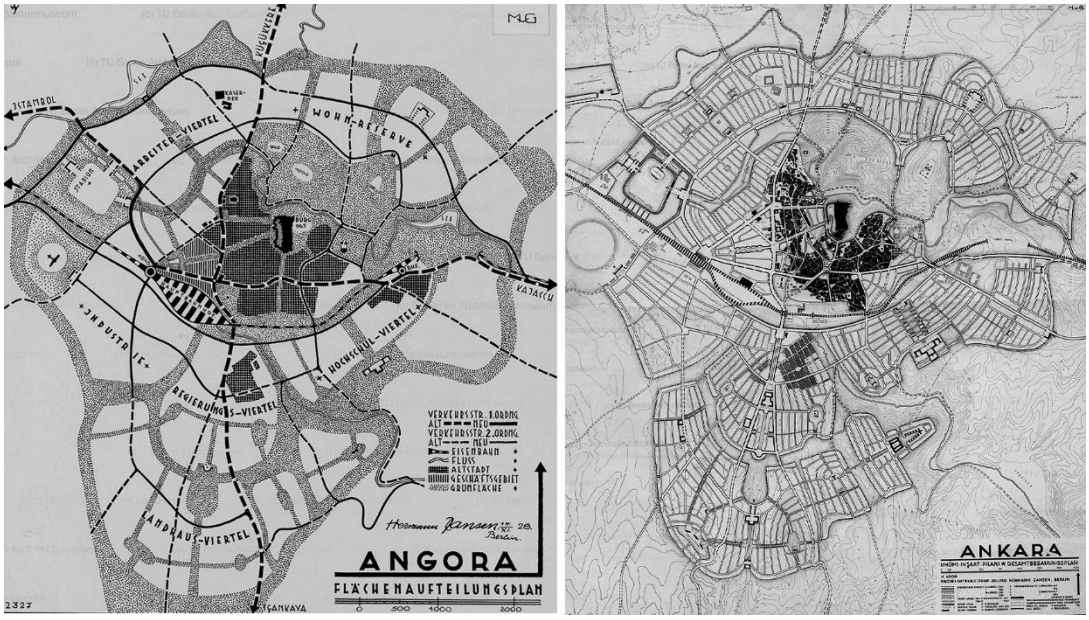


Figure 76. 1928 Ankara Development Plan Avant Project by Jansen (Günay personal archive)

The diagram of his design scheme prepared for the population of 270.000 could be put forward. The formation of east-west axis, connecting the industry and higher education zone, was proposed orthogonal to the pre-existing north-south axis that bridges Old Town, Ulus, the governing center and New Town, new governing

compounds along with residences. It is rather intesresting that these two orthogonal axes intersect on the center of the Calyx.

Parallel to the functional division of the urban land; industry was located on the west with reference to the predominant wind direction. The Workers' Quarter (*Arbeiter-viertel*) was situated on the northwest, adjacent to proposed industrial area. The new Governmental Quarter (*Regierungs-viertel*) was located on the southern extension of the Old Town and Station, as previously suggested by Lörcher. The residences of government officials (*Landhaus-vietel)* were situated on the south of the governmental quarter. A new formation of Higher Education Quarter (*Hochschul-viertel*) as the cultural zone was located on the east. A large proportion of urban land was allocated as housing reserve, although Jansen was concerned about the location, since the area was disjointed from rest of the city (Tankut, 1990, p. 57).

The proposal consisted three types of housing in concentric structure. The inner part constituted the traditional houses of Old Town. The secondary circle included maximum three storey attached or detached houses with yards. The tertiary part constituted "the open system" of low dense, sparsely standing mansions.

The open-space structure was utilized as a division between the land uses and as a connector for the inner circulation. Although the inner structure of the system was not yet refined in the draft plan, it is laid out that the extensions of the outer green belt infiltrates in a dividing position, whereas capillary extensions circulate inbetween different zones. The geomorphic units of Hatip Stream and İncesu Stream was integrated in this structure.

5.4.3.1 Pre-Implementation Process (1928-1932): Laying the Core on the Basin

The draft plan was put into practice as soon as the Jansen's proposal was approved in 1928. Later, Jansen was required to prepare an implementary development plan. Considering that he was equipped with very few repository of base maps, 1/4.000 scale Şehremaneti Map as well as large-scale military maps, the preperation of up-to-

date base maps[21] and cadastral plans were exercised by municipal officials. The time interval, starting from 1928 until Jansen finally submitted the implementation plan in 1932, is addressed as "pre-implementation process" by Tankut (1990). Technical and process oriented shortcomings as well as economic and political problems majorly affected the supervision of the process (Tankut, 1990, pp. 88-104).

Although Jansen was responsible for visiting the city each year as demanded by the contract, he monitored the process from his office in Berlin. This remote position of his deprived him from following current affairs on urban environment closely and consequently from resolving the emerging problems on time. The urban development was taken under pressure by the wills of different power elites manipulating the process for their favor. The revisions in implementation plan was becoming difficult, since the capital city was rapidly formed in line with the insufficient guiding of the avant project. In addition to that, base maps were handed to designer in pieces, resulting him to lose the sense of integrity in the overall city. Partially accurate cadastral plans were either not provided or run late attaining to the implementation.

Nevertheless, Jansen concluded the final master plan of Ankara (Figure 77) by the year 1932, eventually initiating the "implementation process" until 1939.

The overall design decisions of the implementation plan demonstrate consistency with comparison to the avant project, minor revisions aside. The form and the use of open spaces gain legibility with spatial references in this refined scheme. The formation of open spaces (*freiflächen*) was considered as a major potential in the pursuit of constructing a modern capital. The activity of recreation were essentially aimed in the formation of healthy, vibrant, and playful open spaces; urban parks, pathways, sport plazas, small gardens, forests as such, since the modern generation to be raised was defined in relation to their involvement in physical activities taking place in these areas.

[21] It could be safely stated that Müdafaa-i Milliye Map (1/25.000) prepared in 1928, right after Jansen's proposal was adopted, serves for this purpose.

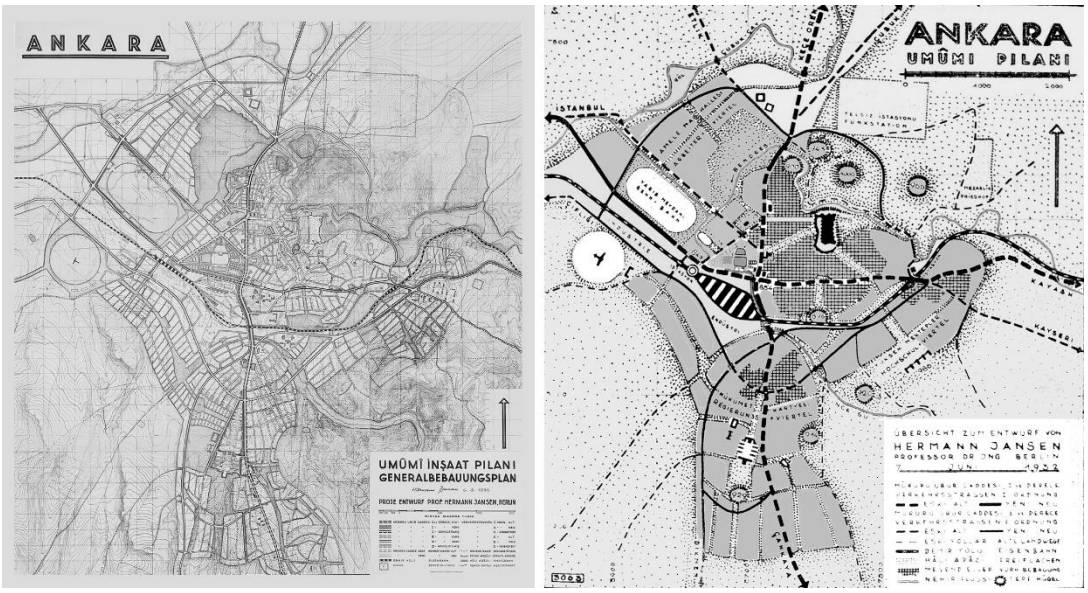


Figure 77. 1932 Ankara Development Plan by Jansen (Günay personal archive)

The geomorphological elements of valley floors and stream courses become the nexus of the open space structure. Expanding their width at certain intervals, creating waterfalls in sloping areas as well as creating ponds are suggested as certain design operations to be exercised on the stream courses. Construction on the valley of streams, on the other hand, was strongly refrained from.

İncesu Stream was suggested to be reinforced through technical interventions. Construction of a small dam close to its spring on the south was proposed. The course of the İncesu was surrounded by open spaces and public uses from where it started to flow within the city at southeast to where it left at northwest; the nursery (*Fidanlık*) was secured, a women's college (*Mädchen Schule* – today, TED University), Hygeine Institute (*Hıfzıssıhha Enstitüsü*), and Ministry of Health (*Sıhhiye Vekaleti*) was situated on the southeast. After running parallel to the north-south axis (*Atatürk Boulevard*), the direction of the stream faces west in fron of the Exhibiton Hall (*Sergievi*). The presence of İncesu was manifested in the form of grand pool at the center of Youth Park (*Gençlik Parkı*). Jansen's design proposal in terms of plans and sections of Youth Park demonstrate the integration of İncesu in the urbanscape (Figure 78). Stadium and Hippodrome were also located on its course to northwest as İncesu confluences with Bentderesi Stream.

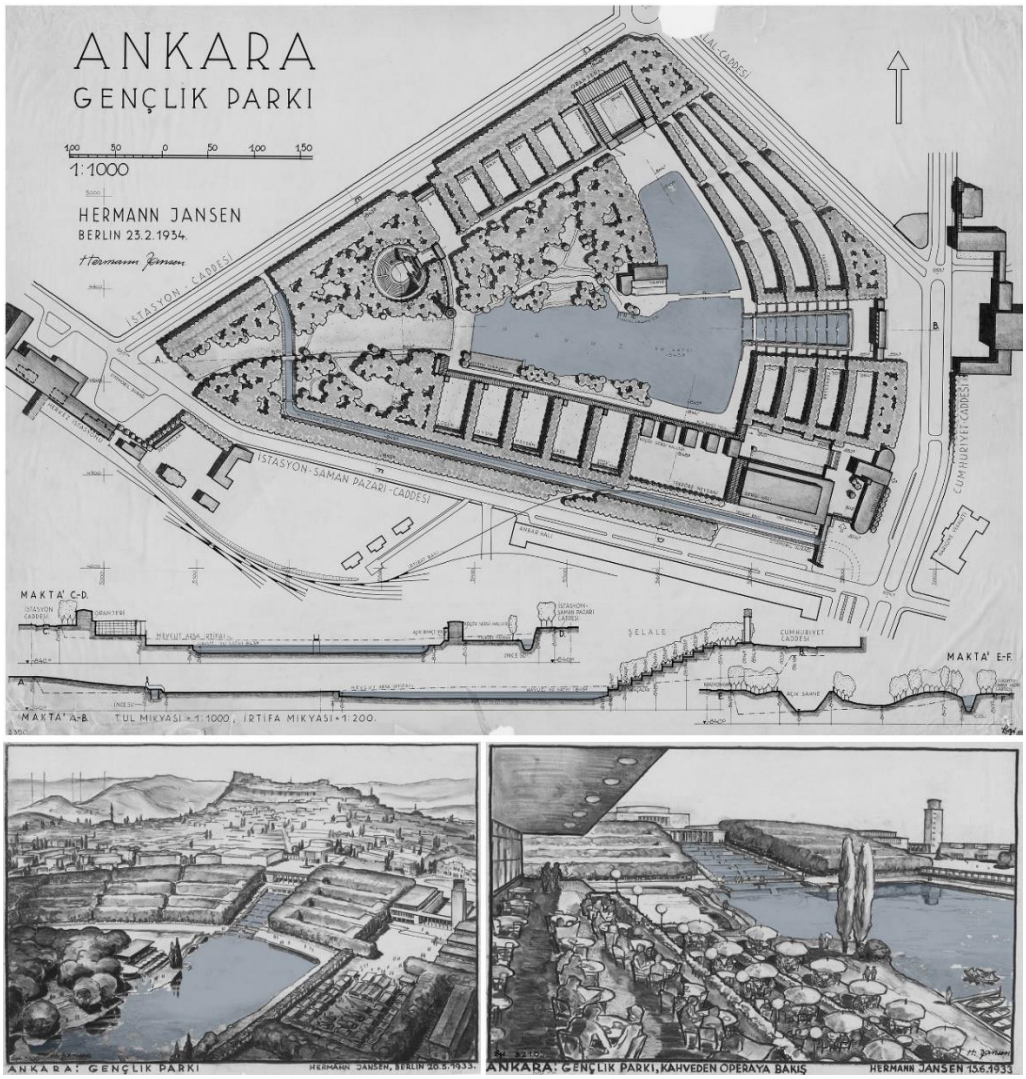


Figure 78. The plan, sections and drawings of Gençlik Parkı by Jansen (Architectural Museum of Berlin Technical University)

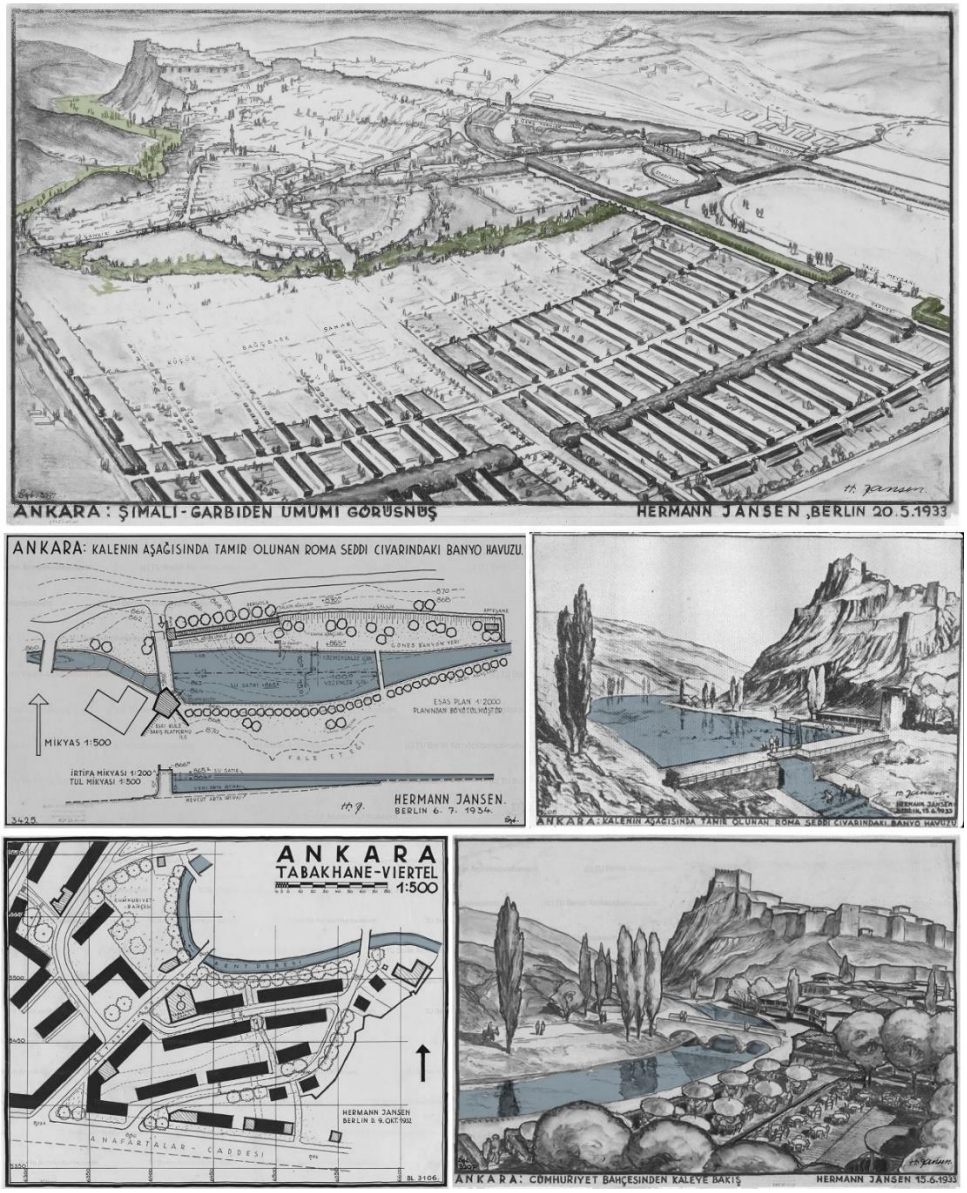


Figure 79. Jansen's proposals on the Bentderesi Stream (Architectural Museum of Berlin Technical University)

Described as the strongest imagery that a foreigner could witness (Jansen, 1937), the valley of Bentderesi Stream (Hatip Valley) was suggested to be freed from stone quarries. The historical Roman dam located on the north was proposed to be restored as a natural pool was designed on the east of the dam. An urban park (Cumhuriyet Bahçesi) was located on the banks of Bentderesi adjacent to Tabakhane neighborhood. Further to north, the basin floor of Bentderesi was allocated for vegetable gardens (Figure 79).

The principle of making open spaces accessible for the public resulted in the homogenious distribution by means of capillary green spaces (*grünflächen/kutrani yeşil şeritler*). These vessel-like connections were designed to create a functional circulation network interlinking both the different parts of the city and these areas to the open spaces. Two types of green strip formation could be observed in the plan. One of these types provides the arterial connection between neighborhoods and central open areas. The orthogonal greenway formation crosscutting the Workers' Quarter; one of them leading to Hippodrome, the other connecting the allotment gardens and Çubuk Stream, exhibits such structure on the north of the city. The greenway connection between Airport and Administrative Center (Güvenpark – Tandoğan greenway) on the west of the city also falls under the same category (Burat, 2008, pp. 78-81). The axes of Kavaklıdere, Küçük Esat, and Dikmen Stream was also suggested as major greenways (Tunus Street) interlinking Administrative Quarter and southern residences –as well as vineyard settlements at Çankaya further to south. This type mostly provides the inter-peripherial or periphery to center connections. The capillary greenways connecting close-range areas, on the other hand, denotes another type for strip formations. Two parallel pathways (Yüksel Street and Sakarya Street) crossing through the Administrative Quarter between the central axis (Atatürk Boulevard) and İncesu Stream exhibit such small-scale yet vital connections.

In the overall plan, the city was expanded on the basin floor and lower terraces, whereas, the higher terraces had not yet been included in the overall planning framework (Figure 80). The valley floors (800-850 m.) of major streams were allocated for open spaces or ministry campuses such as allotment gardens, Hippodrome, Stadium, Youth Park, Fidanlık, and Sanitary Institute. This planning

decision coincides with the widely accepted geomorphological recognition, since the loose soil structure, the high carrying capacity and high groundwater level in valley floors are denoted as disadventegeous for heavy industrial establishments and broad residential allotments (Erol, 1973, p. 6).

The settlement, previously located on the hilltop and leaped on the basin floor in line with Lörcher's Plan, was expanded on the the lower terraces (850-900 m.) by means of residential and administrative districts such as Yenişehir, Maltepe, Cebeci. The lower terraces are addressed as the most favourable segment due to the soil structure (loose enough to process, and stable enough to make construction), and drainage conditions (Erol, 1973, p. 9).

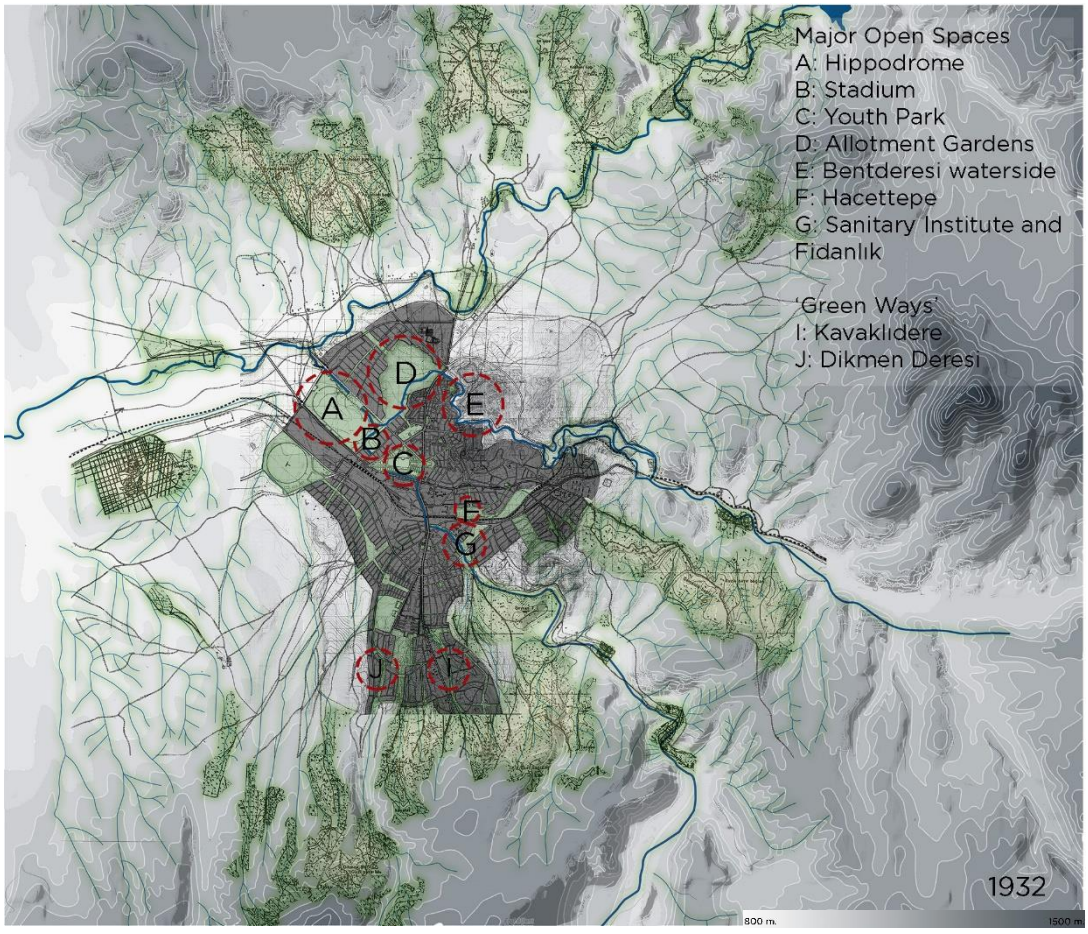


Figure 80. The macroform scheme of Jansen's Plan expanding the development on the basin floor and lower terraces, and integration of the fluvial system in terms of open space structure

The higher terraces (900-1000 m.) had not yet been included in the framework of the plan except for the low-dense residential formation on the south. A small portion of Küçük Esat, Ayrancı, and Kocatepe, where southern vineyard clusters were situated, are designated as the prestigious area for the free standing villas of administrative officials. On the other hand, unique spatial qualities of longstanding vineyard areas clustered around the small villages such as Etlik, Keçiören, Mamak, Dikmen are maintained. The physical ordinance of these areas are addressed as "*bağ bahçe nizamı*".

Small valleys of streams on highly disjointed terrain in higher terraces are transformed into a part of greenway structure serving for pedestrian circulation as well as open space. Such design principle is consistent since small valley corridors in the higher terraces are referred as major channels of air circulation in geomorphological terms.

5.4.3.2 Implementation Process and the Plan of Greater Ankara (1932-1939): Urbanizing the Terraces

After the final form of the master plan was submitted, the urban development gained pace as planned despite the conflicts occured in micro scale. As Jansen continued to involve in the process with proposals in urban design detail, he proposed to extend the frame of the development plan reaching up to the municipal boundaries. This offer was well-received by the Ministry of Internal Affairs. The undersecretary of internal affairs stated the necessity for spatial restructuring of an area pivoted around the center of Ankara with the radius of 5,5 km. Hereafter, Jansen was commissioned for "Master Plan of Greater Ankara (*Ankara Civarı Planı*)" in October 17, 1934. 1/10.000 and 1/20.000 scale base maps as well as 1/3000 and 1/2000 scale base maps, on which macro and mezzo scale plans of urban development within thirty years are to be drawn, were agreed to be supplied by Development Directorate[22] (Tankut, 1990, p. 119).

[22] However, Tankut (1990, p. 143) later mentions that Jansen was handed only 1/25.000 military maps. She describes the process as rather organic since development plans, implementation plans, base maps and cadastral plans were prepared simultaneously. The

The contract concluded between parties contained information on the locations and the size of the growth. In that sense, 48 localities of which the development plans are required to be prepared were included Article 4. of the contract. These localities were mostly addressed vineyard areas, farmlands, small villages and so forth. The square measure of the area to be included in the plan, on the other hand, was referred in the Article 6. Consequently, 15.864 hectare land inside the municipal boundaries was taken under the responsibility of the plan. This meant expanding the planning boundary eight times larger comparing to the 2.100 hectare land as the area covered in 1/4000 scale 1932 Plan. Eventually, the initial plans of the 8.167 hectare area were required in two years, as well as the plans of 3.600 hectare area were asked to be prepared in three years.

Meanwhile, the physical fabric of the city was rapidly taking form as observed in the map produced by General Directorate of Mapping (*Harita Umum Müdürlüğü*) in 1934 (Figure 81). Low dense formation of the urban fabric shaped the nucleus of the New Town and the district of Cebesi on its eastern extension as planned. Without a clear evidence of development on the west (such as airport), seemingly the city expanded and reached until the higher terraces at south (Figure 82). Besides, the north-south axis of the city come forward as it connects Keçiören at the northern terraces and Çankaya at southern terraces.

The housing deficit and the migration from rural areas lead to formation of informal houses in the era. Consequently, one of the two eruptive hilltops in the core of the calyx, Altındağ, was inhabited by unauthorised houses after 1930's. As the nearest threshold to the attraction zones of Cebeci and Yenişehir, the valley of İncesu was also occupied by informal housing (Şenyapılı, 1983, pp. 65-66).

signing of the contract before preperation of base maps supposedly cover an area almost twice as large than previous planned area could be given as indicator of the process.

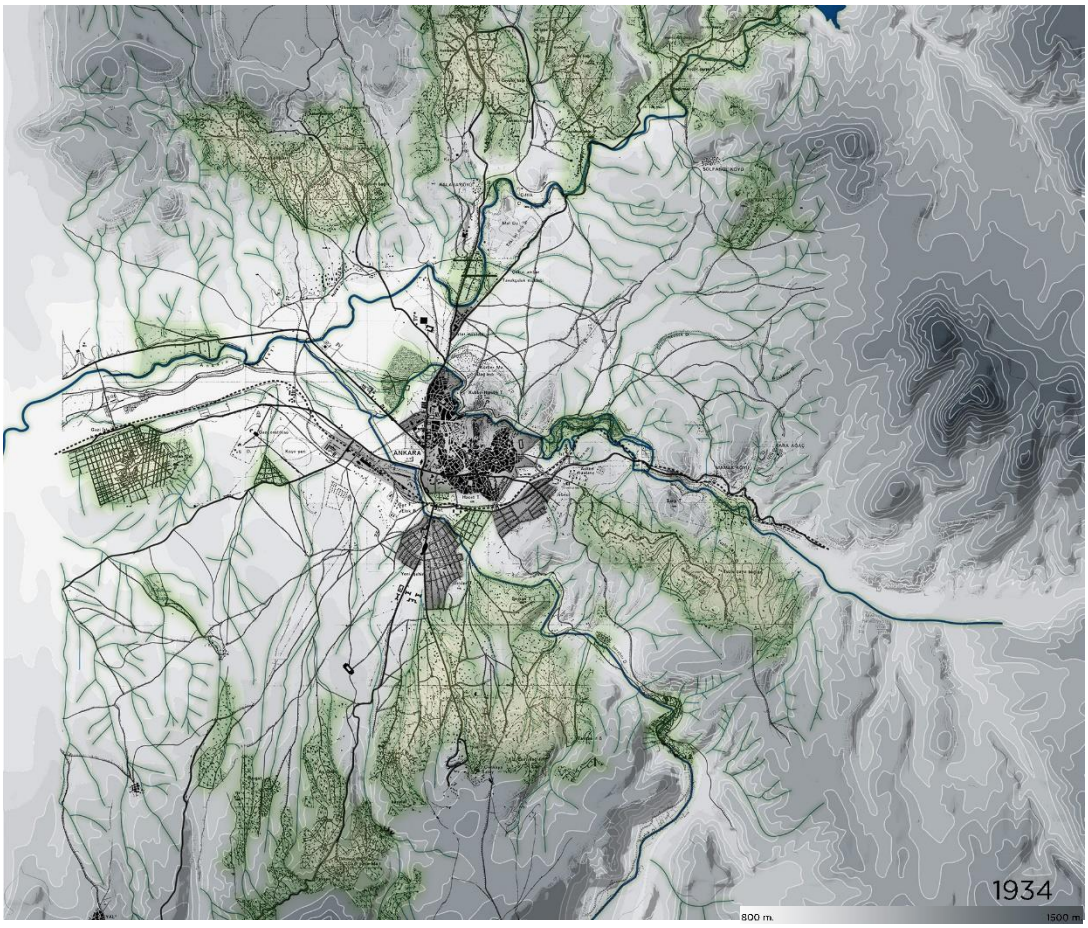


Figure 81. Urban growth gravitated towards southern terraces in the implementation process of Jansen's Plan (reproduced from 1934 Map of General Directorate of Mapping)

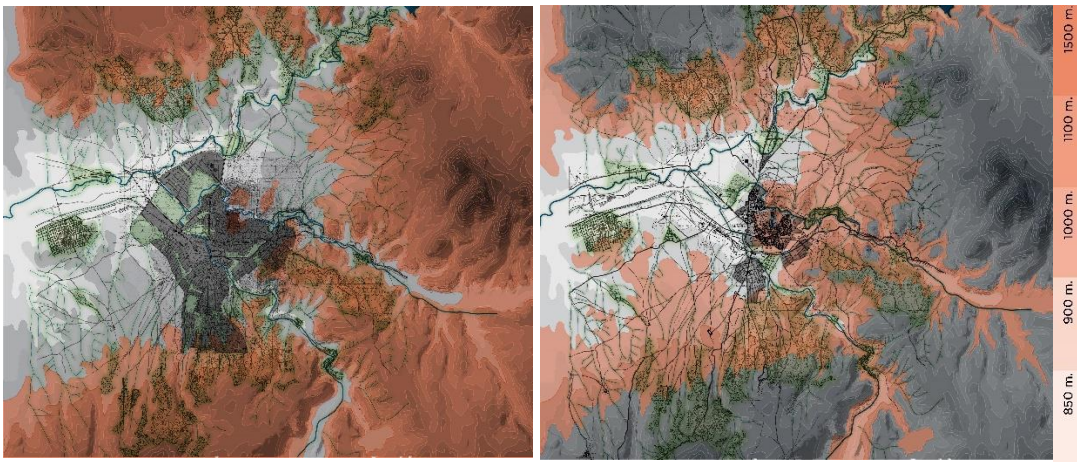


Figure 82. Jansen's proposal of expanding the city on the basin floor and southern terraces, and the development of New Town on the lower terraces and Cebeci district on the higher terraces

The Plan of Greater Ankara demonstrates the initial intervention on the vineyard areas[23]. Furthermore, this plan substantially informs about the pursuit of urbanisation on the periphery of the calyx with higher terraces (Figure 83). Etlik and Keçiören vineyard clusters on the north, Çankaya and Dikmen vineyard clusters on the south, and Samanlık vineyard cluster on the east were included in the scope of the plan. The expansion of developmental boundaries altered the design scheme in a larger context in terms of circulation system, settlement pattern, urban morphology, and open space structure (Figure 84).

To start with, for the first time the limits of the urban growth were expanded beyond Ankara Stream through the integration of vineyard clusters at north, Etlik and Keçiören, into the plan. This ultimately affected the circulatory system as a new arterial connecting Etlik to the major arterial (Atatürk Boulevard) was proposed on the north. A similar arterial connection was formed on the south, linking Dikmen to the New Town. Samanlık vineyard clusters were also connected to the system by means of an extension on the east-west arterial.

Consequently, a radial scheme was adopted in the final form of the circulation system; Etlik and Keçiören arteries bifurcated on the north, Dikmen and Çankaya arteries bifurcated on the south, the major north-south arterial interlocking northern and southern arterials as it connects Old Town and New Town, and the major east-west arterial connecting functionally diversified zones of the city from Samanlık to Gazi Forest Farm. While the north-south and east-west arterials are continuous enabling for the inter-city connections, Etlik and Keçiören arteries make a loop circulating between different levels of higher terraces as to integrate vineyard areas into the system.

[23] Authorities also prioritizes the preparetions of the development plans for peripherial settlements of Keçiören, Etlik, Mamak, Dikmen, Ayrancı, Keçiören, where the traditional vineyard fabric was agglomerated (Şenyapılı, 1983, p. 66).

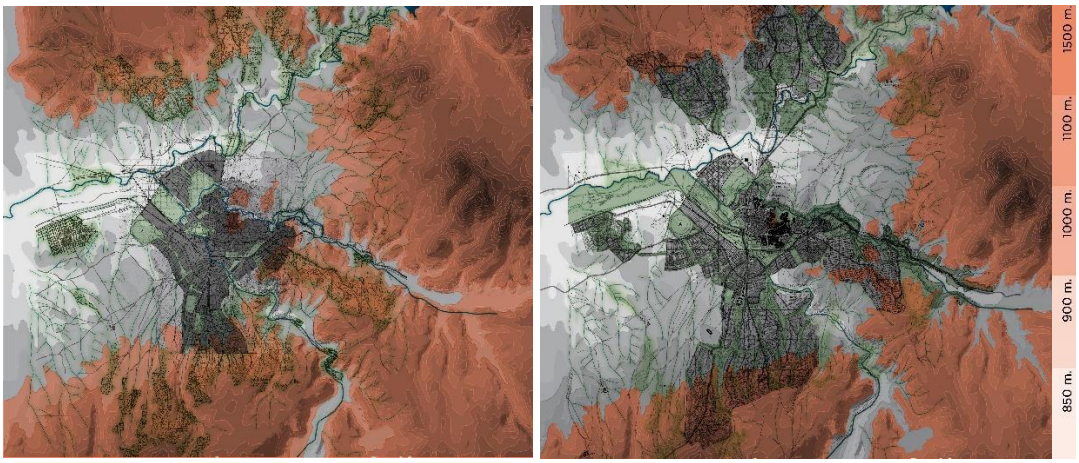


Figure 83. Urban development limited by the higher terraces in 1928 Jansen Plan and urban development reached towards the higher terraces on the north and expanded on the lower plateaus on the south in 1937 Greater Ankara Plan

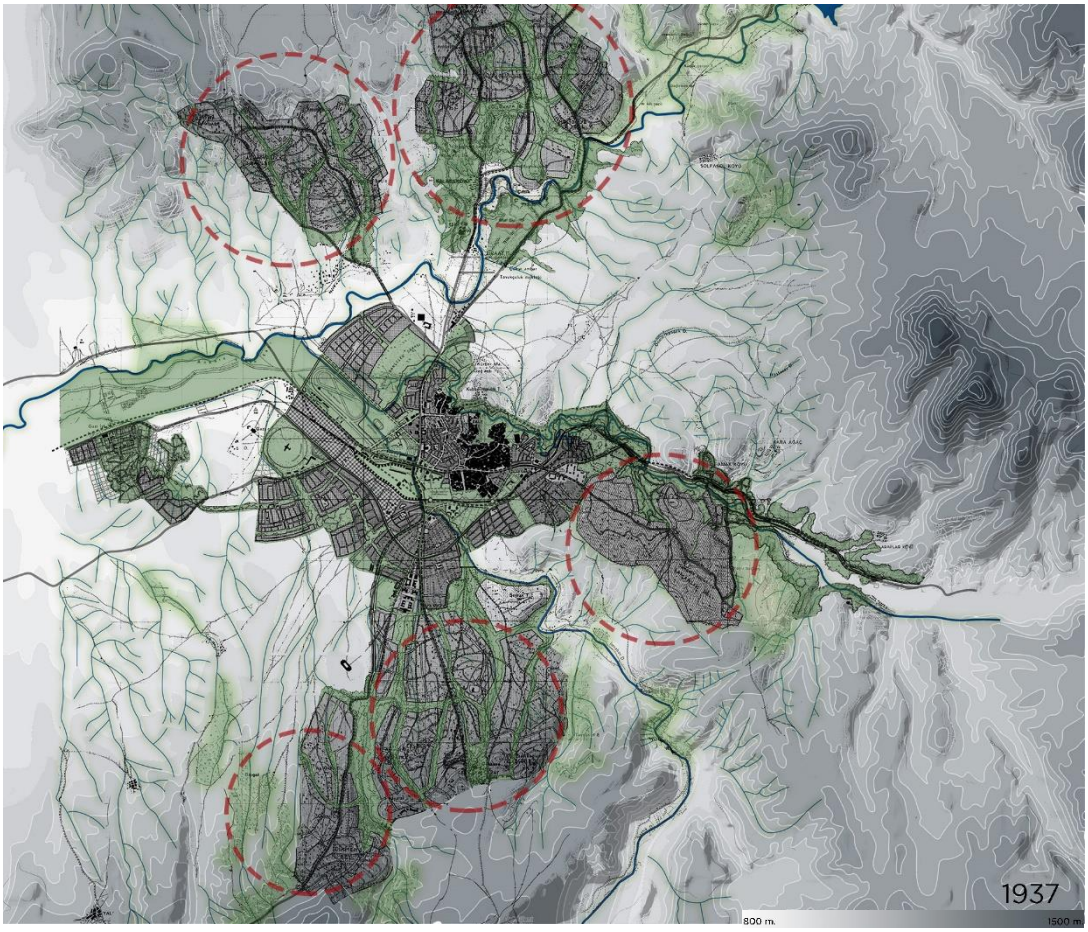


Figure 84. Greater Ankara Plan in terms of the integration of small valleys and fluvial system into macroform structure, circulation network and urban development

The settlement pattern demonstrate varieties in the growing circles of the urban form. While the Old Town was dominated by traditional urban fabric, the New Town was highly structured in line with the visions and principles of modern urbanism. A rather flat surface of the basin floor provided a flexible ground for an alternate design pattern. In that, the urban area encompassing the newly formed Bahçelievler, Maltepe, Yenişehir, and Cebeci was referred as "Internal Growth Zone", within which only residential fabric was allowed to be formed on 600 to 1000 square meter plots.

The tertiary circle of vineyard clusters, on the other hand, was denominated as "External Growth Zone" where free-standing villas were allocated in 1000 square meter plots in Çankaya, Keçiören, Etlik, Mamak, Dikmen. The plan layout of these areas was highly shaped by the formal constraints of the topography and was inherently affected from the former agricultural pattern. However, expanded development area lacked micro scale design proposals or representations as to how these vineyard areas will be transformed or retrofitted in line with the plan decisions. As Tankut (1990, p. 128) implied, the status of vineyard areas were undefined in terms of urban growth as the cadastral plans were not updated, the physical configurations were left open-ended, the related parts of the plan were not transferred in development plans.

A slightly elaborated plan of Keçiören depicts formal and functional articulation of an urban district that was previously a vineyard cluster (Figure 85). In that sense, the denser core formation (*Dichter Bebauter Ortskern*) and agglomeration of cultural and commercial facilities around the core gain legibility. It could be asserted that the core formations in the new development areas redefine the status of these areas as sub-centers in hierarchy with central functions of the Old Town and the New Town.

The circulation scheme created as the system of loops is clearer at this level. It is possible to deduce from the plan that the configuration of the road network predominantly conforms to the topography.

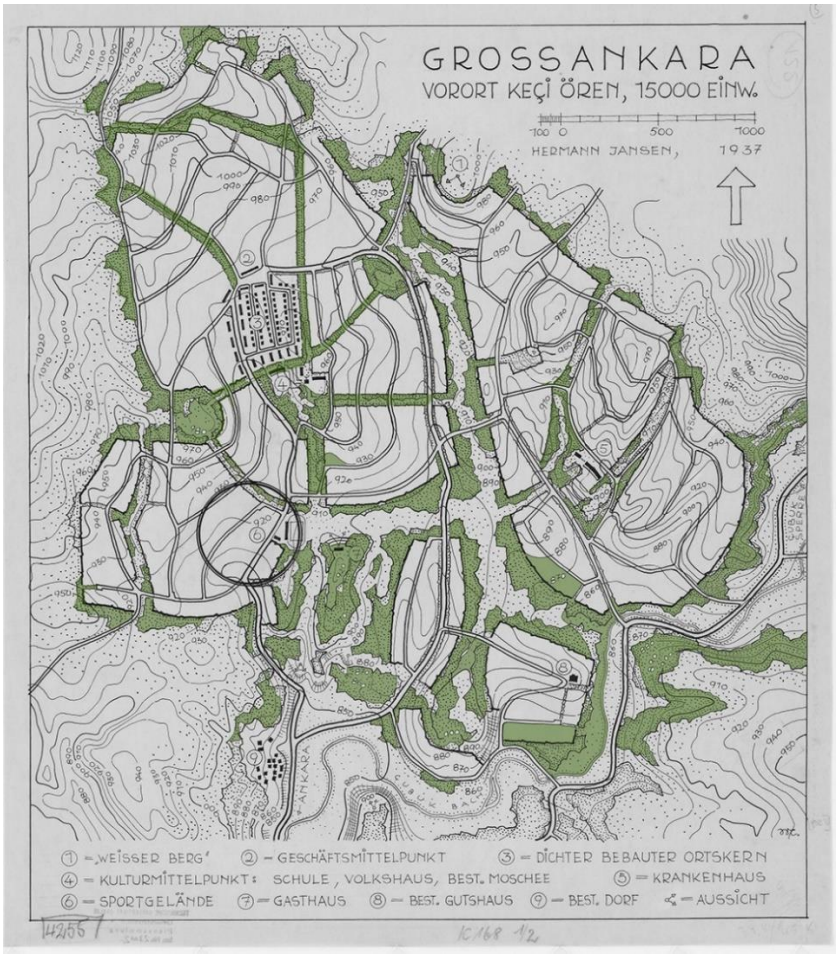


Figure 85. Detailed development plan of Keçiören, former vineyard cluster

The principle of laying open space structure on small valleys of tributeries is repeated at this section as well. Therefore, the valleys of Kubbeli Stream and Toklu Stream were designated as the major greenways ascending towards the Çubuk Stream. Similarly formed open spaces were based on Ayvalık and İncirli Streams in Etlik, Dikmen and Kirazlıdere Stream in Dikmen, Küçük Esat and Kavaklıdere Streams in Çankaya as the green arteries that form an interface between neighborhoods, and ensure continuity between neighborhoods, urban center, and central open spaces. In fact, the valley of Dikmen Stream and the course of Küçük Esat Stream were suggested as the major green arteries which link the proposed development areas to the core, New Town.

After the preperation of the Greater Ankara Plan, Jansen's involvement in the spatial formation of the capital was terminated in 1939.

5.4.3.3 Post-Implementation Process (1940-1950): Informalizing the Valleys

Towards the second half of the 20th century, a major migration movement from rural parts of the Turkey to the developing urban centers was witnessed due to restructurings in economics, especially in the agricultural production. That the housing demand was much higher than the supply led rural migrant to reside in informally built environments located at challenging terrain conditions. The planned environment were also taken under pressure due to technical and financial insufficiencies, administrative disputes and communicative incompetencies, conflict of interests amongst individuals (Tankut, 1990). Expansion of the development boundary to the municipal boundaries by the authorities in 1938 also implied an expansion of the limits of speculation over the urban land. This critical decision hindered the applicability of Greater Ankara Plan for the future growth of the city.

While the Old Town and the New Town was consolidated as the dual segments of the core, squatter areas were formed on the environs of central functions where topographical condition was considered as a treshold by the previous planners as well as planning authorities. In that sense, Altındağ, Atıf Bey, Yenidoğan on the foothills and environs of Timurtepe, Topraklık and Balkeriz on the terraces of southeastern terraces and on the valley of İncesu Stream was populated by the *gecekondu* houses. Şenyapılı (1983, p. 113), addresses the geomorphology as the parameter of the urban form basing the argument on the informal housing. She stated that if the topographical configuration (or threshold areas as mostly associated) of the city would present a different scheme, the layout of informal fabric within the city would differ accordingly.

Although the development in the New Town gravitated towards south with the allocation of embassies the terraces of Çankaya (Figure 86), where vineyard areas were present, Küçük Esat and Kavaklıdere, were not yet declared as a development area at the beginning of 1940's. In fact, the vineyards of Kavaklıdere was consolidated in terms of wine production with the establishment of Kavaklıdere Wine Factory (Resuloğlu, 2011, p. 63).

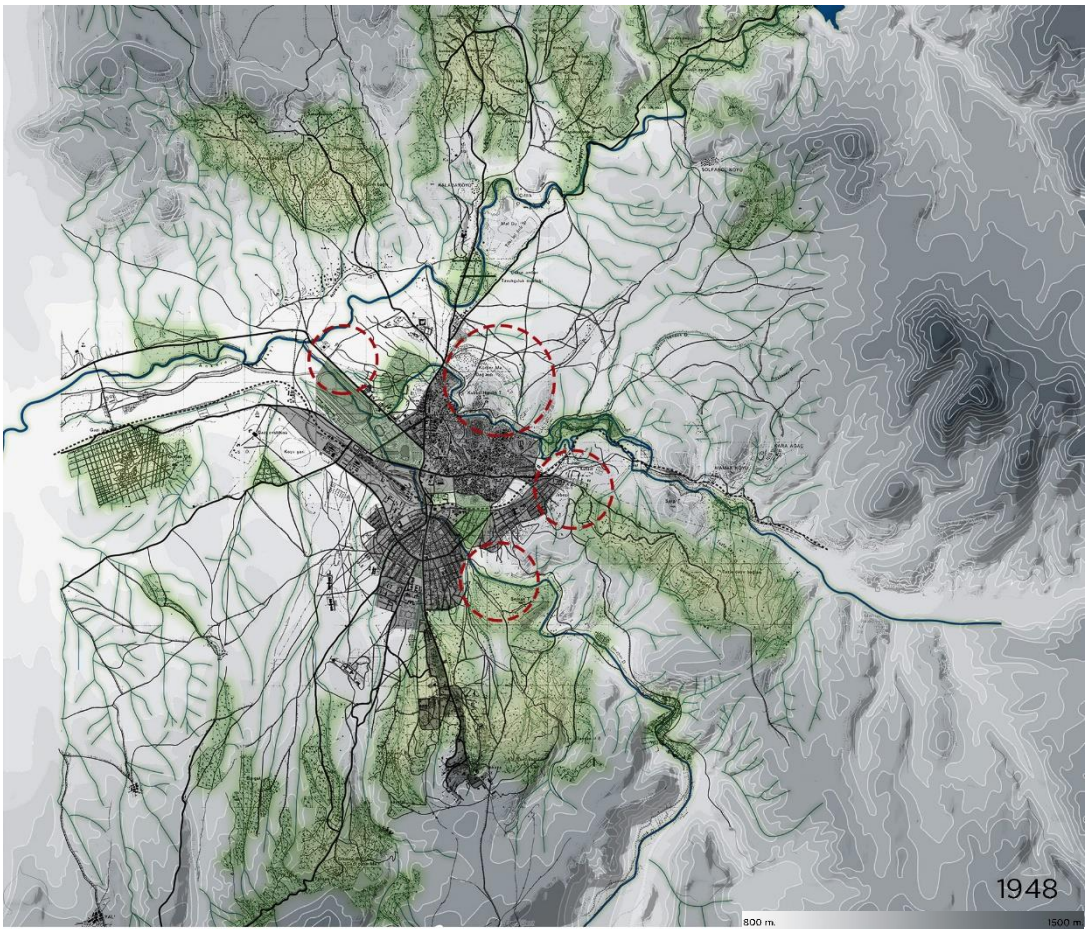


Figure 86. Linear urban development towards the higher terraces of Çankaya by the allocation of embassies and major spread of informal settlements on the fringes of the Citadel and New Town (reproduced from 1948 Map of General Directorate of Mapping)

Detached buildings with gardens was still the dominant type of housing in the residential urban fabric, although construction of apartment blocks were accelerated in Yenişehir in order to compensate the increasing land rent. In fact, the low-dense housing type with garden was adopted in the physical congifuration of cooperatives as an alternative mode of housing the middle class. The location choises of housing cooperatives was predominantly outside of the development boundaries (Şenyapılı, p. 78). This resulted in the urban expansion to gravitate towards the basin floor on the south with the development of housing cooperatives (Figure 87 and Figure 88).

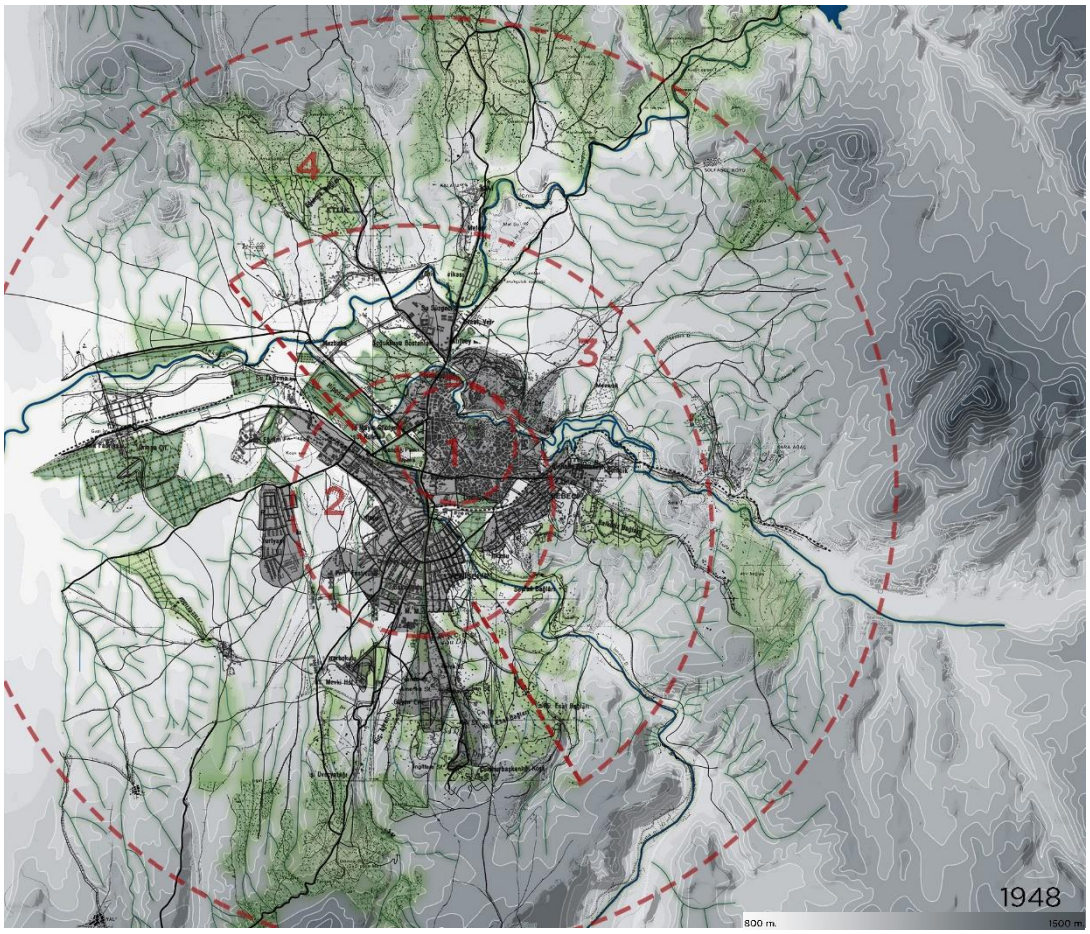


Figure 87. The western expansion of the city with housing cooperatives as well as the southern development and concentric growth of the city; Old Town (1), New Town (2), Informal Settlements (3), Vineyard Clusters (4) (reproduced from 1948 Map, İnönü Ansiklopedisi)

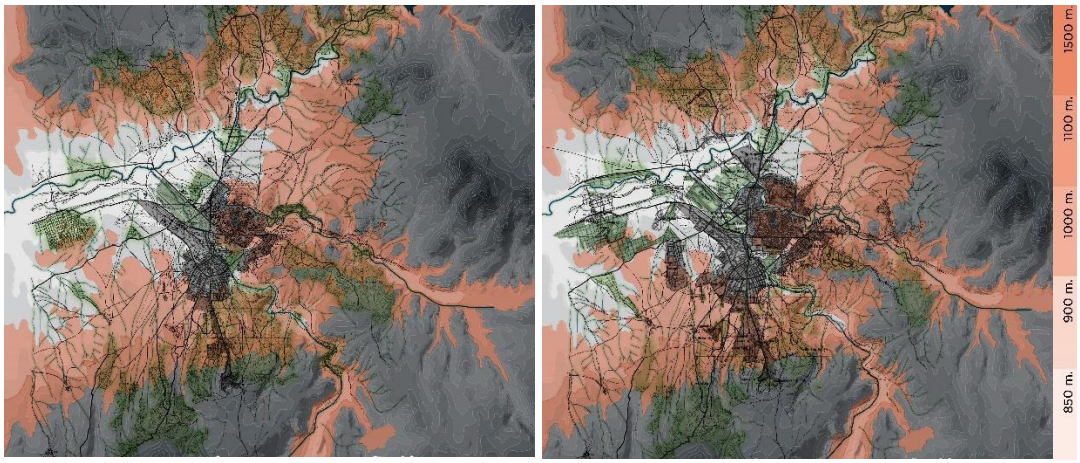


Figure 88. The development on the lower terraces towards the mids of 20th century

Some other industrial functions of the city, on the other hand, gravitated towards the Akköprü area, where three streams in the calyx intersect. Lumber market, joinery factories, marble industry, and abattoir was located in the vicinity (Şenyapılı, 1983, p. 98). The parameter for locating the industrial uses was substantially the direction of the wind as it was previously addressed by Jansen. This rationalization presents a perpetuity with the "downstream orientation" of pre-Republican era in the sense that a geographical phenomena indicates a parameter for urban formation.

As it was mentioned previously, Lörcher and Jansen targeted for a perception of the Citadel in terms of monumental and aesthetic quality through their design principles. The Citadel as the glorious reminscent of previous civilizations as well as a geomorphic phenomena characterizing the city was experienced from the city developed down the lower terraces. Although this visual experience was later destroyed as a result of the increasing building heights, a similar effect was created by relocation of mausoleum of Mustafa Kemal Atatürk on the top of Rasattepe, later to be called as Anıtkabir after 1944.

Up to north, the spatial qualities of Keçiören and Etlik vineyard clusters were secured in terms of preserving their country-side identity. However, the seasonal cycle of moving into the vineyard house in the vintage time vanished as the owners became the permanent inhabitants of vineyard houses due to increasing accesibility to the city center enabled by developing transportation facilities[24]. Similarly, Dikmen followed a similar track on the south of the calyx (Şenyapılı, 1983, p. 98; Toygar and Toygar, 2005). Despite the fact that the ratio of building permission requests were higher amongst vineyard areas in Keçiören and Etlik following the central areas, the Committee pursued the principles of Jansen Plan by controlled development (Şenyapılı, 1983, p. 105-107).

The urban pattern varied with reference to four concentric zones in this era. At the core, the traditional pattern in the Old Town persisted. The urban fabric of New Town

[24] Considering the fact that Etlik is located 6 km, and Keçiören is located 7 km away from the Old Town, the shift occured as soon as public buses were taken into service in these parts of the cities.

(Yenişehir), Cebeci, Bahçelievler, Station, Industry was majorly shaped in line with the ideal of creating a modern capital. Kavalıdere and Çankaya was also on the verge of urbanisation at the fringe. The tertiary belt consisted the informal settlements that emerged as an urban phenomena such as Altındağ, Atıf Bey, Yenidoğan, Topraklık, Balkeriz. The fringe belt consisted of vineyard clusters, Keçiören, Etlik on the north of the Ankara Stream, as well as Dikmen on the southern terraces.

The pattern of urban growth did not follow a uni-directional expansion in the era. As the center was developing from the inside out along major arterials[25], the peripherial vineyard settlements such as Etlik, Keçiören, Dikmen, Kayaş, Mamak were growing from outside-in towards the center (Figure 89). This bidirectional growth both from center to periphery and from periphery to center started a pattern that will eventually result in merging of both sides in the mid-century. Indeed, the northern settlements of Etlik and Keçiören coalesced with the city (Figure 90) as Altındağ, Atıf bey, Telsizler were settled by informal housing, former allotment gardens (*Kazıkiçi Bostanları*) were transformed into small scale industrial area, and small villages of Kalaba, Aydınlıkevler as such were urbanised through the initiative of housing cooperatives (Şenyapılı, 1983, p. 145).

[25] The urban development taking place in Kocatepe, Küçükesat, Kavaklıdere areas as the southeastern extension of the New City-Yenişehir presents an example to inside-out urban growth.

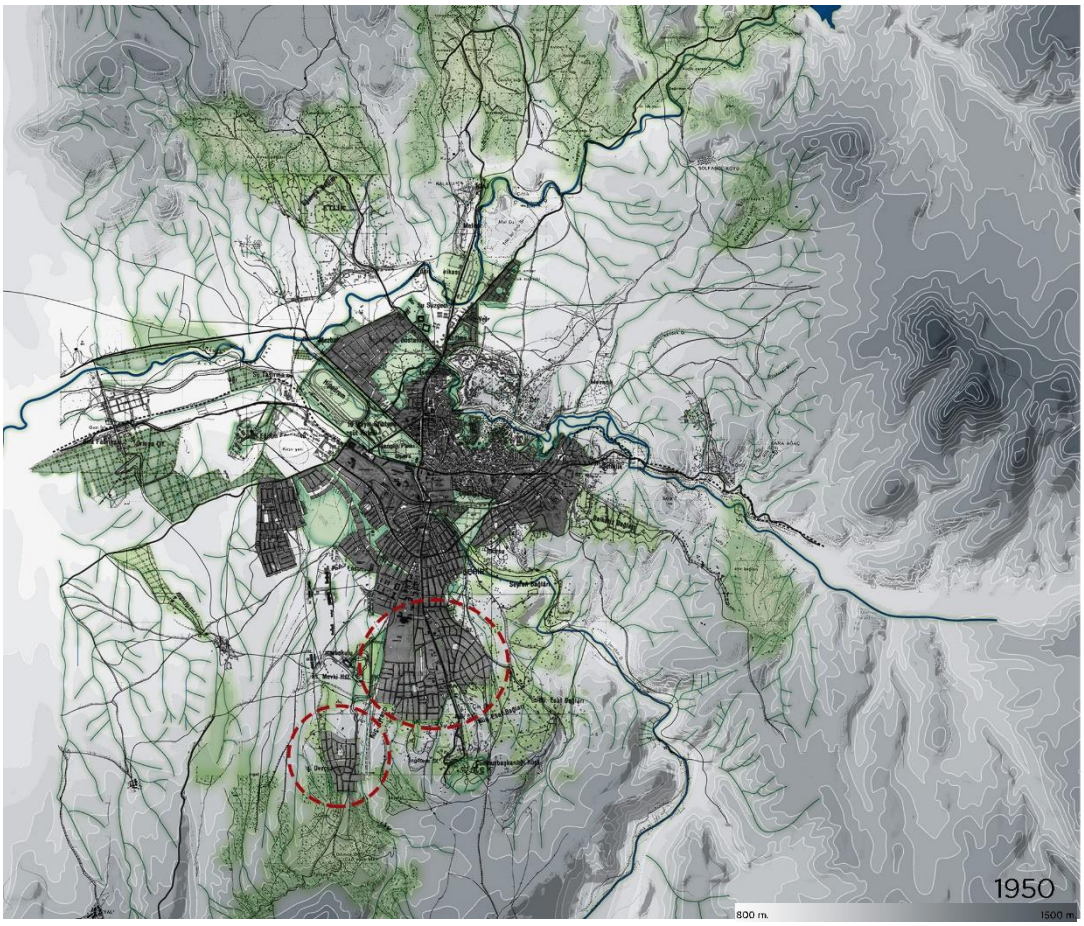


Figure 89. The east-west and south-north expansion of urban development and the bidirectional urban growth as the development of Dikmen gravitates towards the center (reproduced from 1950 Map prepared by Culture and Tourism Office)

As a summary of the post-implementation process (1940-1950), the urban macroform was shaping as envisaged by Jansen in Greater Ankara Plan in terms of expanding the planning framework with the integration of low dense urban fabric on the higher terraces (Figure 91). The realization of central bodies of open space system also played a part in structuring the urban macroform. However, the internal structure of the city started to deviate from the plan and degraded due to the increasing speculative value of the urban land, the expansion of the development boundaries, the rapid migration to the cities. Thereafter, pursuing the plan decisions of Jansen and controlling the urban development lost its practicality. Although the efforts to avoid uncontrolled development was partially yielded, the pressure of informal urban development necessitated a new plan with an updated agenda.

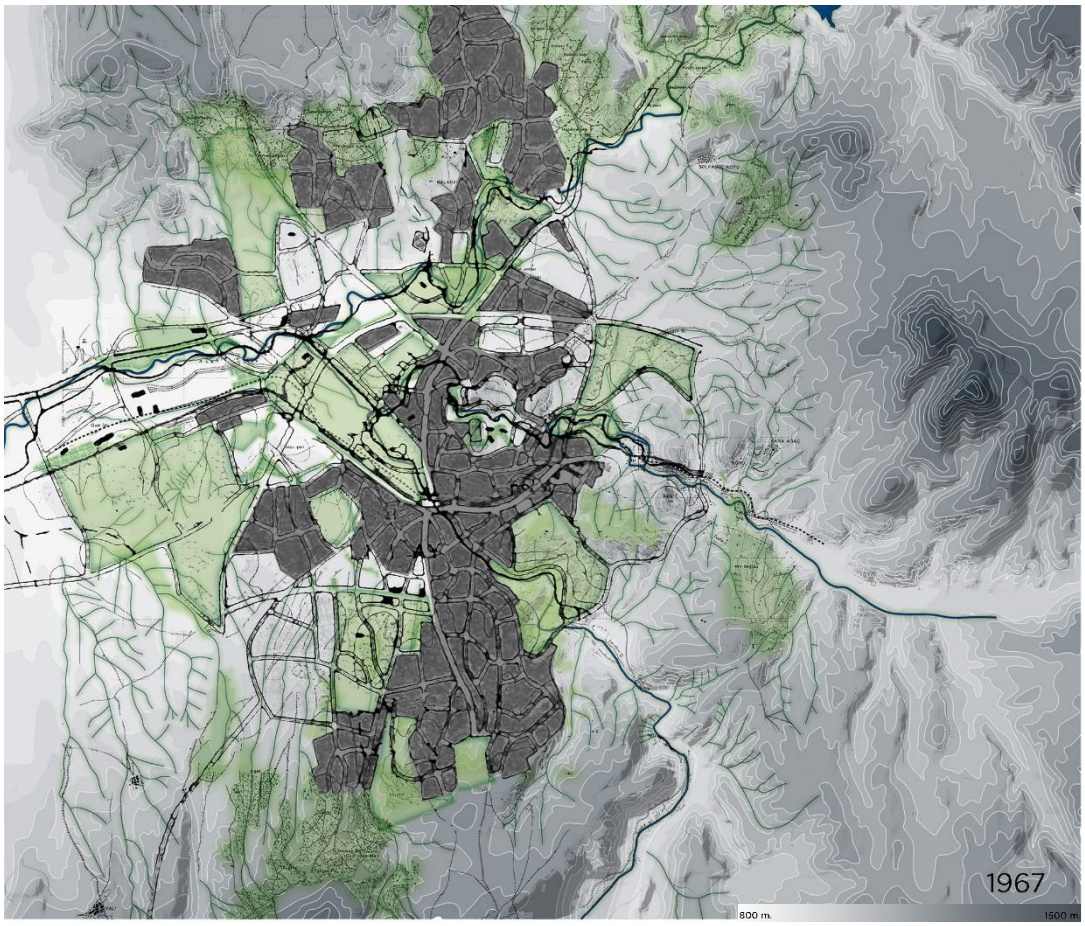


Figure 90. The fragmentary urban formation on the former vineyard clusters of Etlik and Keçiören directioned towards the center (reproduced from 1967 Map taken from The World Atlas in the collection of University of Chicago Digital Collection)

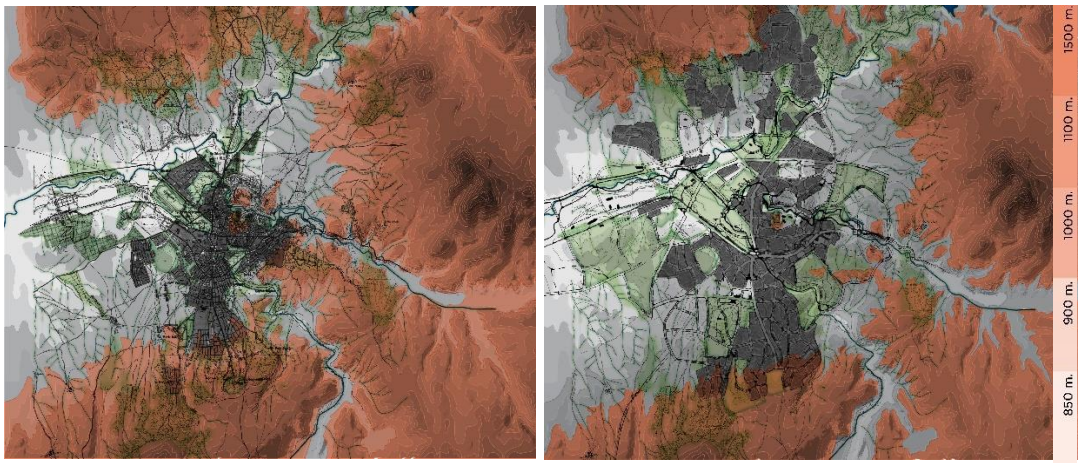


Figure 91. The urban expansion on the higher terraces and the lower plateaus as the new limit for further growth

5.4.4 Consolidating the Urban Development in Calyx: Yücel-Uybadin Plan

The resolution to the urban problems emerged in the post-implementation process of Jansen Plan was once again sought in a suitable master plan yielded from an international competition. A report, prepared by Development Comittee of Town Council of Ankara, provided preliminary information on the analyses of various aspects of the city; "geographic, climatic, geologic, environmental, historic, demographic, land ownership features and facilities, education, health, agriculture, commerce, economy, transportation, recreation as such" (Kaya, 2002, p. 42). The project brief required structural, formal, and functional ends in the design proposals of participants. The scope of the plan was set for the population of 750.000 for a 50 year timeframe[26]. The planning boundaries was limited by the İstanbul, Eskişehir, Konya, and Çankırı roads.

Amongts the competitors[27], the proposal of Raşit Uybadin and Nihat Yücel was selected by the jury in April 16, 1955. The basic implications gathered from the plan could be listed as follows (Ankara Nazım İmar Plan Raporu, 1957):

- The major sites of intervention within the scope of the plan were former vineyard areas on the higher terraces (Etlik, Keçiören, Kalaba, Dikmen, Ayrancı, Çankaya, Küçükesat) as the urban development was elongated on the north-south axis (Figure 92). A controlled development was proposed in the settlements of Hatip Valley on the east (Mamak, Kayaş, Üreğil). No major development was proposed on the western direction since the planning decisions was required to be limited within the municipal boundaries.
- The plan favoured an infill development on the empty plots located in the urban fabric instead of a new development area by negating the further expansion of the city.

[26] The population estimated by authorities was brutally criticized as not being realistic as the 300.000 population expected for 1965 in Jansen's Plan was already reached in the mid-century besided the 50 year timeframe (Şenyapılı, 1983; Tankut, 1990; Kaya, 2002).

[27] The renowned foreign and Turkish architects and planners were participated with their teams. However, it is unfortunate that the proposals of these teams are not available at municipal archives.

- The proposed urban morphology reflects CIAM-esque aspirations with high-density apartment blocks situated green as well as low-density Siedlung type neighborhoods.
- A similar open space structure of Jansen Plan was proposed although these areas were identified as “areas outside settlements”, instead of a hierarchical and functional space definition (*freiflächen, grünflächen, grünstreifen*). The valleys of tributeries were secured as open spaces functioning as wind and air circulation channels. In that sense, the valleys of Kurtini, Ayvalı, and İncirli Streams in Etlik, and the valleys of Portakal Çiçeği and Dikmen Streams in Dikmen could be exemplified as a part of the open space system apart from the central open spaces such as Youth Park, Hippodrome, Stadium, that were realized through the Jansen Plan.

  Moreover, the plan report reflects the concerns on İncesu and Bentderesi Streams as they were becoming a part of the sewer system. Hence, the plan highly suggests the maintenance of these now-inner city streams by means of enhancing sanitary conditions.

The jury found the plan successful in terms of perpetuating the urban structure as the product of Jansen Plan, proposing new development areas at north and south, forming an open space system in good connection with the development, generating a circulation network flexible for future growth. However, the plan was also criticized for being limited with timid internal arrengements of the present condition instead of a radical planning strategy that would potentially shift the formation of the city.

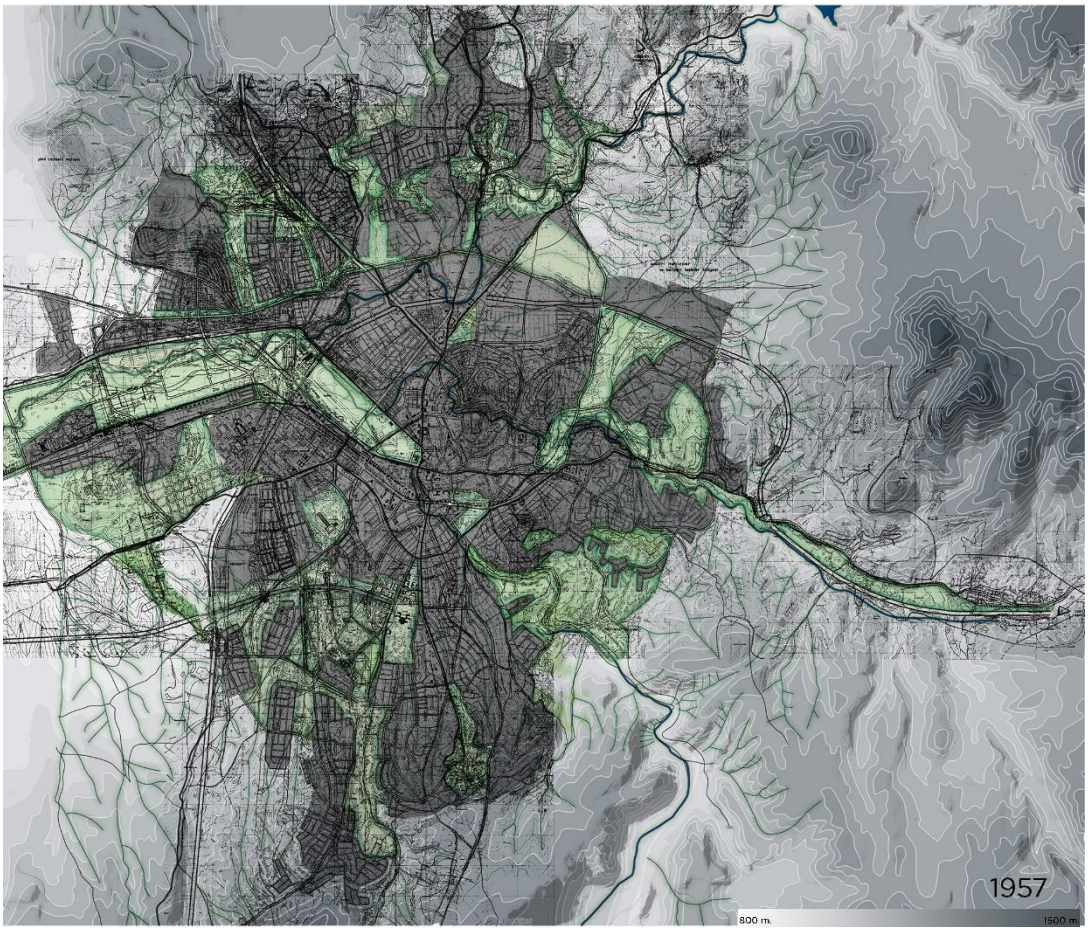


Figure 92. The macroform pattern of Yücel-Uybadin Plan; urban growth on the terraces and integration of small valleys on the terraces as an open space system (reproduced from 1957 Yücel-Uybadin Plan)

Altaban specifies the geomorphological features of localities where new urban development was proposed in Yücel and Uybadin Plan. The development on the north was located between lower terraces on 850-900 meters elevation and higher terraces on 900-1050 meters elevation (Altaban, 1987, p. 134). The southern counterparts of these settlements, Dikmen, Ayrancı, Çankaya, had a similar, yet more compact spatial organisation. 1000-1050 meters of elevation designated the altitute of urban formation in the higher terraces of Çankaya (Figure 93). The development in the higher terraces of Dikmen, on the other hand, 1150 meters of elevation defined the upper limit (Figure 94) (Altaban, 1987, p. 134).

Altaban (1987, p. 135) also refers to the geomorphological conditions on which the unplanned development haphazardly spread inside and outside of the planning

boundaries. Informal settlements were densely located on the western parts of the city close to Balgat, between Balgat and Dikmen, on the valley of Dikmen, and on southwestern higher terraces of Aşağı and Yukarı Öveçler with 950-1150 meters of altitude the urban form on the east of Cebeci and Abidinpaşa, and on settlements of Hatip Valley from Mamak to Kayaş also intensely constituted by informal fabric.

The vineyard pattern were no longer pursued in Keçiören, Etlik, Kalaba and Aydınlıkevler, instead, these areas were considered as *banlieues,* the low dense peripherial segment of the city. Kaya (2002, p. 87) unfolds this transformation in relation with the population densities per hectare;

> "Proposed low dense settlements and development in Keçiören –100 people per ha., persists a rural character resembling the existing vineyard houses. However, in Etlik –245 people per ha., Ayrancı –473 people per ha., Çankaya –321 people per ha., and Küçükesat –304 people per ha., a denser settlement and development was proposed reflecting an urban character."

A case study based on the analysis of transforming urban fabric in Küçüesat reveals the dynamics of transformation and its results in physical environment. The alterations in the former vineyard areas in terms of physical fabric and the character of the area is strongly correlated with the urban growth proposed by Yücel and Uybadin, land speculation sought by the public as the self-interest, and administrative decisions. The horizontal expansion gains verticality in the former vineyard areas as a result of the higher land values that indicate higher land rent (Kaya, 2002, pp. 103-104). Consequently, former "unity and identity" of vineyard areas as well as the design principle of sustaining a low dense banlieue type of urban environment in these areas dissolved altogether as a result of prevalent administrative, regulatory, and individual approaches to urban space. Further to that, timid planning strategies failed to respond to the urban problems except for carrying these problems to another level.

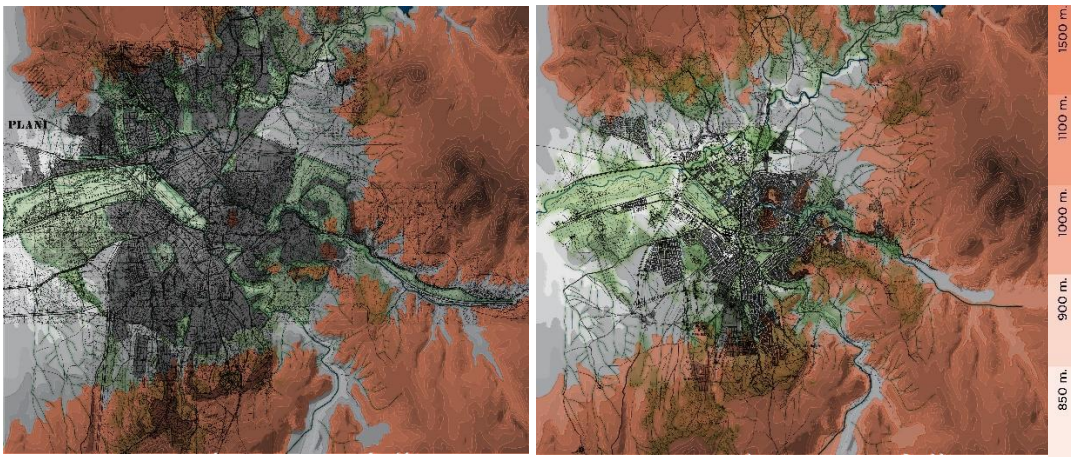


Figure 93. The urban development proposal limited by the edge of plateaus and the urban growth on the higher terraces of Çankaya, around the center on the lower terraces, and lower terraces of north (Yenimahalle)

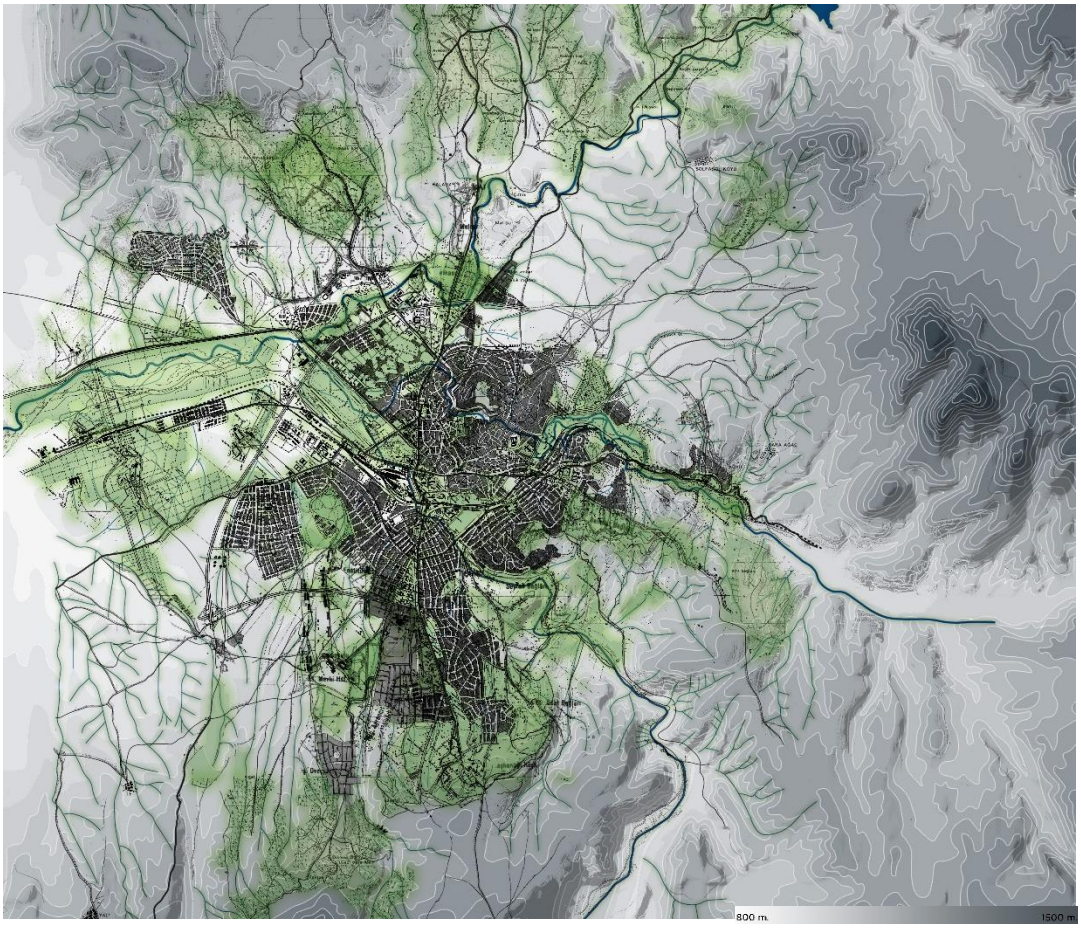


Figure 94. Urban growth towards the higher terraces on the south and on the northwest, and towards the basin floor on the west (reproduced from 1960 Map)

5.4.4.1 Implementation Process: Disintegration of Urban Formation from Calyx

The ideal of taking development of the capital city under control by means of Yücel-Uybadin Plan did not last long after the plan was put into practice. The major factors that put the Yücel-Uybadin Plan back on the shelf could be summarized as; 'populist' approaches in political regime favouring the development of İstanbul, economical crisis that affected Turkey, 'populist' approaches in administrative and regulatory structures legalizing informal houses with amnesty laws and encouraging land speculation without addressing the problem, population increase in the urban centers, the increasing urban densities with "tear down-build-sell" as a housing process adding to the speculative demands of individuals.

The urban morphology of Ankara as envisaged by Yücel-Uybadin; two partite system composed of high rise buildings standing in spacious green areas along the roads and low dense buildings in rectangular building blocks, has been dominated by "standardized, monotonous, high density, and unhealthy" apartment blocks regardless of the planned context.

Although the core of the green space system laid on the İncesu basin floor was realized as planned by Jansen, the south-north oriented valleys of local streams as the peripherial extensions of this system has undergone a rapid urbanization. Consequently, the valleys of tributeries, functioning as air circulation corridors, recreation, and channels of pedestrian circulation, has been transformed into a part of the road network (Figure 95). In parallel, the valleys small streams lost functional and visual qualities as setting the road network was accompanied with high dense urbanization.

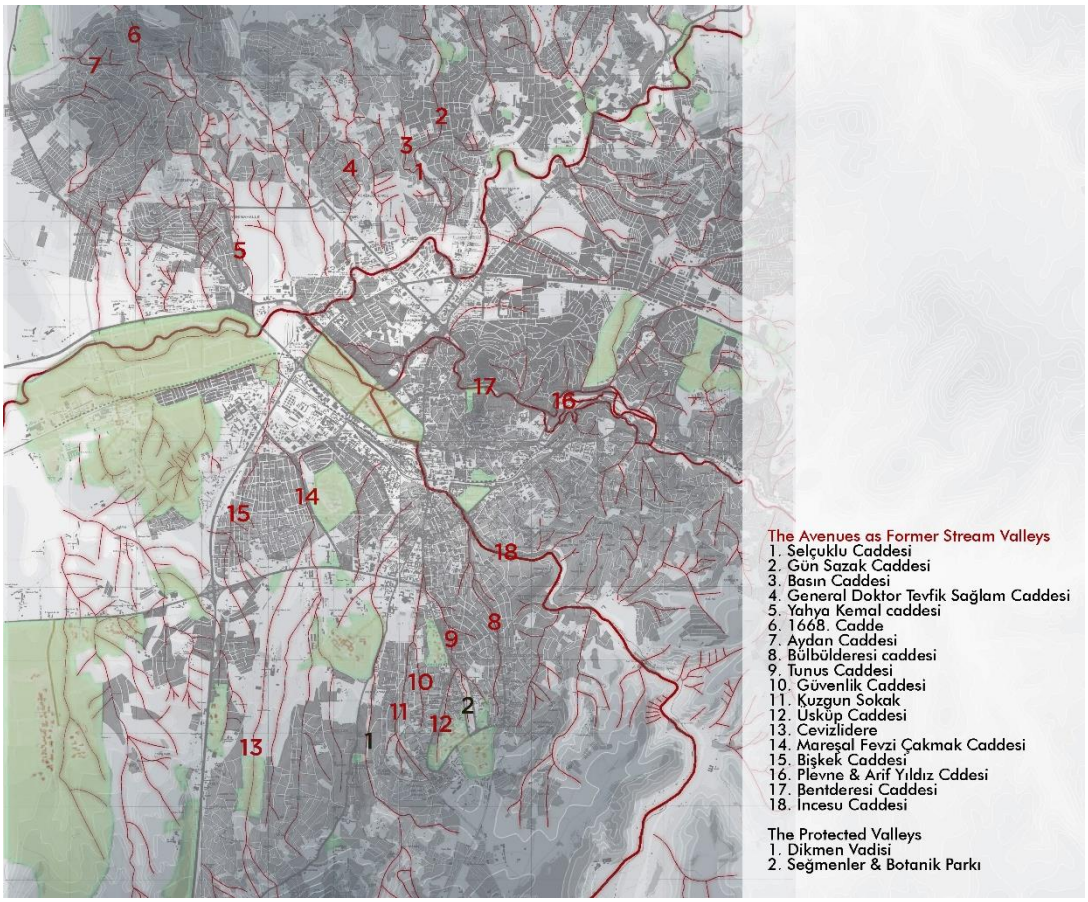


Figure 95. The stream valleys transformed into road network

Tankut (1990, p. 193) pinpoints that the origin of the systematic degredation of open spaces started as early as 1938. He bases her argument on the commission reports and states that;

> "The Republican administratives, who are proud of turning the steppe of Ankara into green in a decade, constantly contradicted with Jansen's open space policies. Occasionally extravagant aspiration of the planner (Jansen) in terms of creating green areas, perpetually disregarded and neglected in practice. The justification to this conflicting approach was set forth as the practical problems of property and expropriation in parcel scale. Therefore, downsizing the open spaces by means of making partial changes in the plan was adopted as the solution."

The major stream valleys of İncesu and Bentderesi, the protection of which were strongly emphasized in the plan report of Yücel-Uybadin, have been filled with informal settlements. The insufficiencies in the infrastructural system of these

settlements resulted in the transformation of the streams into a sewer system[28]. Later Bentderesi Stream (1957) and İncesu Stream (in the beginning of 1970's) were culverted and asphalted as a part of the highway system.

Consequently, urban development ended up pushing the limits of the calyx disregarding the geomorphological context (Figure 96). Although the core was highly consolidated as planned, the peripherial segments of the city was mostly formed as a result of the market dynamics (Figure 97).

The attempts to control the urban development were be failed, and a new plan with an alternative strategy was be sought in the following decade. Ankara Master Plan Bureau (AMANPB) radically proposed expanding urban development boundaries to the outer calyx in the new plan. This planning strategy turned a new page in geomorphological terms yet to be explored in the future.

[28] Şenyapılı (1983, p. 171) notes that the sewege carried by sewege trucks were dumped into Çubuk Stream in 1950's. The waste garbage, on the other hand, were collected and buried in the former vineyard area of Balkeriz.

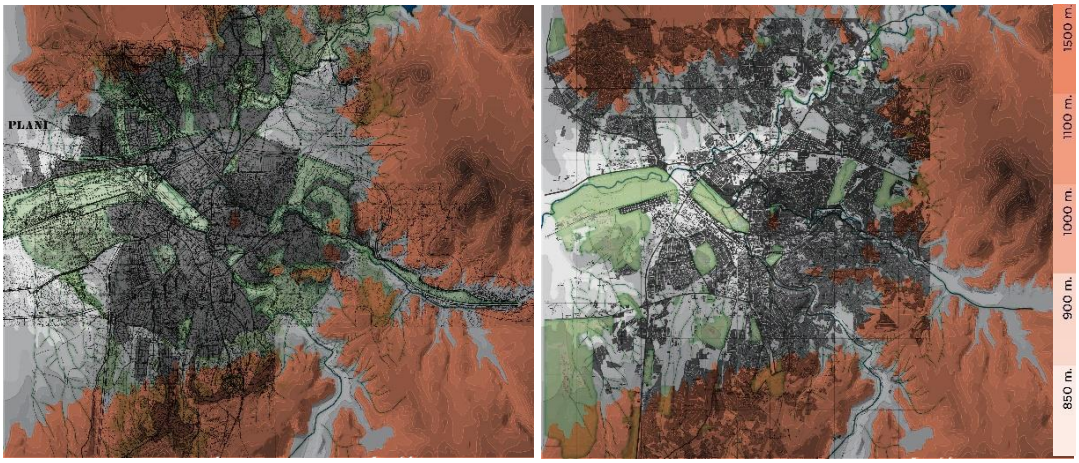


Figure 96. Urban development consolidated within the calyx in Yücel-Uybadin Plan and the following urban growth exceeding the threshold of lower plateaus

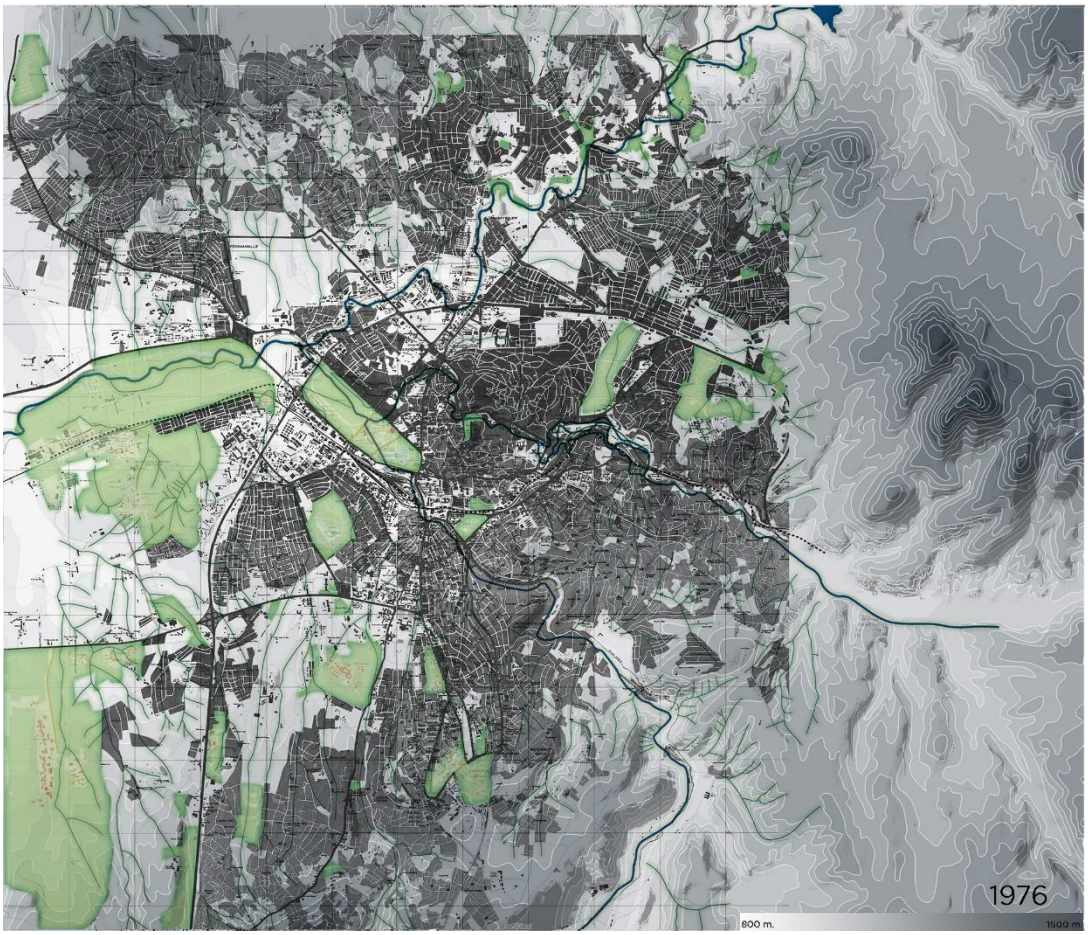


Figure 97. The overly fragmented urban growth after Yücel-Uybadin Plan (reproduced from 1976 Map)

5.5 Concluding Remarks

This section proceeded with the urban formation process of Ankara in relation to different segments and components of calyx. Findings on how the calyx was utilized and approached in different eras by different agents have been transferred.

Up until the Roman Period, the calyx of Ankara functioned as a crossroad. In the previous chapter the nodal position of Ankara in its macro scale geographical configuration was mentioned. This nodality was consolidated with the presence of historic routes such as royal road and roman road system.

As the settlement was located on the eruptive hilltop, it take advantage of defense and shelter position through the control over the basin and routes. Upstream valleys and higher plateaus were mainly utilized as a water source as it was brought into the city by terracotta pipes. Some civic structures such as Roman Bath and Roman Theatre was located on the lower levels of hilltop for the convenience of water supply, climate, topography etc.

Whereas Ankara was attributed with governing functions over the Anatolian Peninsula until the Roman era, the settlement functioned as a trade and commerce center on the extension of Imperial city of İstanbul. The settlement retreated inside the outer walls utilizing valleys as the agricultural production. In the Ottoman period, an upstream and downstream orientation based on the direction of the flowing water. In that sense, the upper segments indicated purity and sanitation where social gatherings or sanitary activities took place. The lower segments, on the other hand, were allocated with petty industry such as leather and mohair production and the abattoir. The downstream of İncesu was already a marshland creating a threshold for the settlement.

The terraces in the Ottoman period had been the locus of a unique settlement pattern of vineyards in close correlation with north-south running small valleys of tributaries. These vineyards were clustered on the northern and southern terraces. The vineyards indicated a rhythmic orientation and identification for the inhabitants of the settlement. The relationship between the settlement and the vineyards were based on temporal rhythms. As the first cycle starts with the coming of spring the inhabitants

of the settlement moved into their vineyards houses, then in summer they moved back into the Citadel. And as the second cycle starts with the vintage season/*bağ bozumu/gazel vakti*, the inhabitants moved back into the vineyards and processed the agricultural products, and they moved into the city as the winter starts.

The turn of the 20th century has been a critical breaking point for Ankara as the city was attributed with capital functions in the construction of the new regime and new nation based on modernity. This shifted the traditional formation of urban space to the making or envisioning of urban space by means of spatial plans, projects, and programs.

As soon as the master plan of capital Ankara was commissioned to Lörcher, the duality of the new town and the old town emerged. In that sense, the Old Town and the hilltop was conceived as a threshold in the production of modern city, yet it was attributed an aesthetic and monumental quality in the configuration of the urban fabric. Lörcher proposes a radial growth on the basin and lower terraces, and bases the open space system on the fluvial structure. It is seen that the marshland on the downstream of İncesu does not constitute a threshold for the city as he suggests draining the marshland with modern techniques.

Following the Lörcher Plan urban growth was limited by the higher terraces and development took place on the basin floor and lower terraces, the forest farm was laid on the former marshland area on the basin, and the regeneration of İncesu marshland.

As Lörcher Plan loses its applicability, a new competition was held. Jaussely and Jansen as the experts on the macroform planning as we witness in the Barcelona, Paris and Berlin Plans proposed future plans for Ankara. We cannot observe such extensive plans in the case of Ankara, and Jansen's plan is approved as being more down to earth regarding the expectations.

Briefly, the plan favors the expansion on the basin floor and lower terraces, and higher terraces to some extent on the south. Jansen proposes the spatial configuration of an extensive open space system in different hierarchies on the valleys and basin floors in close correlation with the fluvial structure.

In the following implementation process, further formation of the city is observed reaching the higher terraces on the south, and north south axis Keçiören to Çankaya starts to gain legibility at this process.

On the implementation process Jansen proposes to prepare a plan for Greater Ankara encompassing vineyard areas. In this scheme, urban development boundaries are expanded until the plateaus as the vineyard clusters are urbanized. Urban fabric is formed in tripartite concentric segmentation: traditionally formed Old Town at the center, New Town and west and east extensions of the New Town as Internal Growth Zone with relatively denser configuration, and Vineyards on the fringe as the External Growth Zone with low dense detached housings.

This plan is the earliest step of urbanizing the terraces. As it is observed from the plan of Keçiören, the south-north running valleys of tributaries integrated as circulation network and open spaces that both divides and holds together the neighborhoods in the configuration of urban form. And it is seen that a denser core formation agglomerated with cultural and commercial facilities is proposed as the sub-centers of the city.

After the Greater Ankara Plan the city linearly expanded towards the higher terraces of Çankaya. Rapid migration movements into the urban areas resulted in the formation of informal settlements in the challenging terrain conditions such as valleys or hillsides.

Urban expansion is gravitated towards the lower terraces and basin floor on the west with the formation of housing cooperatives; as well as towards the southern higher terraces. The city constituted four segments: Old Town in the core, New Town on the south with districts of Yenişehir, Bahçelievler, Maltepe, Cebeci, informal settlements on the eastern environs of the city, and vineyards on the fringe.

Towards the mid-century the city expanded in every direction. The urban growth was bidirectional as the city developed from the center along the major arterials, and urban development on the vineyard areas grew towards the center

After the mid-century, the urban development in former vineyards areas coalesced with the city. Although the macroform of the city is developed as planned Jansen, especially, the open space structure at the center, the internal structure of the city deviated from the plan.

With the rapid population increase and the decreasing control of the plan, a new competition was held within which Yücel-Uybadin Plan was favored by authorities. In this plan, the urban development in the calyx was consolidated. Former vineyard clusters have been the major sites of intervention as low dense banlieues having countryside identity. Open space definitions were rather ambiguous since these areas were denoted as "areas outside settlements", yet valleys of tributaries were integrated as outlying parts of central open spaces. The plan perpetuated the Jansen decisions instead of a radical planning strategy.

In the following period, the urban development in the terraces coalesced with the city, and urban growth took place on the higher terraces at the north and south.

Later, an overly fragmented urban form dominated the calyx. The terraces were occupied with standardized, monotonous, high density, unhealthy apartment blocks rather than low dense banlieues. At the same time, small valleys of tributaries on the terraces were transformed into road network. The urban development spread all over the calyx exceeding higher terraces and reaching plateaus in 1100 meters of altitude.

Stream valleys were transformed into a sewer system and major streams, Bentderesi and İncesu were culverted and transformed into vehicular roads. The characteristic geomorphological attributes were dissolved and the urban development surpassed the defined geomorphological space of calyx. Since the research area has been limited with the Inner Calyx, the continuing urban formation expanded on the Outer Calyx towards the west will not be dwelled on in this study.

CHAPTER 6

CONCLUSION

6.1 A Need for a Geomorphological Approach in Urbanism

As mistakenly conceived today, the Earth's surface could not be reduced to a neutral ground on which cities expand recklessly. The earth-forms, majorly distinguished with physical configuration, substantially establish a predetermined context man-made environment. Geomorphological structures constituting the surface relief harbor spatial qualities beyond presenting a muted physical environment. To that end, the space denominating concepts that transform geomorphological artifacts into spatial phenomena could be followed as *enclosure, extension, centrality, directionality, continuity, and proximity*. How a geomorphological space encloses, how it extends, how it centralizes, directions, or continues denote the spatial configuration of geomorphology. Further to these, the capacity to form *boundary* enables for the identification of a geomorphological space. The use of these concepts facilitate for analysis in different scales as geomorphological spaces unfold as nested systems of *environmental levels*.

The physical formation of geomorphological space is correlated with the configuration of its structural components as predominantly shaped by *fluvial and tectonic forces* of nature, namely through incision, deposition, and eruption. The two structural elements generated by natural cycles are *fluvial and solid structure*, harboring distinctive capacities for the formation of geomorphological space. Some spatially acknowledged geomorphic patterns of solid structure are flat planes, isolated hills, valleys and their capacity to enclose or extend in the environment. In that sense, isolated hills manifest a centralized extension, valleys direct and delimit space, and

uniform hills present a continuous extension. The textural qualities such as vegetation and material contribute to the spatial qualification of geomorphology as a secondary structure.

Fluvial structure and its formal configuration denote a spatial quality in terms of defining the water body, transforming the relief –through water cycle, and defining the adjoining land. *Flows at rest* and *flows in motion* as the prevailing flux patterns create differentiated space definitions; the former with centralizing function, the latter with linearly extending. The fluvial structure could be differentiated into segments in its course. The elevational segments consist of *tributaries, trunk stream,* and *distributaries* producing distinctive spatial patterns. The adjoining land is defined with respect to the physical configuration of fluvial structure in its relation to the solid structure producing the geomorphological spaces of island, lagoon, promontory, peninsula, fjord, bay, and estuary. Not only physical but also temporal quality of fluvial structure becomes a parameter for space definition. The shifts in beds of fluvial elements has been a major influence in the formation of urban spaces in the past as witnessed from Ephesus.

In terms of investigating the influence of geomorphology in the urban formation processes, different approaches reveal that the geomorphological space is engulfed in the *perceptual processes* of whom exposed to that environment. The spatial qualities of geomorphology is then functionalized in terms of *orientation and identification*. Distinctive urban formation patterns of romantic, cosmic, classical, and complex landscapes within which man-made environment is adapted to the contextual qualities of geomorphological space evidently demonstrate this relationship.

The *functional utility* that geomorphological spaces inherit has the potential to influence the formation of settlement ensembles, the fact that evidently manifest in the European settlement constellation due to the navigable function of the European fluvial system. Conzen's experiment on Havel Towns demonstrate such relationship in macro scale.

Mezzo and micro scale *morphological analyses* of Havel Towns, on the other hand, reveal that the distinguished townscape patterns are *two dimensional type* and *three-dimensional type* based on the terrain condition on which urban form is configured.

6.2 A Need for Typological Investigation of Geomorphological Space

A typological inquiry into the various forms of geomorphological spaces is significant in terms of a deeper analysis of the correlation in question. Calyx type sets a precedent in the concretization of geomorphological space regarding the structures and processes of how geomorphological context could potentially contribute to urban formation. Addressed as *Çanak*, *Cuvette*, or *Wanne*, or *Calyx* in the scope of this thesis, this type of geomorphological space is underlined by a synclinal depression in general as the formal characteristic. Different patterns of calyx geomorphology could be pinpointed in diverse geographies of continental Europe, Middle East, Asia and as such in varying scales. In that, enclosed pattern, semi-enclosed pattern, and niche calyx formations are diversified based on the level of enclosure and openness as geomorphological systems. The investigation of calyx towns on differentiated calyxes demonstrate the tendency of setting a foothold in close correlation to fluvial structure and settling on the basin floor taking the terraced periphery of the calyx as thresholds.

Among these cases Ankara sets a unique example in terms of its calyx geomorphology and evolving process of settlement formation. The location of calyx of Ankara in macro scale reveals its nodal position as the central part of the calyx region between Sakarya and Kızılırmak basins. A closer look into the calyx in mezzo scale reveals the two-partite structure referred as Inner Calyx and Outer Calyx. The structural analysis of Inner Calyx demonstrates that the fluvial structure of Ankara presents variety and abundance in terms of tributary and trunk stream systems. It is also evident that the unique solid landform structure of Inner Calyx is substantially shaped by these fluvial forces on the lower levels, and by tectonic forces on the higher levels of the terrain. This intricate process produced a terraced structure as the distinguished geomorphological characteristic of the calyx of Ankara. The micro scale analysis of the center of Inner Calyx points to the eruptive hilltop formation as the dominant landform structure and as the nucleus of urban formation.

6.3 The Shifting Approaches towards the Calyx

An investigation into the processes of urban formation in the calyx of Ankara reveals the significance of geomorphological context in terms of how it established a ground for the settlement as well as how it is conceived, utilized, and structured as a means to shape urban space. The earlier settlements in the calyx benefitted from the crossroad condition that interlocks the natural pathways of Analia in the grand scale. These settlements, anchored on the eruptive hilltop, acknowledged by the civilizations as the Citadel, hold an advantageous shelter and defense position with a prevailing surveillance capacity over the basin, keeping the natural routes under control.

The key position of Ankara within the Roman road network as the major channel of movement and contact in broader scale presents the crossroad function attained through geomorphological configuration. In settlement scale, orientation and geographical positioning of civic structures such as Roman bath and Roman theatre was laid in relation with the fluvial bodies and climatic conditions provided by the Hatip Valley. The plateau of the mount Elmadağ was utilized as the water reserve for the higher parts of the city.

Although Ankara kept a low profile as a minute settlement in the Ottoman Period, the crossroad function was maintained with thriving commercial activities. Traditionally configured urban formation was identified as “Upper Town” and “Lower Town” with respect to the geomorphological segmentation of the Citadel in a terraced structure. This reflected in the spatial configuration of both; while the Upper Town formed the core of settlement, the Lower Town had been the outskirt.

The fluvial structure in the valley floors of the calyx geography provided orientation in the positioning of spatial activities in accordance with the notions of “downstream” and “upstream”. The upstream, associated with purity and sanity, had been the locus for social rituals such as celebration of spring *–hıdrellez*, ablution, laundering. The downstream, on the other hand, was allocated for artisanal activities in which the water is soiled, or abattoir. The downstream also had been a threshold in terms of the marshy soil structure.

The distinctive traditionally distinguished spatial configuration and pattern of agricultural production is embodied in the form of vineyard clusters on the higher terraces of calyx. The vineyard formations provided a temporal *orientation* based on the seasonal rhythms of vintage time. The possession of vineyard house in terraces and a house in the hilltop citadel has been a matter of *identification* for the inhabitants of Ankara.

The turn of the 20th century had been a milestone for the urban formation of Ankara with the declaration of Republic. The precursors of modern town planning pioneered the formation of modern capital in line with the ideals of Republic. In this planned era, the geomorphological context of Ankara was approached with contemporary tools and paradigms. Starting with the Lörcher, as the earliest planner of Ankara, and followed by Jansen, and Yücel-Uybadin the Citadel attributed to a monumental and aesthetic value and had been influential in the physical configuration of the urban form.

The notion of threshold in geomorphological space shifted in this era. While the inclined hills of the Citadel were conceived as a threshold, the basin and the marshy downstream were regarded as suitable grounds for the urban formation through the reclamation of marshland with modern techniques. The New Town was laid on these surfaces of lower terraces with a radial pattern and high-dense "closed" form of urban configuration. The valley floors and fluvial bodies were utilized as a ground for open space structure with legitimate visions of urban health, pedestrian circulation and recreation.

The higher terraces where vineyard clusters were located are reserved for urban development on the extension of radial urban growth with countryside identity in the configuration of urban fabric. Low-dense "opened" urban form was proposed in these terraces having small valleys of tributaries as linkages and as an open space network. The plateaus were regarded as thresholds setting a limit for urban development on higher altitudes.

While future formation of Ankara was idealized in harmony with the geomorphological context of calyx, the speculative approaches to the urban

environment resulted in major transformations on terraces, valleys, and fluvial structure. The rapid population increase, financial shortcomings, and drawbacks in housing processes produced an environment where geomorphological space and its structural components are no longer recognizable besides no further carrying the references for orientation and identification in urban environment.

The process of urban formation of Ankara reveals that geomorphology is not just a concrete physical ground for urban expansion and it carries spatial references to be integrated in the configuration of built environment (Table 2). The study reflects that these references are beyond denominating a threshold for urban development, in fact the conception of threshold changes with dominant paradigms of epochs. In that, sub-geomorphological spaces, such as stream corridors, are functionally and perceptually utilized in the formation of urban space in different periods, although threshold condition is present. However, the study also demonstrate that the structures of geomorphology are not taken for granted to be imposed on the urban formation process. Disintegration of urban development from its geomorphological context results in the effacing of the geomorphological components.

Building its framework on a certain type of example and context, this study offers a basis for an alternative reading of the urban space and encourages further explorations to be conducted on diverse contexts. Thus, differing approaches towards geomorphological space in the configuration of urban space could be concluded in a broader framework facilitating for categorizations and comparisons.

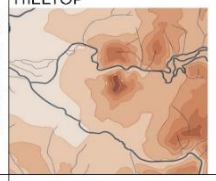
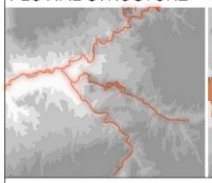
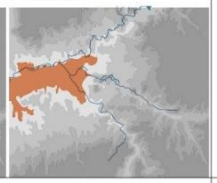
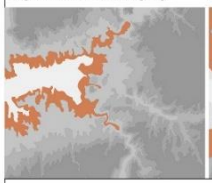
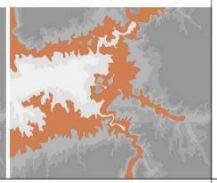
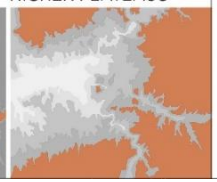
	PERIODS	PRE-REPUBLICAN PERIOD		REPUBLICAN PERIOD
		ROMAN PERIOD	OTTOMAN PERIOD	*(based on the idealizations of Lörcher, Jansen, Yücel-Uybadin)*
MICRO SCALE	HILLTOP 	- **Crossroad function;** Control over the basin -military functions -shelter in defense position	-Traditionally configured urban formation **-Spatial identification** of "Upper Town" and the "Lower Town" based on geomorphological segmentation	- Persistence of traditional identity as "Old Town" - **Monumental Value** as an object to be seen - **Aesthetic Quality** based on its visibility - **Landmark** as a part of the Image - **Orientation** for the physical formation - **Threshold** in terms of terrain condition
MACRO SCALE	FLUVIAL STRUCTURE  VALLEY AND BASIN FLOORS 	-Channels of **movement and contact** in broader scale; Node of the Roman road network - **Orientation and geographical posititoning** of civic structures (climatic conditions, presence of water bodies) such as Roman theatre and Roman Bath)	**-Orientation and geographical positioning of spatial activities** **"downstream"** artisanal activities: leather and mohair processing abattoir **"upstream"** agricultural production social events **Threshold** in terms of soil structure	-A convenient basis for radial urban formation high-dense "closed" urban form -A ground for open space structure/green infrastructure urban health/hygeine urban circulation system recreation **-No longer a threshold** reclamation of marshland
	LOWER TERRACES  HIGHER TERRACES 		Vineyard Clusters: a distinctive traditionally distinguished spatial configuration and pattern of agricultural production **-Orientation** based on seasonal cycles **-Identification** based on vineyard ownership	-Reserve for urban development on the extension of radial urban growth **-"Countryside identity"** in the configuration of urban fabric Low dense "opened" urban form Small valleys of tributeries as linkages and as an open space network
	LOWER PLATEAUS  HIGHER PLATEAUS 	Water reserve for the higher parts of the city		**Threshold** in terms of terrain conditions

Table 2. The utility patterns and shifting approaches towards the calyx geomorphology in the configuration of urban space

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