Research Plan

"Innovating and reintroducing earth construction in wildfire risk villages in Turkey"

Graduation Studio Architectural Engineering

2021-2022

Personal Information
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Studio
Architectural Engineering Graduation Studio – *Harvest*
Design tutor – *Mauro Parravicini*
Research tutor – *Mo Smit*
Argumentations of choice of the studio – *The Architectural Engineering studio offers the time and space to explore several themes I personally am fascinated about, including current environmental and societal issues, sustainability in different ways, vernacular architecture and finding simple but architectural solutions. I like holding onto a leading concept in my design-research process until the very end of it. The possibility to discover and tackle architecture from other countries and cultures excites me the most in this studio, which is an exciting way to start my graduation year and finish my study.*

Content:

Glossary of terms and definitions

Own definitions:

- **Reviving the vernacular:**

"Implementing modern knowledge about a certain aspect on an already existing craftmanship with the aim of improving it."

- **Wildfire resilience:**

"*The ability to cope with wildfires in such a way that as little damage as possible is caused to the environment, including buildings, people, flora, fauna, work and daily life. This concept encompasses several aspects, one of which is architectural resistance to fires. Other aspects are the urban layout, social collaboration and landscaping."*

- **Wildfire resilient rebuilding strategy:**

"A step-by-step rebuilding plan with the aim of making a village and its community wildfire resilient. This strategy includes the following scales: details, building planning, village typology, landscape and the community. The outcome of the design project will depict this strategy and the design will be the elaboration of it."

- **Wildfire resilient village of the future:**

"A village is wildfire resilient when it meets the following requirements: the community is able to (re)build their houses and other buildings with local building knowledge and skills, with materials that prevent damage in terms of a little or no demolishment. They can continue their daily lives or pick it immediately after a forest fire happens. In case of unforeseen destruction, they can easily repair the damage themselves. The typology and landscape of the village is designed specifically in a way that it prevents wildfires from spreading. These requirements are the indicators of measurement."

Definitions from dictionaries and other sources:

- **Building Culture**

"Building Culture encompasses any human activity that changes the environment. Not only the buildings and their designs (including infrastructure, urban planning, public space and landscape) belong to the building culture, but also the process – which consists of regulations, planning and collaboration in building and the architecture culture (thinking about/reflecting on). A high-quality building culture also builds social cohesion, focuses on sustainability and contributes to the health and well-being of everyone." (Ten Cate, 2020)

- **Earth building / construction:**

"The practice of construction using raw earth. Earth buildings are highly durable, have good humidity regulations and sound insulation. They are non-toxic, non-allergenic and fireproof. It provides thermal mass and insulation when built as thick walls and usable as passive solar design. The techniques and methods for earth construction vary with culture, climate and resources. Some are: cob, rammed earth, wattle-and-daub, light straw, earthbags, earth bricks, earthen floors and earth plasters and finishes." (Grey, 2021)

- **Embodied energy:**

"The energy content of a building material or building product that includes the energy to extract original material resources, the energy to process and make the product for its intended use, as well as the energy to transport the material product to the building site." (IGI Global, n.d.)

- **Fire resistant**

"So resistant to fire that for a specified time and under conditions of a standard heat intensity it will not fail structurally or allow transit of heat and will not permit the side away from the fire to become hotter than a specified temperature." (Merriam Webster Dictionary, 2021a) → the chosen material earth also has resistance properties within the resilience context.

- **Geobased:**

"*Based on geographical data"* (Your dictionary, 2021)

- **Resilience:**

"*The ability to recover from or adjust easily to misfortune or change"* (Merriam Webster Dictionary, 2021b)

- **Rebuilding:**

"The process of building something (such as a city, building, etc.) again after it has been damaged or destroyed" (Collins Dictionary, 2021)

- **Turkey's Housing Development Administration:**

"*Housing Development Administration of Turkey (TOKI) aims fundamentally at producing solutions to the problems regarding housing and urbanization in Turkey at national scale. With its rapid housing production practices, aims to meet 5% -10% of the housing need of Turkey*." (TOKI, n.d.).

Introduction: problem statements & research questions

In the summer of 2021, an exceptional number of 270 forest fires took place along the entire Turkish coast (Turkish Red Crescent, 2021). Multiple villages have been partly or completely destroyed spread over 53 provinces. People who lost their homes are now temporarily living in tents and hostels provided by Kizilay, while waiting for the government to rebuild their houses (Turkish Red Crescent, 2021). Besides, they lost their cash savings and sources of income as the wildfires also demolished the agriculture, killed the animals and damaged local restaurants and touristic sites (BBC News Türkçe, 2021). This complicates the process of restarting their lives and buying or building a new decent house. The inhabitants are forced to live in accommodations of moderate quality or move to the cities. Therefore, the traditional villages are at risk of disappearing (Birinci & Ünal, 2020).

As a reaction to this problem, the government ordered Turkey's Housing Development Administration to quickly mass build five-level high apartments or villas and shelter as much victims as possible. Unfortunately, these buildings come with a relatively high average price tag of 200.000 lira's (TOKI, 2021). People whose houses are burned down also doubt the purpose of the new project, because they got loan offers before the fires were even extinguished (Evrensel Gazatesi, 2021). On top of this, interviewed villagers refer to the lack of their involvement in the housing projects (Sadi Öz, 2021). Local politicians criticise TOKI for taking advantage of the situation and are sceptic about the project as well. Rebuilding provided by the government should not only be for the ones who can afford the financial costs (Ayhan, 2021). Besides, TOKI does not provide evidence nor explanation on the fire resiliency aspect of the new project.

Currently, there are no alternatives for rebuilding other than abovementioned plans. Looking at Turkish villages on the national scale, the local practices of earth construction has disappeared overtime, because the knowledge and skills became degraded and outdated. A national change was made into brick, natural stone, or concrete (Ada, 2021). Actually, the fact that Turkish villagers have built their homes themselves with local materials in the past provides insights into new possibilities and opportunities in the rebuilding process of the destroyed villages. This graduation project focuses on the reviving process of those villages, with the angle on doing this in a fire resilient way. The proposed graduation project aims to design a new type of village, with a step-by-step rebuilding strategy, tackling multiple scales and aspects on how to rebuild the "**wildfire resilient village of the future"** (glossary, p.3). The scales involve detail, building, village typology, landscape and the community. The overall design question is: **How can destroyed villages in wildfire risk areas be rebuilt in a new resilient way involving local craftmanship in Turkey?** The outcome of the design project will depict the strategy and the design will be the elaboration of it.

Figure 1 shows the provinces Muğla and Antalya being one of the riskiest wildfire areas. The concept of "**wildfire resilient village of the future"** will be developed throughout the project using a specific village as a case study: Kalemler Village, attached to the city of Manavgat. This village was chosen due to its outstanding vulnerability to future fires because of its location and it is the most damaged village of last summer (DW Türkçe, 2021). It is representative for burned down villages in the Mediterranean region in Turkey in terms of community and settlement in the landscape. It is characterized by its positioning close to mountains, at the countryside and nearby popular touristic cities like Antalya, Alanya and Manavgat. The main building method in the village centre is mainly evaluated into brick, concrete or stone houses. Remains of earth construction are present in houses of older farmers and people with a lower income spread over the whole Mediterranean region. Appendix 1 depicts an in-depth analysis on further characteristics (p.16,17).

To support the technicality in this design project, a technical thematic research related to the overall design question is conducted through a written academic paper. Despite all wood in the area has been burned, earth is still harvestable as a building material. Earth is also a non-combustible material (Minke, 2000, p.36). In that sense, it is potentially valuable for the fire resiliency aspect of this project. Earth also has other valuable and sustainable characteristics, like the good humidity regulations, sound insulation, thermal mass and insulation. It has very low embodied energy, especially when it's harvested on the site (Grey, 2021). The innovation of vernacular earth construction methods might provide a sustainable future for the villages. With innovation and modern techniques, the new generations can be taught a new fire resilient way of (re)building. By improving local craftmanship on earth constructions with a fire resilient angle, villagers might be able stay in their hometowns without taking loans for standardized governmental houses. This research will explore what possibilities there are for harvesting earth in the area and how to strengthen the skills to use it in an improved fire resilient way in the rebuilding process.

Hence, the thematic research question is **How does innovation of vernacular earth construction contribute to the wildfire resilient rebuilding strategy for burned down villages in the Mediterranean region of Turkey?** This is developed further with the sub questions: **What earth construction methods were used in this region historically**? , **To what extent are earth construction skills and knowledge present within the current building culture of self-built village houses and which potentials are there to reintroduce earth construction to builders who now use other materials?** , **How is the regional landscape with corresponding soil types characterised and how can this local earth be formed into a building material?** and **How can vernacular earth construction methods be innovated in order to enhance a wild fire resilient way of (re)building?**

The aim of this research is to innovate the degraded vernacular earth construction knowledge and skills of the villagers, resulting in revived local building methods so that villagers can build their own houses in a potentially sustainable, easy, affordable and fire-resistant way. The outcome will guide the graduation project on how to design a fire resilient village, specifically on the scale of construction methodology. Figure 2 depicts the problem statement diagram (p.7) and figure 3 depicts the research question (p.8). The research plan diagram is in appendix 2 (p.18).

Hypothesis
The reintroduction of vernacular earth construction could contribute to the **wildfire resilient rebuilding-strategy** (glossary, p.3) in two ways when it is innovated. The first is because the material is non-flammable and the housing gets minimum damage due to fire. The second comes from the sustainable knowledge of the village community to be able to rebuild by themselves.

Antithesis
Vernacular earth construction does not contribute to the **wildfire resilient rebuilding-strategy** in Manavgat, despite the improvement or is not improvable at all.

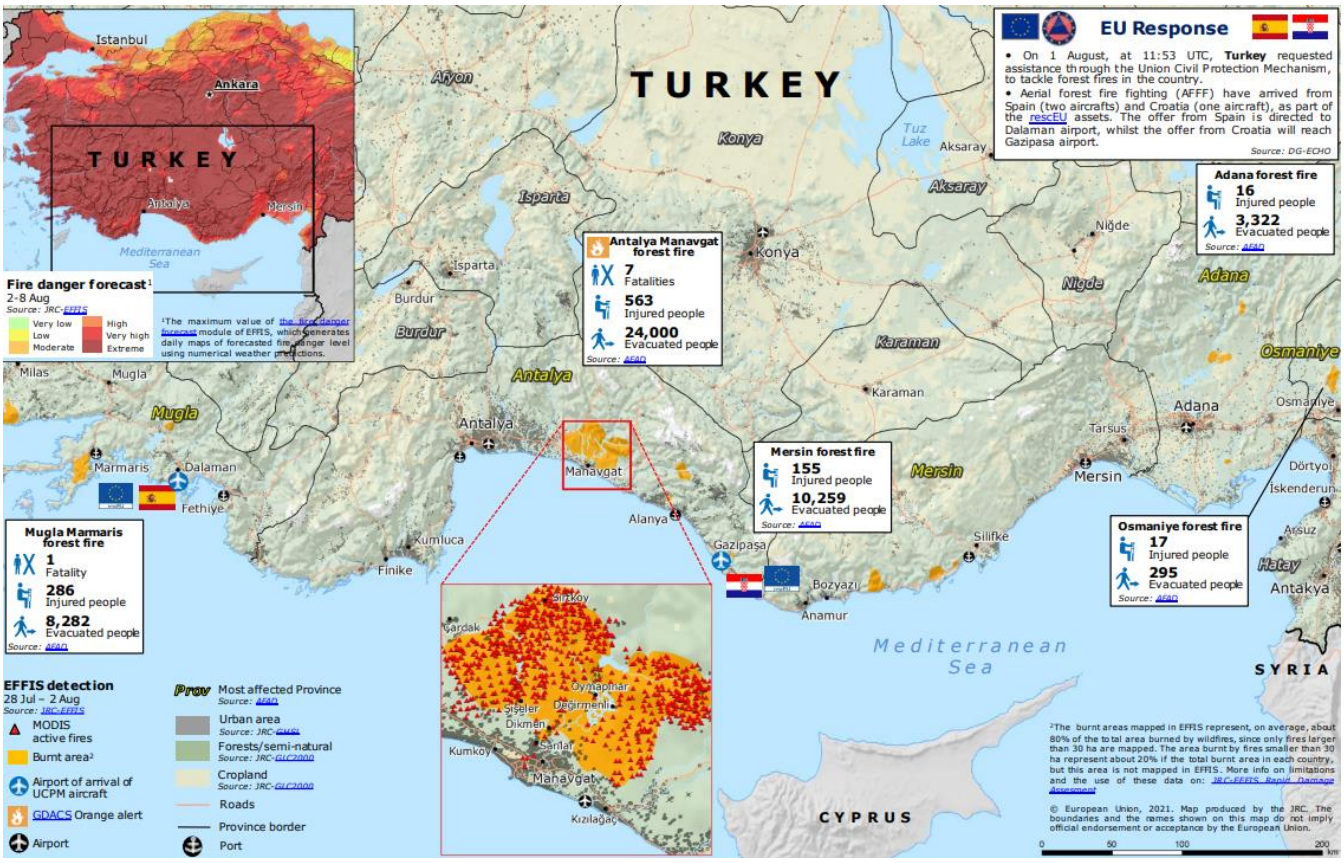

Figure 1: Map of Wild fires in Manavgat and Muğla *(ERC, 2021. https://erccportal.jrc.ec.europa.eu/ECHO-Products/Maps#/maps/3782)*

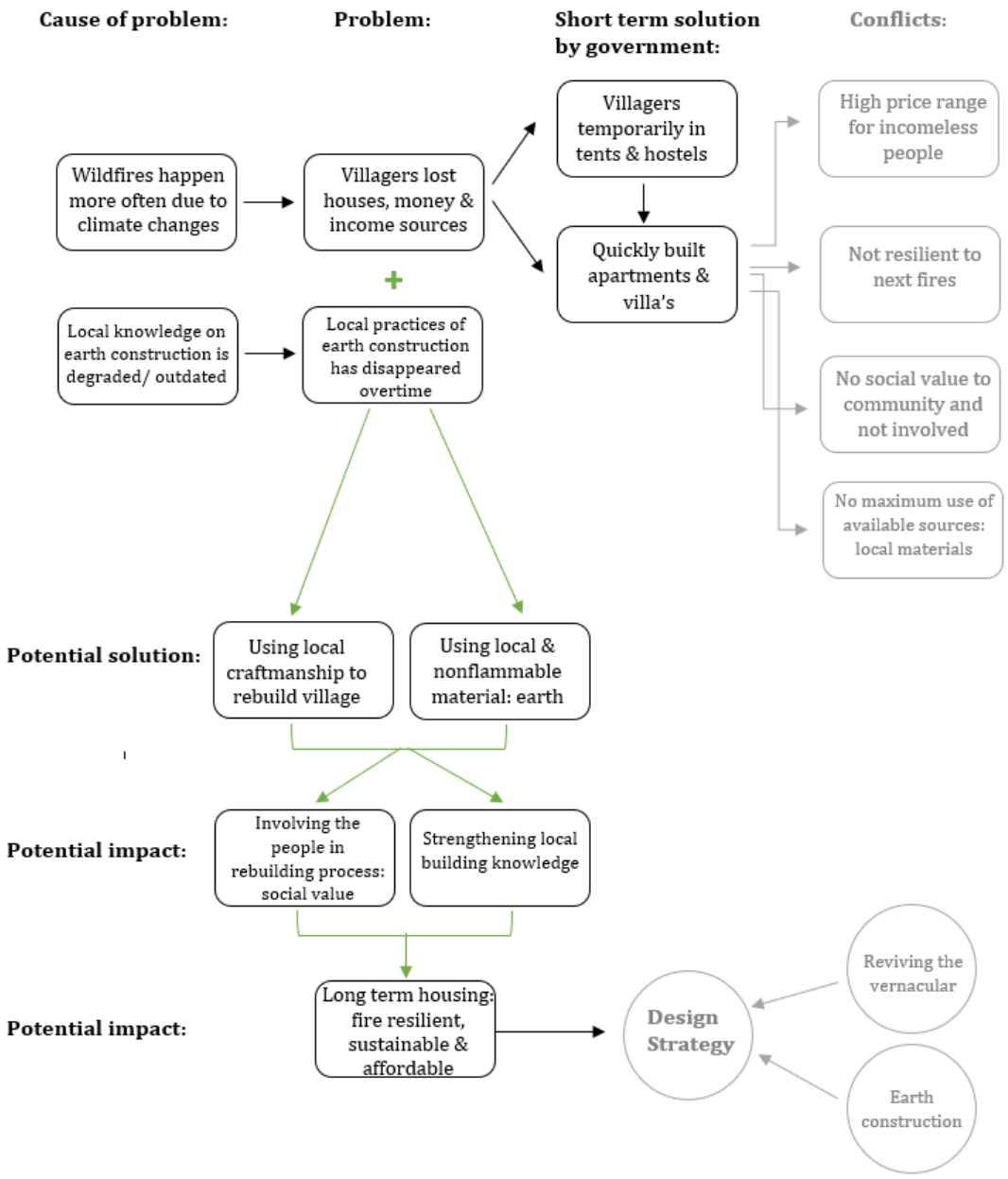

Figure 2: Problem Statement Diagram *(Own image, 2021)*

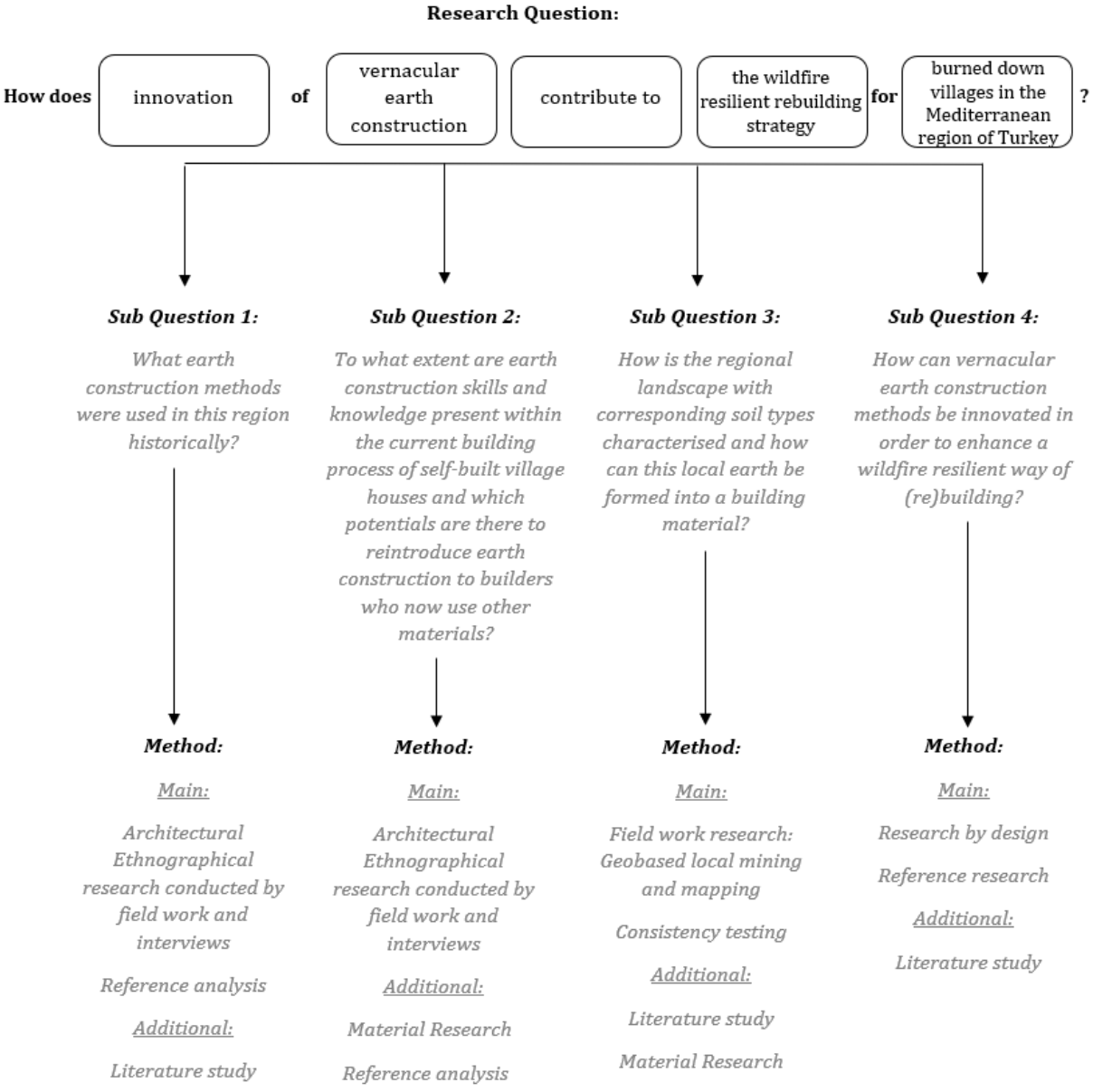

Figure 3: Research Question Diagram *(Own image, 2021)*

Theoretical framework

Other architects and researchers already thought about making high-risk wildfire areas resilient. In addition to the project of TOKI as a practical example, relevant theoretical and historical references for the research paper are explained below.

Architectural, urban planning and engineering firm Skidmore, Owings & Merrill (2021) has done a project called "*Designing Communities for Wildfire Resilience*". The outcome of this project presents wildfire guidelines for managing wildfire vulnerability at three scales of application: the region, the city and the building. In this research plan, their work is used as a frame of reference to describe definitions about wildfire resiliency by elaborating on it. Due to using all scales at once in their project, the individual topics have been treated more globally. Despite this, their general guidelines form a structural frame to build upon. In the research paper, the regional building scale will specially be discussed and in depth, the perspective of assets that local construction techniques might have while designing wildfire resilient is added.

Former student Sunnefa Gunnarsdottir (2021) made the project "*Earth and Vernacularity: Reviving vernacular architecture in Iceland with rammed earth construction*", in which she researches a very similar topic but in a different country. She specifies on rammed earth, which might be an interesting outcome of this research as well.

Julian and Rowland Keable (2011) explain theories and methods on how to practise field earth research in their book *"Rammed Earth Structures: a code of practice".* They provide tests to analyse local earth's qualities and possibilities to form it into usable earth building material. Ronald Rael (2010) lists different ways of constructing with earth in architecture in his book "*Earth Architecture".* He focuses on the modern-day possibilities of rammed earth, mud brick, compressed earth blocks and moulded earth. This work is a relevant frame for the thematic research question because it shows modern uses of different earth techniques. In addition to this work on earth construction, Gernot Minke overviews many techniques for processing earth all over the world in his books "*Earth construction handbook"* (2000) and "*Building with Earth*" (2012). He includes earths' properties, physical characteristics and explains the materials' beneficial qualities and how to maximize them. John Norton (1997) provides insights in how to build with earth, soil selection, construction and maintenance in his book "*Building with earth: a handbook*". He states that earth is associated with poverty in many countries and is not thought of as a high-quality durable material. This is an interesting insight and will help on how to tackle this topic in Turkish villages as well. Finally, Romero and Larkin (1994) emphasize the experience of constructing with earth, which they think is a communal act. Families and friends are all engaged in the making of bricks and building up walls in their book "*Adobe: building and living with earth".* This can be an important value in the villages and contribute to the social aspect of becoming resilient to wildfires.

Focused on practicality, Michele Barbato, Nitin Kumar, Julie Nguyen and Thomas Ton practise experiments on the fire resistance ability of earth blocks (Kerlin, 2021). They use the same temperatures as forest fires to test earth blocks and to measure at what point they crack under pressure as well as the 'recipe' for their best durability. Their conclusions provide a framework for field experiments with earth in Kalemler.

Objective
The purpose of this graduation project is to explore the potentials of local earth construction as the main element to rebuild the burned down village houses in a wildfire resilient way. The intention behind this is to revive the vernacular architecture in a new fire resilient way, involving the locals and use the possibilities at hand. Simultaneously, this gives opportunities to preserve the traditional village identity and helps local people to move forward independently from the government. The strategy used to research this potential is an architectural ethnographic analysis and geobased local mining of Kalemler village and its community.

The research paper serves as the foundation of construction techniques. The architectural ethnographical analysis will give insights in what local craftmanship is known by villagers and their skills on using earth as a building material. With geobased local mining, harvestable earth is analysed. Literature and reference research help to implement new earth construction methods on the vernacular. Followingly, the detail scale and partially the building scale for the **wildfire resilient design strategy** will be developed, with the aim of improving and reintroducing the vernacular architecture in Turkish villages. **This fire resilient design strategy** is a part of the overall resilience program in the project, like village typology and social research. Throughout the graduation project, a new village typology with improved wildfire resilience at multiple scales and interfaces will be designed. Social, sustainable, heritage and economical research also will be part of the design research to develop the "Turkish village of the future". The outcome of the research paper will guide the aesthetics of the architecture and further program changes in the villages.

Fascination
The pre-existing ancient earth houses in Turkey are a relevant example of my fascination. The mud dome houses of Harran, cave houses in Cappadocia and the old house of my great grandfather made of adobe are relevant examples for the vernacular craftmanship. The way they are handmade, using local mud and the durability are impressive. However, they switched to concrete constructions. Exploring those old vernacular techniques and implementing newer earth construction techniques might provide very valuable outcomes for the rebuilding process of the villages. In this research, the perspective of resiliency to fire is added upon the rebuilding process.

Methodological positioning

The overarching methodology for the project is architectural ethnography. Within the theory on ethnography, there is architectural ethnographic research. Powell (2017) describes ethnography as "*a process of inquiry that involves the description and interpretation of the cultural and social practices of people, […] that emerges from a lengthy period of in-depth study and, often, residence in, a particular setting"*. This method would take many years to research. In this graduation studio, micro-ethnographic research is applied. This is ethnographic research but in a shorter timeframe due to the time limitation of the project (Powell, 2017). 'Architectural' ethnography in this research differentiates itself by the focus on the built environment and depicts the way of assembling buildings and the environmental aspects (Kaijima, 2018). It applies drawings as a communicating medium and can consist of different architectural characteristics, such as details, plans, sections, concepts, empirical and abstract data. Furthermore, it contains practices and cultural norms (Ronald, 2011). Buildings influence behaviour, which makes it important to design housing that fits the cultural practices (Cranz, 2016). This is important in this graduation project since the cultural norms and social practices in Turkish villages differ from the Dutch one. The research focus is on the architectural aspects that stem from the earlier earth building culture in the Turkish villages and an attempt will be made to improve this by implementing current innovations.

Ethical dilemma's

Using architectural ethnography as a research method can be risky, because it might be interpreted subjectively. Because one of the main ways of documenting is through drawings and photographs, the reader can misinterpret these documents. Subjectivity might mislead the objective understanding of a subject (Ratner, 2002). Therefore, it is important to use clear textual explanations of the findings during the field research on local craftmanship. Mantzoukas (2012) mentions three genres of ethnographic research: classical, critical and interpretive. Classical ethnography is about reproducing the research culture with high accuracy. The researched is limited to observing and tries to be highly objective (Mantzoukas, 2012). Critical ethnography goes beyond observing and tries to interpret and analyse the researched element. This is where it can be too subjective in relation to the topic. Within Interpretive ethnography, the researcher engages with the participants to get very detailed, nuanced and emotional imaginations of the participants' world (Mantzoukas, 2012). This thematic research will be mainly on the critical side of ethnography, because the topic has more architectural loading than cultural, but not separable. The vernacular and local craftmanship is inseparable with the culture in the villages.

In addition to this, the question arises whether the villagers are open to building their own villages. Older generations might be excited, but physically unable to contribute, though the heaviness of their daily activities is surprising. The younger generations may be more interested in leaving the villages because it takes effort to rebuild everything. The young people who do want to stay in their villages and preserve the local architecture would be a fantastic starting point for a construction group. It is important to emphasize the potentials of rebuilding their village, like finding opportunities to add social, economic and sustainable value and not to flee the city. To avoid social engineering, an attentive collaboration must be formed with the locals and their input must be implemented in this research. Finally, building resilient housing in terms of materiality is most likely not enough in the total picture: it's one of the building blocks in the overall strategy that will be explored and elaborated during the project, which includes the layout and redesign of the villages as well. A fire resilient village design tackles multiple scales and aspects which will be researched during the whole project. During the design process, it will become clear if the hypothesis is indeed more affordable than the governmental solution. Aspects to consider are insulation, waterproofing, life span, aesthetic et cetera.

Research methods

Used methods:

1) Architectural ethnography research: interviews, site visit and mapping
2) Geobased local mining: soil and consistency tests
3) Literature research
4) Material research
5) Research by design: drawings, conceptualizing, sketching and modelling
6) Reference analysis

To answer the main research question, four sub questions will be explored. Each of them has a different approach. The research of the first and second sub questions will be conducted with a site visit to the burned down villages in Turkey. During this field research, architectural ethnography will be used to map the current local building culture, its practices, methods and processes. Besides, questions will be asked to investigate social and cultural aspects about the housing in the villages and the way people used to build or use the buildings. What was the local craftmanship and why did they stop practicing it? Does it need or allow improvements? Interviews about their experiences and skills on building and their willingness to build again will be researched. The goal is to interview as many locals as possible. The outcome will be written down on paper, the interviews will be recorded, photo's will be taken and sketches will be made to record the results. Literature on materials will also be used when more scientific details on local building methods are needed in the research. The interview questions for the architectural ethnographic research are in appendix 3 (p.19).

The third question on local harvestable materials will be conducted with geobased local mining. Local earth will be analysed during the field trip with methods from previously mentioned literature on how to do tests on earth and focus on the recipe for forming earth into building material: *"Rammed Earth Structures: a code of practice"* (Keable & Keable, 2011). The specific choices for the tests will be made on the site, based on the availability of materials and time (shovel, bucket, pots etc.). Photos and notes will be recorded of these tests.

The last qualitative part of this research is tackled with literature and reference research. Modern techniques on how to build fire resilient with earth will be analysed to explore if the craftmanship can be improved. This will hopefully result in prototyping improved feasible building methods for locals. The outcome will be answered in design sketches and physical models of building with earth. The potentially improved techniques will be implemented in the overall fire resilience program in this graduation project.

Appendix 4 depicts the research plan structure with expected outcomes and measurement criteria (p.20).

Requirements

The following requirements are the indicators of measurement for a **'wildfire resilient village'**: the community is able to (re)build their houses and other buildings with local building knowledge and skills, with materials that prevent damage in terms of a little or no demolishment caused by wildfires. They can continue their daily lives or pick it immediately after a forest fire happens. In case of unforeseen destruction, they can easily repair the damage themselves. The typology and landscape of the village is designed specifically in a way that it prevents wildfires from spreading.

Relevance

According to climate scientists, wildfires will increase in the future because of hotter summers (KNMI, 2021). Thus, it is important to research wildfire resiliency in inhabited settlements. Former research focuses on cities, but villages specially are not included. The focus of this research is on villages in the Mediterranean region of Turkey, which makes de approach specific for their local craftmanship on earth. This research can be redone by other researchers by following the same methodology on another region as well. The outcome of this research paper could be a strategy for multiple villages in Turkey, as well as other burned down villages in Mediterranean countries or even other continents with matching craftsmanship and types of local earth. The conducted insights and developed knowledge can be exemplary for similar research. Time and size limitations are the reasons why this research is focussed on one village as the case study. This specific village will also provide a clearly defined context to design.

The outcomes of the architectural ethnographic analysis of Kalemler village are valuable for further research in the design. Social and cultural aspects might be explored which could be crucial to know in order to design a suitable new village. If the hypothesis is (partially) correct, the improved building method of the locals could be applied as the foundation for the whole new design of the village. The aim is to discover a fire resilient way of building by involving local people and materials that is also affordable. Being able to (re)build fire resistant houses is a first step to become resilient against forest fires and a good starting point in the overall design strategy. The ideal futuristic picture would be if the villagers can continue their daily lives or pick it up immediately after a forest fire happens, because little or nothing has been destroyed. In case of destruction, they easily could repair the damage themselves with the improved craftmanship. This project might have an impact on the Turkish villages in the Mediterranean region.

Planning

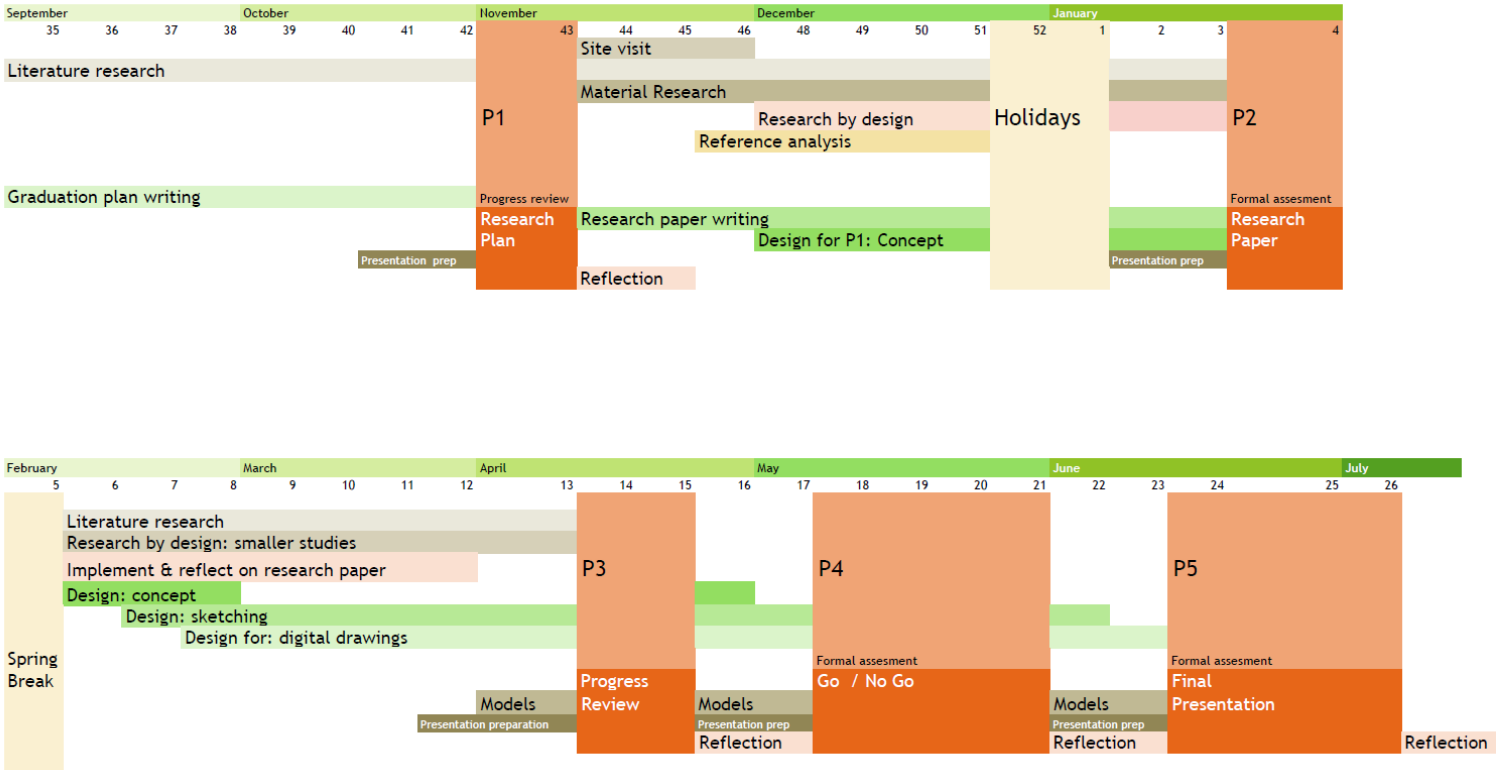

Figure 4: Planning graduation project *(Own image, 2021)*

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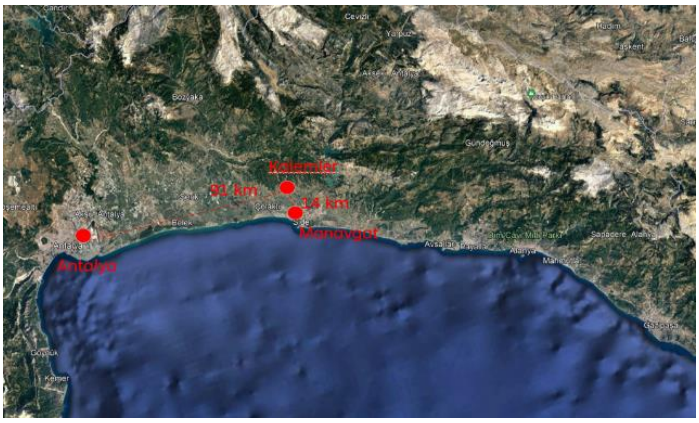
Appendix 1:

Characteristics Kalemler village: 1

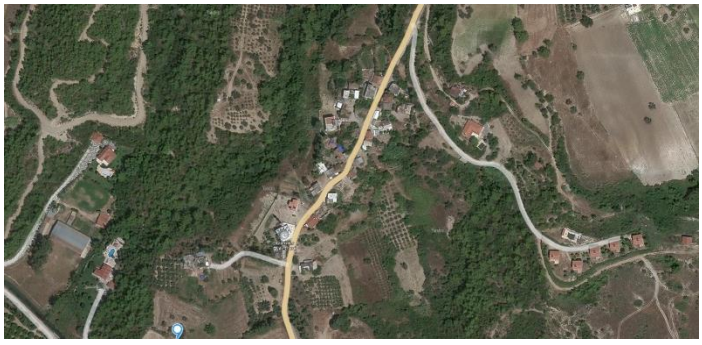
Geographical location

Mediterranean Region. (Touropia, 2021. *https://www.touropia.com/regions-in-turkey-map/v*)

National scale. (Own notes, Google Earth, 2021)



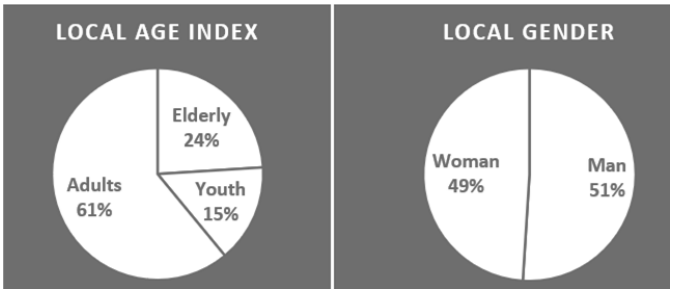
Regional scale. (Own notes, Google Earth, 2021)



Zoomed in Kalemler village. (Yandex Maps Database, 2021)

Socio-Cultural background

274 inhabitants



Important numbers. (Own diagrams, Endeksa, 2021. https://www.endeksa.com/tr/analiz/antalya/manavgat/kalemler/demografi)

Local Economy

Animal husbandry

Agriculture

Historical background

"Koca basin" → burned down
"Kalanlar" = the ones who stayed
"Kalemler" → burned down again

(Yilmaz Okutan, 2021. https://www.youtube.com/watch?v=xFGyvNih95w&t=2s)

Infrastructure

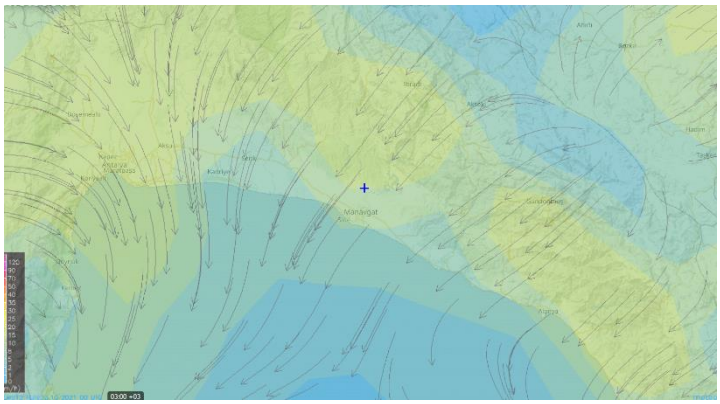
Main road: asphalt;
No sewerage system;
Clean water system, electricity and fixed telephone available.

(Municipality of Manavgat, 2021. https://www.manavgat.bel.tr/tanitim/kalemler-mahallesi)

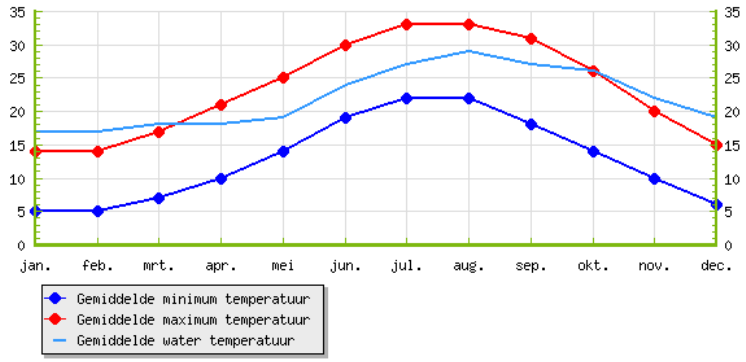
Characteristics Kalemler village: 2

Climate analysis

Mediterranean Climate: hot and dry summer, mild winter

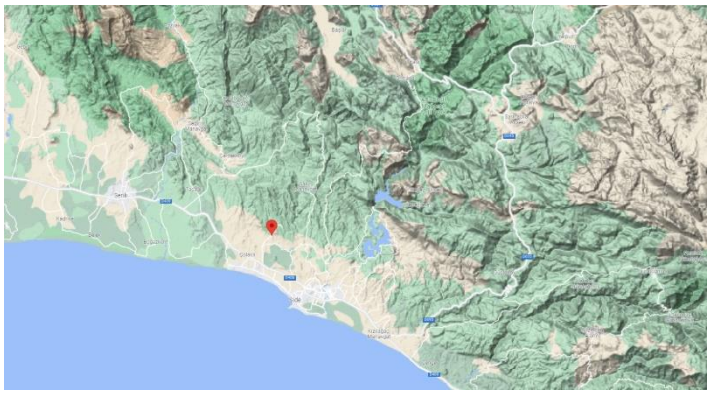


Wind directions. (Meteoblue, 2021. https://www.meteoblue.com/tr/hava/webmap/antalya_t%C3%BCrkiye_323777?variable=wind_streamlines&level=surface&lines=none&mapcenter=36.8296N31.4854&zoom=10)



Temperatures. (LazyTours, 2021. https://lazytours.nl/bestemmingen/turkije/antalya/weer-antalya/)

226 mm of rainfall / year
dry 236 days / year
average humidity of 58%



Mountain slope location. (Google Maps Database, 2021)

What's nearby?

Kalemler village is characterized by its location on the slope of a mountainous landscape and Mediterranean settlement. The landscape is characterized by fields for agriculture and livestock. It is a farming community that has established itself a permanent place in Kalemler. The village is settled around the asphalt main road. There is a mosque (0kms), but the GP (1kms) and elementary school need some travelling (5,5kms). Nearby are touristic sites, like the Naras lake (5,5km), Lyrbe (10km) and Cennet Canyon (2,5km).

Local mosque.
(Yandex Maps Database, 2021)

Lyrbe.
(Google Images Database, 2021)

Local buildings

Before & after images. (Google images Databank, 2021)

After the fires. Building materials: stones, bricks, concrete.
(Google images Databank, 2021)

Appendix 2:

Research Plan Diagram

Problem statement

Cause of problem:	**Problem:**	**Short term solution by government:**	**Conflicts:**
Wild fires happen more often due to climate changes	Villagers lost houses, money & income sources	Villagers temporarily in tents & hostels	▪ High price range for incomeless people ▪ Not resilient to next fires ▪ No social value to community and not involved ▪ No maximum use of available sources: local materials
Local knowledge on earth construction is degraded/ outdated	Local practices of earth construction has disappeared	Quickly built apartments & villas	

Potential solution: Using local craftmanship to rebuild village overtime + Using local & nonflammable material: earth

Potential impact: Involving the people in rebuilding process: social value + Strengthening local building knowledge

Potential impact: Long term housing: fire resilient, sustainable & affordable

Design Strategy

- Reviving the vernacular
- Earth construction

Overall design question

"Wildfire resilient village of the future"

How can destroyed villages in wildfire risk areas be rebuilt in a new resilient way involving local craftmanship in Turkey?

Step-by-step wildfire rebuilding strategy to design a new village
The scales: 1.detail , 2.building , 3.village typology , 4.landscape & 5.community

Technical thematic research question

How does innovation of vernacular earth construction contribute to the wildfire resilient rebuilding strategy for burned down villages in the Mediterranean region of Turkey?

Sub question 1:
What earth construction methods were used in this region historically?

Expected results
A primitive way of building with relatively few materials. The use of a wooden mol, filled with local earth mixed with cow dung, finished with plaster or mud layers.

Sub question 2:
To what extent are earth construction skills and knowledge present within the current building process of self-built village houses and which potentials are there to reintroduce earth construction to builders who now use other materials?

Expected results
Some skills and knowledge on how to build with earth is potentially present within the elderly part of the community, and younger generations may know it from them. The current methods on concrete, stone or (fire)brick housing may be implemented in the rebuilding strategy with earth.

Sub question 3:
How is the regional landscape with corresponding soil types characterised and how can this local earth be formed into a building material?

Expected results
There is potentially gravel, sand, silt and clay in the ground in different consistencies. Different methods can be applied to form it into building materials.

Sub question 4:
How can vernacular earth construction methods be innovated in order to enhance a wildfire resilient way of (re)building?

Expected results
There might be several improvement techniques that are applicable on the earth building technique, together with the current knowledge and skills of the villagers. The fire resiliency aspect will mainly depend on the detailing and material characteristics of earth construction. This innovated earth construction method is 1/5th of the scales from the wild fire resilient building strategy (detail/materialism).
This sustainable knowledge may ensure that locals can (re)build themselves, which contributes to the community scale (2/5th) of the total strategy.

Expected outcome

A potentially innovated vernacular building method with local earth, which is a non-flammable material. The housing gets minimum damage after wild fires happen.
+
Sustainable knowledge on innovated vernacular earth construction methods for the community. The locals become able to rebuild by themselves.

Appendix 3

Number of interviewees: as much as possible during the site visit in the village.

Interviewees: both people whose houses have been burned down and people whose houses are still standing.

Location: Village of Kalemler, connected to the city of Manavgat in the province Antalya.

Date: between 16 – 20 November 2021

Interviewer: Ecem Kiliçaslan

Short introduction explanation:

Hello Sir / Madam …,

I am going to interview you about the local building culture in your village. I am also going to ask you about the wildfire damages from last summer. And I would also like to hear your opinion on the current plans that are being made for your house by the government. If you don't have questions for me, I would like to start with the questions.

1. Can you tell something about yourself (name, age, education, work, family, daily activities)?
2. How long have you been living in this village?
3. Do/did you own a house in this village?
4. Who or which company constructed your house?
5. How were the houses built in your village?
6. Do you know any craftmanship or building skills?
7. Can you tell something about the building skills of your (grand-) parents?
8. When did you buy / start renting this house?
9. What did it the house look like? Façade? Plan? How many rooms?
10. How many people did you share your house with?
11. Is earth construction a known phenomenon for you?

    No → Further to question 13
    Yes → Further to question 12

12. Can you tell something about what you know about earth construction?
13. Do you have any experience with building?
    Yes? → What kind of experience?
    No? → Further to question 16
14. Do you have any knowledge on building?
    Yes → What do you know?
    No? → Further to question 16
15. Have you ever thought about rebuilding your burned down house yourself?
16. What do you think about houses made of earth?
17. Do you know any houses in the village that are self-built with earth?
18. What do you think of the housing plans made by TOKI?
19. Are you happy with the village you live in?
20. What things could be done differently in your village?
21. What do you like about your village?
22. What do you dislike about your village?

Appendix 4: Research plan structure

Sub questions:	What data is needed?	How can this data be collected?	How will this data be analysed?	What will be the expected results?	Measurement criteria:
What earth construction methods were used in this region historically?	Data about historical vernacular architecture in the region.	Literature research, interviews, references, photo's, archives of Manavgat municipality.	The most common knowledge and skills will be mapped out in drawings and pictures with written explanation.	A primitive way of building with relatively few materials. The use of a wooden mol, filled with local earth mixed with cow dung, finished with plaster or mud layers.	Methods taken between 1800-2021.
To what extent are earth construction skills and knowledge present within the current building culture of self-built village houses and which potentials are there to reintroduce earth construction to builders who now use other materials?	Data about current knowledge on self-built village houses. The skills and knowledge used for example concrete or (fire) brick that can be used with earth construction.	Site visit: Interviews (architectural ethnographical research) on as many villagers as possible. Interviews with builders and non-builders.	The answers will be recorded and put in order based on the conducted answers.	Some skills and knowledge on how to build with earth is present within the elderly part of the community, and younger generations may know it from them. The current methods on concrete, stone or (fire)brick housing can be implemented in the rebuilding strategy with earth.	Leading interview questions beforehand.
How is the regional landscape with corresponding soil types characterised and how can this local earth be formed into a building material?	Data about regional landscape and soil. Data about how to form earth into building materials.	Geobased local mining: digging in the ground and doing local tests. Literature research. Tests will be chosen on the site, based on the availability of materials and time (shovel, bucket, pots etc.).	The landscape will be documented in a drawn map and photo's will be documented of the soil tests. The consistency for a building material 'recipe' will be documented as well.	There is potentially gravel, sand, silt and clay in the ground in different consistencies. Different methods can be applied to form it into building materials.	A map of soil within the borders of the Mediterranean region with the focus on Kalemler (+-2km). The methods from the theoretical framework provide different criteria for measurement. (J. & R. Keable, 2011)
How can vernacular earth construction methods be innovated in order to enhance a wild fire resilient way of (re)building?	Data about contemporary and innovated earth construction methods. Data about fire resilient building methods with focus on earth as a building material.	Literature research and reference research. Research by design.	Contemporary examples will be mapped and the innovated data on the knowledge and skills will be zoomed in on. The applicability on the current building methods in the village will be sketched and documented with drawings and written explanation.	There might be several improvement techniques that are applicable on the earth building technique, together with the current knowledge and skills of the villagers. The fire resiliency aspect will mainly depend on the detailing and material characteristics of earth construction. This innovated earth construction method is 1/5th of the scales from the wild fire resilient building strategy (detail/materialism). This sustainable knowledge may ensure that locals can (re)build themselves, which contributes to the community scale (2/5th) of the total strategy.	A contemporary innovation is applied to vernacular earth construction, which contributes at the detail/materialism level to the fire resilient rebuilding strategy. This method will be learned and applied by the locals to rebuild their own village houses → sustainable local knowledge on rebuilding adds to fire resiliency.

Potential outcome:
The results of these sub-questions serve as ingredients for the potential final conclusion of the technical thematic research.
The innovation of vernacular earth construction contributes to the wild fire resilient rebuilding strategy for burned down villages in the Mediterranean region of Turkey in two ways:

1. A potentially innovated vernacular building method with local earth, which is a non-flammable material. The housing gets minimum damage after wild fires happen.
2. Sustainable knowledge on innovated vernacular earth building methods for the community. The locals become able to rebuild by themselves.