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# RESEARCH THESIS

## related to SIX CROSS CUTTING THEMES UNDER URGENT PROJECT

### Potential of A Large Development Scheme Of Independent Bungalows In Improving The Microclimate Of The Neighbourhood

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*Batch: 2018-2022*

**B Arch Program**

**P 12**

**NIRMA UNIVERSITY**

**AHMEDABAD**

**GUJARAT**

**INDIA**



In the final semester of a Bachelor of Architecture (B. Arch) program, students engage in academic research by selecting an area of interest within the field of architecture. This process typically involves several steps to ensure that the research is rigorous, structured, and valuable. The process starts with a course on Research Methodology in VIII Semester followed by Research Proposal in IX semester. Here's an overview of the process:

## 1. Choosing an Area of Interest

- **Exploration:** Students begin by exploring various topics within architecture, such as sustainable design, urban planning, architectural history, construction technology, or digital architecture.
- **Narrowing Down:** After exploring, students narrow down their interests to a specific research question or problem. This could be based on current trends, gaps in existing literature, or personal interest.

## 2. Defining the Research Question

- **Problem Statement:** Students formulate a clear problem statement or research question that their work will address. This defines the scope of the research and sets the direction for the study.
- **Objectives:** Setting clear objectives helps in focusing the research. These could include understanding certain architectural phenomena, proposing new design solutions, or evaluating existing practices.

## 3. Literature Review

- **Existing Research:** A thorough review of existing literature helps students understand what has already been done in their area of interest. This involves reading academic papers, books, case studies, and other scholarly articles.
- **Gap Identification:** Through the literature review, students identify gaps or areas where further research is needed, which helps in refining their research question.

## 4. Research Methodology

- **Qualitative vs. Quantitative:** Depending on the nature of the research, students choose between qualitative methods (such as case studies, interviews, or observations) and quantitative methods (such as surveys or statistical analysis).
- **Data Collection:** Students plan how they will collect data. This might involve fieldwork, archival research, simulations, or experiments.
- **Data Analysis:** Once data is collected, students analyze it using appropriate tools and methods. This could involve software for statistical analysis, 3D modeling, or comparative analysis techniques.

## 5. Design and Proposal Development

- **Conceptual Framework:** Students often develop a conceptual framework that guides the design or theoretical aspects of their research.
- **Prototyping:** In some cases, students create physical or digital models to test their ideas. This is particularly common in research that leads to a design proposal.



## 6. Documentation and Presentation

- **Writing the Thesis:** The research findings are documented in a thesis, which includes the introduction, literature review, methodology, findings, discussion, and conclusion.
- **Visual Presentation:** Architecture students often need to prepare visual presentations of their research, including drawings, models, or digital renderings.
- **Defense:** Students may be required to present and defend their research in front of a panel of faculty members and peers.

## 7. Conclusion and Future Research

- **Summary of Findings:** The thesis concludes with a summary of the findings and their implications for the field of architecture.
- **Suggestions for Future Research:** Students may also suggest areas for further study based on their findings, contributing to ongoing academic discourse.

## 8. Submission and Review

- **Final Submission:** The completed thesis is submitted for review. This may include peer review, faculty evaluation, and sometimes publication in academic journals.
- **Feedback:** Based on the review, students may be asked to make revisions before the final acceptance of their research work.

This process not only helps students gain a deep understanding of a particular area within architecture but also equips them with the skills to conduct independent research, a valuable asset in their professional careers. Some of the research works undertaken by students are listed, examples of the some are also elaborated further.



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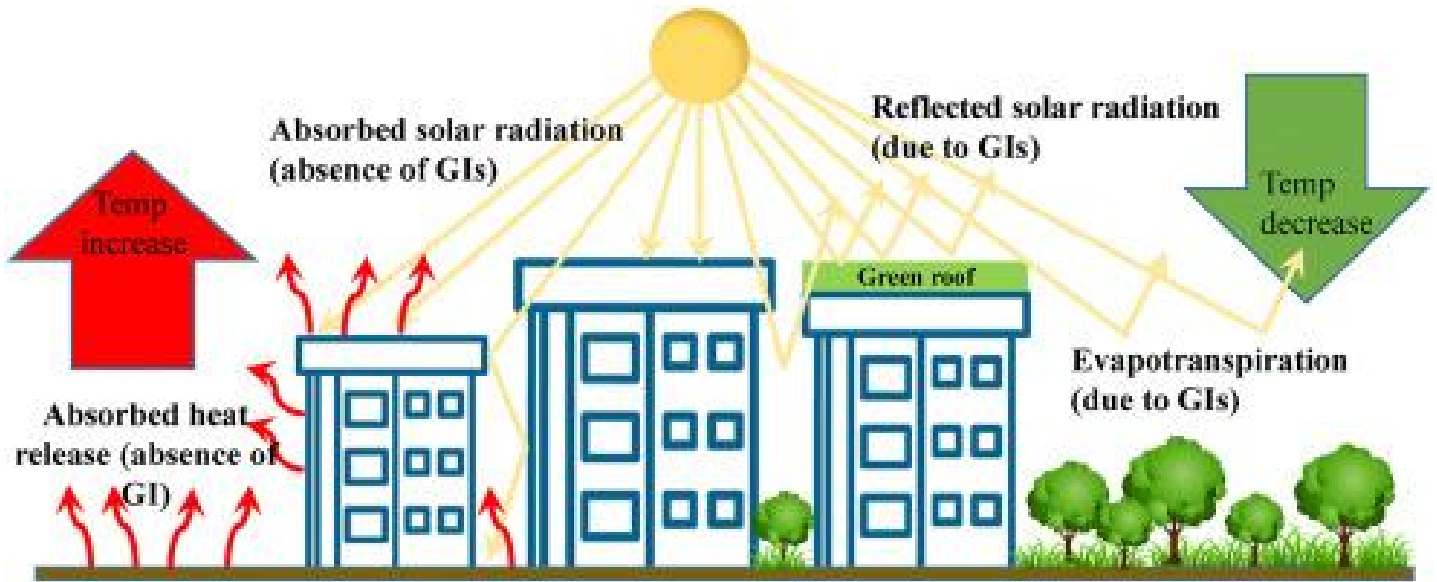
## **Aim:**

To study the opportunities of improving the microclimate around a bungalow colony through the use of green open spaces.

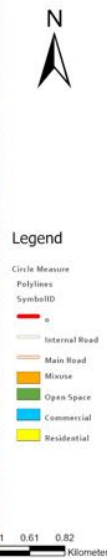
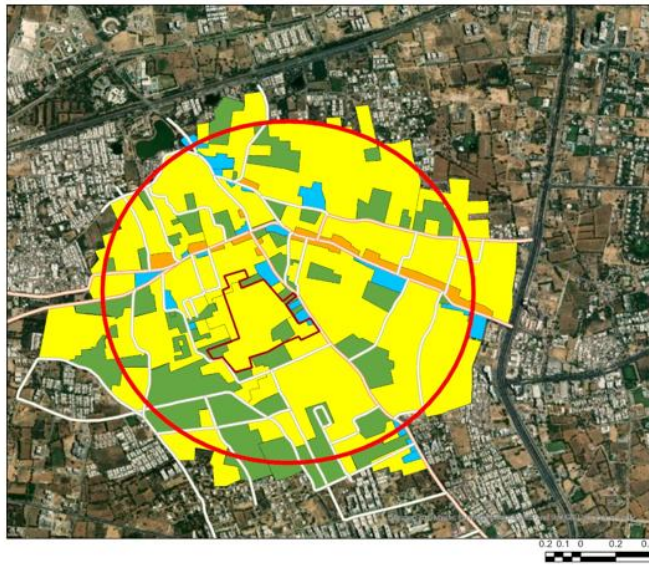
## **Objectives:**

- To analyze the role of a bungalow colony in creating a functional green sponge in the neighborhood.
- To understand the potential of these housing societies and why they are an area of impact.
- To propose a bungalow colony as a mitigation measure to ease the microclimate in the neighborhood.

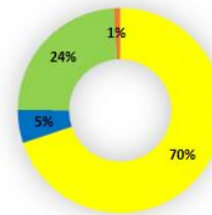
**MICROCLIMATE:** A microclimate is the climate of a small, localized area that differs from the climate of the surrounding region due to various factors such as topography, vegetation, and human activity and can have different temperatures, humidity, wind, and precipitation patterns than the surrounding macroclimate. (Lai, Liu, Liao, & Yu, 2023) (Rotach & Calana, 2003)







### Landuse Division



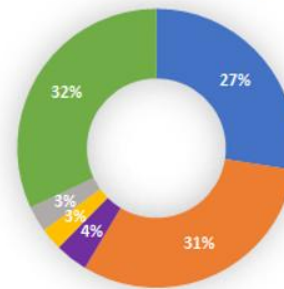
Residential Commercial Open Space Mixuse

It is clear from the pie chart the majority area in this neighborhood is covered by residential use which is 70% with the next largest use the open spaces around. A lot of these open spaces are up for development and will soon have either a residential or a commercial building. Commercial and mixed-use buildings are comparatively fewer. But the area has almost all the shops and essential facilities necessary for everyday life.

Figure Ground and Typologies



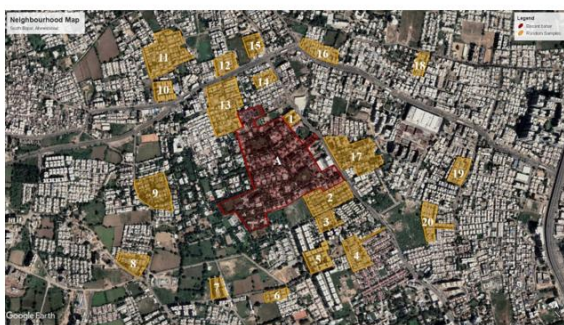
### Typology



Bunglow  
RowHouse  
Commercial  
Mix Use  
Co Op Housing Society  
Apartment

The typologies of housing are divided into Bungalows, row houses, cooperative housing societies, apartments, Mixed use housing, and commercial buildings. This chart shows an almost equal majority of bungalow schemes, row houses, and apartments. But this also tells us that low-rise housing is almost double that of mid-rise or high-rise as both bungalows and row houses fall under low-rise housing. The majority area is a low-rise area till now.

### Samples of Different Typologies in The Neighborhood



- A. Basant Bahar
- 1. Gala Hub
- 2. Shyam Villas
- 3. Dev Bhoomi
- 4. Jaldhara
- 5. Garden Residency
- 6. Maruti Kutir
- 7. Shreelaxminivas residency
- 8. Nand
- 9. Binori bungalows
- 10. Kabir Enclave
- 11. Pujan Bungalows
- 12. Baleshwar gold society
- 13. India Colony
- 14. Anandnagar Co. Op.
- 15. Aishwarya Appartments
- 16. Purushotamnagar society
- 17. Vraj Vihar Bungalows
- 18. Nayan Darshan
- 19. Kadamb Flats
- 20. Shivajay Bungalows

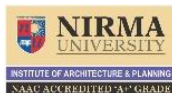
Typology	Area (Ha)	Num. of Units
<b>Bungalows</b>		
Basant Bahar Bungalows	15.81	95
Vraj Vihar Society	1.8	20
<b>Commercial complex</b>		
Gala Hub	0.36	2
<b>Commercial+Residential</b>		
Kabir Enclave	0.86	9
Shreelaxminivas Residency	0.55	5
<b>Residential apartment</b>		
Aishwariya	0.75	6
Garden Residency-2	1.43	13
Kadamb Flats	0.94	9
<b>Row houses</b>		
Baleshwar Gold	0.86	25
Binori Bungalows	4.5	150
Dev Bhoomi	0.45	35
Jaldhara - 2	1.42	55
Maruti Kutir	0.68	45
Nand	1.13	55
Nayan Darshan	0.68	30
Shyam Villas-2	2.1	65
Shivajay Bungalows	1.4	35
<b>Cooperative Society</b>		
Anandnagar co-operative society	0.34	35
India Colony	0.74	75
Pujan Bungalows	2.5	135
Purushottam Society	1.19	50

Table 1: Sample Typologies





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## Basant Bahar Society, South Bopal, Ahmedabad



It is a bungalow development with 95 bungalows spread across 39 acres. The society has three common gathering places, with a water body in one of them. The project started in 1996 and ended in 1999. It was designed by architect Kamal Mangaldas. The average plot size of the society is 1280 sq. m. and the average built-up area is 375.5 sq. m.

## Basant Bahar Society, South Bopal, Ahmedabad

### Area Break-up

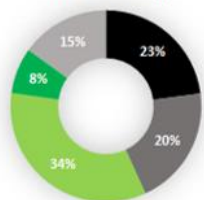
Site Area breakup (sq. m.)	
Total site area	158202
Total built area	34172 22%
Total private paved space area	30373 19%
Total private Green space area	50832 32%
Total common Green space area	11575 7%
Total road area	22460 14%

Total road area	22460
Paved	17175 76%
Green	5285 24%

Total site area	158202
Total built area	34172 22%
Total paved area	47548 30%
Total green area	67692 43%

Total open space area	115240
Total paved area	47548 41%
Total green area	67692 59%

Area Breakup



■ Total built area  
 ■ Total private paved space area  
 ■ Total private green space area  
 ■ Total common Green space area  
 ■ Total road area

Road Area Breakup



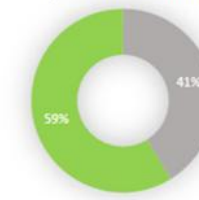
■ Paved  
 ■ Green

Total Area Division



■ Total built area  
 ■ Total paved area  
 ■ Total green area

Open Area Division

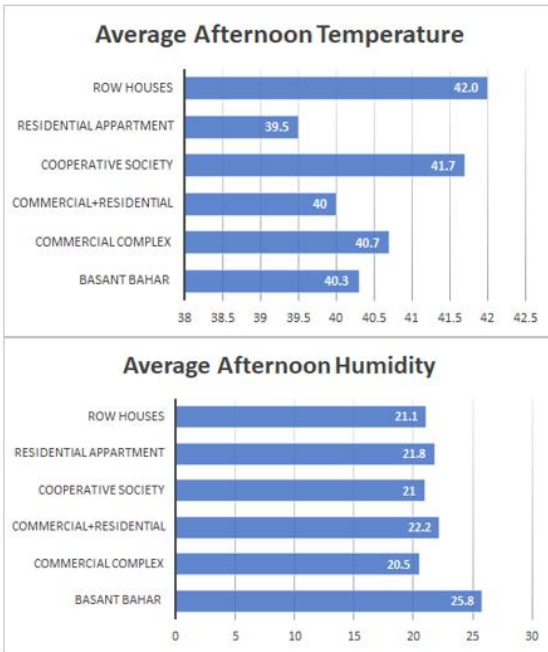


■ Total paved area  
 ■ Total green area

The area breaks up of the entire society tells us that the private green spaces take up the majority of the land which is 34% and the total coverage on the site of the greens is 43%. The total built area compared to the open is very less. When we see the open spaces in society, there are more green open spaces than paved open spaces.



## Findings



The greens are quite helpful when considering the temperature and humidity in more detail. The vegetation increases the atmospheric humidity, which inadvertently aids in the temperature maintaining some linearity. But another finding from this is that, with the right amount of shade, even a paved surface may be made cooler for temperature. In this situation, shade becomes a crucial element for thermal comfort. It could be trees or some man-made structures that may provide that shade. If all the streets were covered in shade throughout the afternoon, society would be more comfortably cooled. In the study, a comparable instance could be seen where the society had narrow streets and the building form was closer to one other, achieving mutual shading.



In conclusion, this research provides insight into the potential of a development scheme of independent bungalows in easing the microclimate. It also provides hints and recommendations to achieve an efficient microclimate using open spaces as well as other design tactics. There are multiple layers to understanding microclimate and its factors which can be further explored in other typologies as well, which gives us an idea of their potential.

On a larger scale, while planning the HRHD area, a network of these typologies can be created to ease the climatic pressures in the neighborhood and make a green network not only of public spaces but also residencies.