



**MAN IN THE DESERT**  
**1975-2019**  
**Closing Seminar**

**BOOK OF ABSTRACTS**

**Midreshet Ben Gurion**  
**12-13 June 2019**



**Book of Abstracts**

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## **1. Social and Environmental Research in Drylands and Peripheral Areas**

### **1.1. "Islands of Peace": An ethnographic research among mixed families - Jews and Arabs in Israel**

**Alice Gaya**

This study focuses on the relationship between ethnicity, religion, gender and nationality in Israel by examining the lives of mixed Jewish-Arab families living in Israel. Mixed Jewish-Arab families constitute social phenomena that have never been thoroughly researched up until now. Such marriages are a rare exception in our region and tend to be socially illegitimated by both societies. The main question under discussion is how this mixed relationship exists within the complexity and tension of Israeli reality. From this broad question, a number of secondary questions arise: How are these relationships formed? What mechanisms make it possible to create such a relationship? With what identity do the children grow up? Do they feel Palestinian, Israeli or have a mixed identity? What kind of relationship exists in the daily life between the mixed families and their extended families? Does the tension and hostility between the larger social groups seep into the marital relationship and if so, in what ways? In this lecture, I will discuss the nature of the phenomenon, its scope, and the way it is perceived by both spouses on all levels: the nuclear family, the extended one, the community and the state. I would like to illustrate how identity is constructed in these mixed families and show especially these negotiations between spouses and their families, the community and the state of Israel.

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### **1.2. The effect of Place-Based Education on the Sense of Place and educational achievement of Bedouin children living in an unrecognized village**

**Hashem Sayed**

Positive Sense of Place (SoP) and an effective Place-Based Education (PBE) contribute to pro-environmental interactions. This paper analyzes the extent of the impact of PBE on children's SoP, and how it is reflected in their attendance and performance. This research was carried out with a variety of lesson plans and analyzed a wide application of student abilities. In order to examine the influences of SoP on schoolchildren in the unrecognized Bedouin village of Avdat, 36 weekly workshops were conducted, where the students participated in activities with the purpose of raising environmental awareness. Through observations of behavior and interviews (inquiry), results were based on two sources (I) the outcomes of PBE and (II) the level of SoP by drawings. PBE Promotes environmental awareness to understand the importance of an environment and its protection. The results documented that the majority of students have a positive SoP experience. Therefore, this



methodology improved the students' perceptions of their environment. PBE and SoP activities concluded that the students refreshed their SoP significantly, creating vibrant partnerships between students, community, and teachers. Also, it boosted student attendance and improved environmental, social, and learning performance. The study determined that positive SoP, created a greater learning atmosphere in the school. PBE engagement in suburb schools is a successful method and can reach a greater educational achievement through analyzing students' SoP.

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### **1.3. Theorizing frames in Environmental Communication**

#### **Aiste Klimasauskaite**

Framing in environmental political communication transcends borders, shapes nature and our perceptions. Theoretical framework building, however, received limited attention compared to studies on framing effects in political communication research. One outcome of it is that empirical studies often fail to associate particular frames with their initiators and, usually, assign the blame to media or political elites. Similarly, framing explorations overlook when salient frames and not people take over processes. Therefore, I build on Entman's and Usher's (2018) cascade model and on Meraz and Papacharissi's (2016) networked framing theory to structure framing in environmental political communication. To do so, I select the Red Sea-Dead Sea development project as a case study. This is a trilateral project among the Palestinian Authority, Jordan, and Israel. It has three main goals that transform into three main frames of the project rhetoric -- fresh water production, to save the Dead Sea, and to build a symbol of peace.

The project spans macro and micro levels with a broad range of stakeholders. In turn, I am able to map how framing evolves vertically (from local government bodies to international intergovernmental organizations) and horizontally (among non-governmental actors). The case study allows me to explore how these distinct project levels interconnect and shape each other. To capture this complexity, I choose three main methods of a qualitative approach for data collection: in-depth interviewing, digital ethnography, and document analysis. Interviews are conducted with stakeholders of the Red Sea-Dead Sea project and comprise rich, thick data. Similarly, the digital space enables me to trace the framing utilized by digital communities and opinion leaders. Lastly, document analysis allows to discern framing on organizational and government levels. Then, I employ qualitative (coding) and quantitative (text mining) approaches to analyze and interpret the data.

Findings show that the three beneficiaries have distinct framing patterns. Yet, these patterns are downplayed by the need to fit under one



project title. Additionally, international level agenda imposes certain frames on national governments. These imposed frames, however, are turned into manipulative frames that mimic environmental rhetoric to promote contested project goals. To conclude, the Red Sea-Dead Sea case allows to re-evaluate and refine theoretical discussions on framing in the context of environmental political communication and international development projects. Paired together with framing effects, these theoretical insights can help question and, perhaps, dismantle manipulative frames by revealing their building patterns.

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## 2. Health and Employment in Desert and Peripheral Communities

### 2.1. The most successful immigration? Post-Soviet women in the peripheral labor market

**Yulia Shevchenko**

This paper presents the complex lived experiences of post-Soviet women in the blue-collar unskilled Israeli labor market in the southern periphery of Israel (the Negev region). The research is based on a mixture of qualitative and quantitative methodologies.

The vast portion of the academic literature in Israel concerning the post-Soviet population portrays them as a homogenous and hegemonic group, while ignoring the heterogeneous characteristic of this population. Such perception is compatible with the discourse of the Israeli formal institutions which describes the post-Soviet immigration during the 90s as “the most successful immigration wave” of the Israeli state. This “successful immigration” supposedly was meant to elevate the Israeli professional labor force.

Researching the lived experience of post-Soviet marginal women reveals that these women entered into the secondary labor force in which they dispossess economic and symbolic capital. These women express high levels of loyalty to their workplace, and at the same time, they experience exhaustion in their line of work. Their loyalty is grounded in their Soviet past, where their identity was formed around the concept of “the worker” and the ideals of high work ethics. As immigrants, their work ethics made it possible for them to accept any job at hand and become the new desired labor force. At the same time, it also exposed them to the gendered neoliberal labor market which praised their work ethics and exploited it in order to establish an obedient and cheap labor force.

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### 2.2. Employment patterns in Ulpana graduate from Mizrahi ethnic origin in the Negev settlements

**Or Eliezer**

This research explores the pattern of integration of Ulpana graduates of Mizrahi origin in the workforce of the Negev region. I’m using intersectionality feminist analysis to examine the reality of life and work in the Negev region in line of my commitment to contribute to the shaping of social policy as well as developing feminist theoretical. The main objectives is to find out whether religious education provides these women with better employment options than women who graduate from secular education. The research uses ethnographic methods that document the reality of life of Mizrahi religious women living in the Negev in order to outline the unique characteristics of this population. The ethnography comprises of data collected via in-depth interviews with Ulpana students, teachers and graduates.



Intensive ethnographic research includes documenting everyday life of these women in their homes and work places. Participant observations carried out in two Negev Ulpenas, are compared to get further data.

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### **2.3. Sexual reproductive health education: First line of defence for adolescent girls in Gaborone**

**Tebo Kgosiemang**

In a country where HIV/AIDS poses a threat to the health of young women, teenage pregnancy in Botswana is constructed as a social ill to be treated with proper government policies designed to prevent it. Most academic research examining underage pregnancy also pathologises this phenomenon, not accounting for the socio-cultural factors that affect the girls they portray as voiceless. Looking at the issue from the girls' perspective will help reveal the underlying social and cultural factors that are needed to understand the phenomenon. This study used feminist ethnographic research methods which focused on the narratives of the girls to give them a platform to express how they define themselves within this phenomenon. As a participant observer I aimed to establish a relationship that will allow me access to the lives of the girls, and how they navigate their circumstances, along with how they are perceived in the public sphere.

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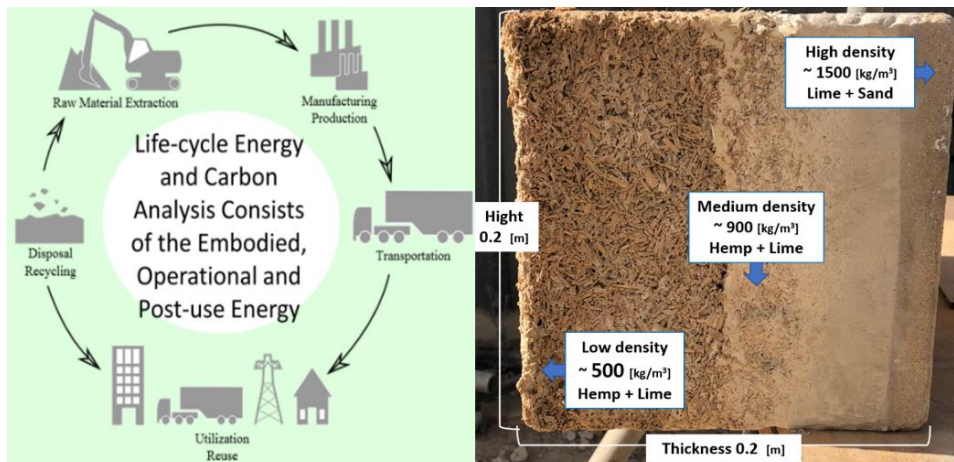




### 3. Alternative Building Materials

#### 3.1. Development and Life-Cycle Energy and Carbon Analysis of a functionally graded biocomposite building material

Yaakov Florentin



A significant portion of humanity's energy consumption and carbon emissions may be attributed to buildings – both in their construction and manufacture of their materials, and in their ongoing operation and maintenance as useful and comfortable spaces. Conventional, concrete-based building materials have a high level of energy and carbon "embodied" in their production – as do typical insulation materials, which are crucial for addressing operational energy demands for heating and cooling. Therefore, there is increasing interest in the development of bio-based building materials whose production has a relatively low carbon footprint. Meanwhile, a well-insulated building envelope which also incorporates effective thermal mass (usually applied in two separate layers, with widely varying densities) can form the basis of a thermally efficient building – reducing its operational energy and CO<sub>2</sub> emissions.

The research aims to combine these different energy and carbon-related properties in the development of an integrated, variable-density biocomposite building material which can reduce the life-cycle energy consumption and carbon emissions of the building. This biocomposite material combines lightweight aggregate based on the porous woody core of the hemp plant mixed with a lime based binder. Hemp is a non-psychoactive variety of the plant species *Cannabis sativa* L. which has been utilized historically for countless products due to its unique physical properties. Such hemp-lime (HL or Hempcrete) biocomposites have recently generated interest as eco-friendly and sustainable alternatives to conventional construction materials which can potentially reduce CO<sub>2</sub> emissions in the building industry.

In this talk, I'll present the lab work and evaluation of the development of the density-gradient hemp-lime building block for envelope construction, including mechanical, physical



and thermal tests as well as thermal performance from the test cell experiment. Results show that the development stage has met most of its goals, including superior thermal performance and lower embodied energy and CO<sub>2</sub> emissions during manufacture compared to conventional building materials. Remaining work on the full life-cycle energy and carbon analysis of a small-scale case study test building incorporating the developed gradient block, will hopefully be done in the coming year.

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### **3.2. Low Energy Insulating Building Materials Based On Hemp Bio-Aggregate**

#### **Rotem Haik**

Buildings are responsible for approximately 40% of the global energy consumption and CO<sub>2</sub> emissions. These values include the operational energy (OE) and operational carbon (OC) required for heating, cooling, etc., but they are even greater if the embodied energy (EE) and embodied carbon (EC) are also included, i.e., the energy and CO<sub>2</sub> emissions involved in the production process. One innovative development of sustainable building materials that was proven to be energy efficient and environment friendly is Lime-Hemp Concrete (LHC) which is based on hemp bio-aggregate and lime. However, lime, like other fired materials, has relatively high EE and EC values. Few works show the high potential of clay (unfired) as an alternative binder for LHC.

The current research studied the influence of replacing the lime in LHC with alternative unfired binders in several contents. Five alternative binders with low EE and EC values were examined (based on clay, limestone, dolomite, and basalt), including waste by-products of aggregate quarries, these last ones presenting additional environmental benefits. The thermal conductivity and heat capacity (thermal mass) were investigated, aiming to obtain a good balance between thermal insulation and heat capacity, in order to improve the thermal behavior of the building and reduce its OE and OC. The thermal, physical, chemical and mechanical properties were also examined. The four mixtures that presented the most attractive results were selected for the next stage which examined the thermal behavior of test cells composed from those mixtures and compared it to conventional building materials. Based on the results of the test cells, the OE and OC were calculated by EnergyPlus simulation. Eventually, Life Cycle Analysis (LCA) will be conducted in order to assess the energy and CO<sub>2</sub> savings ensuant to replacing the lime in LHC with alternative binders at several contents, compared to conventional building materials.

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### **3.3. Life-Cycle Analysis of innovative building material using biocomposites and rammed earth**

**Shahar Ouannou**

Biocomposite building materials, which incorporate plant-based lightweight aggregates in a protective matrix, have the potential to dramatically reduce the carbon emissions and the embodied energy (EE) that are typical for conventional building materials. This is significant because the building sector is responsible for 40%-50% of the global primary energy demand and 23% of the global CO<sub>2</sub> emissions related to energy. In this study, an innovative double-layer wall system was developed based on waste from orange processing factories and locally sourced soil, resulting in an insulating biocomposite layer composed of dried orange peels in a clay matrix, and a high thermal mass layer constructed of rammed earth. A Life-Cycle Assessment for energy and carbon is performed based on laboratory experiments, measurements in test cells and thermal simulation. Findings point to an 80% savings in the EE without compromising the thermal performance when compared to Autoclaved Aerated Concrete, and similar trends were found when comparing with other conventional building materials.

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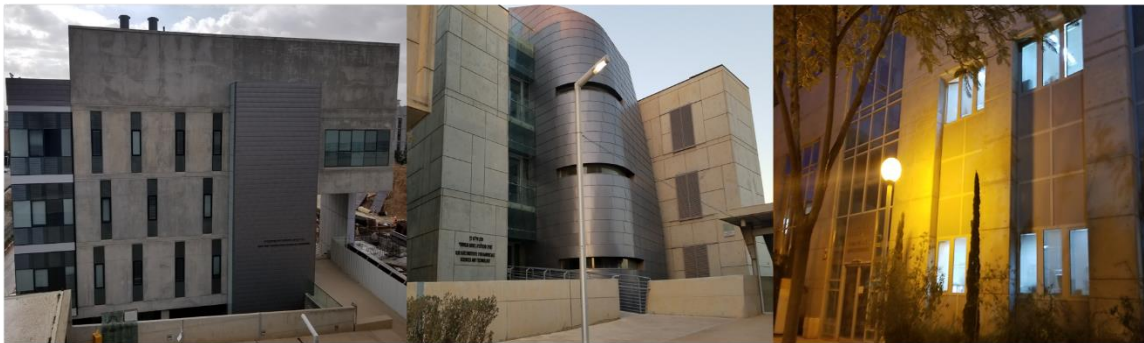
## 4. Buildings and Well-Being

### 4.1. Post-Occupancy Evaluation of university facilities in a hot arid climate: The case of Ben-Gurion University of the Negev

Annette Penny

Today's building strategies are beginning to incorporate "modern" techniques to build more efficient, sustainable, healthier, and more comfortable buildings. Often, however, these techniques can lead to unintended negative impacts on the building occupants. Furthermore, such design mistakes are frequently repeated for the sake of saving money, building more efficiently, or simply due to lack of data. Post-Occupancy Evaluation (POE) offers the ability to identify such building flaws in order to correct and/or avoid them in the future. POE is a multi-disciplinary method of evaluating building performance and user satisfaction by combining and comparing environmental measurements with occupant surveys.

This research project explores the trend of building design on the growing BGU campus in Beer Sheva by comparing three generations of university buildings. The three buildings share a number of similarities which provide a snap-shot through time of building design on campus as we explore the respective building's impacts on their occupants. Findings show a significant increase in satisfaction of newer buildings over older ones.





#### **4.2. Circadian light and health outcomes in hospitals in Israel**

**Sigal Rosenfeld**

Designing a healthy hospital in which a patient would feel safe, supported and calm is of high importance. How can a well-designed visual environment support and improve patients' health and recovery? Can good lighting help hospital buildings to fulfill their potential and capacity to heal?

Sunlight regulates the biological mechanism of most animals in nature as well as human beings from time immemorial. However, due to modernization processes and changes in lifestyle, people spend more than 90% of the time in buildings. This, along with urbanization processes, changed the ratio of time to nature, and thus also to the synchronicity of the circadian mechanism with natural light. Not only that, recent scientific developments have revealed that the circadian light mechanism (the blue light spectrum) has a direct impact on human health (even at the cell level) and the development of disease. However, there are relatively few studies on the subject in the context of the built environment, especially in the context of hospital buildings.

The aim of this study is to clarify the relationship between lighting and health and to create relevant knowledge for the planning of hospital buildings that will benefit from improving the health and welfare measures of those who reside in them. The study will focus on the documentation of the lighting conditions in the building, especially the circadian light, and examine the effect of light exposure on two patient populations hospitalized in the internal ward C at Soroka's Medical Center in Beer-Sheva.

The information will be supplemented by questionnaires about the patients' perceptions and satisfaction with the lighting conditions in the building.

Using bio-statistical tools, this study will examine the correlation between intensity and quality of circadian light, past and present health measures, and measures of visual comfort and well-being of patients.



## 5. Energy efficient high-performance buildings

### 5.1. Development of sustainable natural insulation materials for high performance buildings

**Alex Cicelsky**

Israel is committed to decreasing its greenhouse gas (GHG) emissions of which a significant amount originates in the construction sector and the energy consumed to heat, ventilate and cool (HVAC) buildings. These processes account for about 50% of the total energy consumption and the associated CO<sub>2</sub> emissions. This research aims to develop an insulating construction material from existing agricultural waste. Wheat straw is locally available in large quantities. The straw remains in the field following harvesting the grains to be burned or collected. Straw bales, used in construction for over 100 years, have very low embodied energy (EE) and embodied GHG emissions (EG) values. Buildings constructed from straw bales are insulated, have low operational energy (OE) ratings, and sequester atmospheric carbon. The straw bale construction industry, while it has been proven energy efficient and environmentally friendly, has not become mainstreamed because of lack of standardization due to its packaging, dimensions and unique construction methods.

The goal of this research is to develop a straw block with low conductivity that could replace blocks commonly used as wall fill that are of relatively lower ability to insulate a building envelope. Previous research has produced compressed straw blocks that do not insulate. The proposed research will utilize clay, an environmentally sustainable binder, in order to produce an insulated building block with low EE and EC values. Clay and straw have been used together for thousands of years and preliminary testing of this combination has shown a fire-resistant product. The research will identify optimal combinations of binders and straw in order to produce a lightweight straw clay block (LSCB) with high thermal performance in order to achieve low OE. In addition to laboratory testing and OE simulation, the blocks will be monitored in real climate conditions. Life-Cycle Assessment (LCA) will also be conducted in order to estimate the savings in energy and CO<sub>2</sub> emissions during construction (EE, EG) and use (OE) of a building made from LSCBs.



## **5.2. Feasibility study of Embodied and Operative Energy (EE, OE) savings by envelope construction thermal mass elements analysis**

**Eyal Zilberberg**

The research deals with the question whether it is possible to reduce/save operational energy expenditures which evolve due to heating and cooling use, by exploiting envelope reinforced concrete wall thermal mass properties of an office building in the predominant Israeli climates. Operative energy savings are scrutinized relative to the Embodied Energy (EE) expenditures and standard regulations. The research is executed on a 4 storey building, constructed with a reinforced concrete frame and glazing panels in the building's envelope and reinforced concrete walls in building's core. The use of heavy walls with high thermal mass at the building's envelope has been proven to be a useful way to reduce the Operative Energy (OE) expenditure. However, opposed to researches in the field, this research takes into consideration hundreds of design options for reinforced concrete elements location and arrangement in the building's exterior with consideration of serviceability design constraints as requested by the Israeli standards.

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## **5.3 Design strategies towards more energy efficient high-rise buildings**

**Tanya Saroglou**

As of 2007 more than half of the world's population is living in urban areas (a figure expected to rise to 60% by 2030). Thus, the liveability of the high-density city is gradually becoming a central point of focus and concern. A successful skyscraper model of urban planning could provide the possibility to increase city-space vertically as opposed to the current continuous expansion outward, which has obvious environmental consequences. However, skyscraper development, as well as all other new construction and gradually the older building stock, have to comply with current strict regulations on building energy efficiency. Contemporary high-rise examples do not present a sustainable solution to an increasing population or as models of prosperity, as they are linked to high-energy demand, environmental and social imbalances. An important consideration is the increased transparency of the building envelope from the mid-twentieth century onwards, that resulted in high-energy loads, especially prominent in high-rise construction.

This research looks at design strategies towards promoting skyscraper energy efficiency by considering a climatically responsive design, where orientation, the thermal properties of the building envelope, the building height, and building use, become the main design tools. Simulations of different envelope scenarios, single-skin and double-skin, in the Mediterranean climate are conducted with EnergyPlus thermal simulation engine, and comparisons are made on energy loads in relation to height. Conclusions are drawn on the relationship of the building envelope with climate, with a preference on double skin façades



(DSFs) towards a low carbon building design, while suggestions are made for further DSF research.

A second phase of this research work included the installation of weather stations within the city, in order to study in depth the temperature and wind speed changes within the urban fabric, and how these affect passive design strategies such as a ventilated DSF. These studies become especially valid in hot climates, where the combination of high solar gains and a glass-building envelope affect greatly cooling loads. The outcome will eventually be a categorization of specific design strategies of the building envelope for energy efficiency according to climate that will essentially lead to greater reductions in the energy loads of the structure by design alone.

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## 6. Urban and Rural Planning Aspects

### 6.1. Scrutinizing intra-urban microclimate variability in Be'er Sheva: A multi-method approach

**Bin Zhou**

Mapping spatial and temporal variability of urban microclimate is pivotal for an accurate estimation of ever-increasing exposure of urbanized humanity to global warming. This concerns particularly cities in arid/semi-arid regions which cover two fifths of the global land area and are home to more than one third of the world's population. Focusing on the desert city of Beer Sheva Israel, we investigate the spatial and temporal patterns of urban-rural and intra-urban temperature variability by means of satellite observation, vehicular traverse measurement, and computer simulation. We present a novel and computationally efficient approach to deriving urban geometric parameters based mainly on open-access data of moderate resolution, constituting a handy supplement to a broad range of modelling community. Our study reveals a well-developed nocturnal canopy layer urban heat island in Be'er Sheva, particularly in the winter, but a weak diurnal cool island in the mid-morning. Urban-rural and intra-urban differences in air temperature during the daytime are very weak, despite pronounced urban surface cool islands observed in satellite images. Contrasting outcomes obtained from each method, we shed light on the advantages and disadvantages of each method and discuss their potential fields of application.

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### 6.2. Transportation challenges in Sub-Saharan Africa – Opportunity for sustainable and inclusive urban mobility solutions through a Bus Rapid Transit (BRT) system

**Francisco Achwoka**

Public transport in Nairobi, Kenya forms an integral part of the broader urban informal sector and is run by private transport operators through various modes such as buses, mini-vans (*matatus*) and taxi motorcycles (*boda boda*). Despite the crucial role it holds, the sector faces major challenges in the provision of mobility to residents due to poor regulation of the operators by government, with the lack of capacity and efficiency among industry actors and within enforcement institutions increasing the risks faced by commuters. These risks include fatal traffic accidents caused by unsafe and unroadworthy vehicles, air and noise pollution, poor service at the hands of untrained and unfit crew, loss of man hours due to time wasted in traffic congestion and inadequate access to the various modes of public transport during peak hours and in 'unprofitable' routes. The unreliability of their services is



further compounded by the high cost in accessing regular public transportation in Nairobi, that excludes the urban poor and socially disadvantaged sections of the population from participating in socio-economic activities and even limits their access to health, education and employment opportunities.

This research investigates the existing dilemma in the provision of public transport in Nairobi, with a view of developing a rationale for adaptation of sustainable transport alternatives such as a Bus Rapid Transit (BRT) system for the city. Against the backdrop of Nairobi's informality and the political economy of public transport in Kenya, which present several dynamic factors for consideration, the research aims to present an understanding of what a sustainable urban public transport alternative will look like for Nairobi and its residents.

By leveraging the need for sustainable solutions addressing the mobility needs of the Global South, the research focuses on '*matatus*' as the vehicle of study into urban mobility, transport infrastructure and development and user needs/commuters' preferences. Inspired by dialogue between mobilities and transport scholars, the research incorporates 'action research' as a mixed methods technique to capture the dynamism of informal transport in Nairobi. It responds to critique on conventional approaches to urban poverty and infrastructure by revealing the role of informal transport in the lives of both operators and commuters, thereby setting a research agenda to rethink informal transport and urban sustainability in ways that adapt transport solutions to local contexts rather than doing away with inefficient transport systems completely.

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### **6.3. Planning rural neighborhoods from a community perspective**

**Keren Shalev**

The late Israeli architect, Shmuel Beckles once wrote, "The human settlement is a product of Society. It forms the most genuine expression of the society's structure, expectations, dreams and achievements. Thus, the built settlement turns out to be the symbol of Society and the substance of its creation." Is this saying relevant also for modern settlements? Are modern settlements an expression of their society? If so, what can we learn from Israel's rural settlements about their social structure, dreams and expectations? What other influential factors have a significant role-play in dictating the nature of the rural development in Israel?

The research examines these issues through traditional settlement patterns and new suburban patterns of *kibbutzim*, *moshavim* and community settlement. Factors which have dramatically changed over the years such as general land use plans, neighborhood location, housing density, nature of public areas and private house design; all influence communities, their social interactions and their sense of belonging. Structural factors found to have a key role in dictating the rate and nature of rural development are: Geographic factors such as



remoteness and accessibility, that are positively associated with the likelihood of rural settlement development; Social structure, such as type of settlement and if it is secular or religious; And demographic factors, such as age and size of a village, which are positively associated with settlement development.

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## 7. Archeology and History of Desert Settlements

### 7.1. Quarries and building stones used for the construction of the Negev cities in the Late Roman and Byzantine period. Nessana, Avdat and Rehovot-in-the-Negev as case studies

**Haim Mamalya**

Seven ancient Negev settlements developed to actual cities during the Roman Byzantine period (2-8 c. CE) when the Negev became an imperial province (Provincia Arabia) on the Empire's eastern borders. According to archaeological reports, two extensive construction outburst periods can be identified in the Negev chronology: the first occurred between 2-3 c. CE and lasted for approximately 150 years, and a second period which is dated between 4-6 c. CE and lasted for approximately 200 years. Within these periods, the central government administration created demand for a significant quantity of raw materials, first and foremost building stones, to construct the major settlements and huge agricultural infrastructure.

Three geographical units were explored as a part of the geo-archaeological surveys (Permit No. S919-2019) within the ruins' territory (AS1/NS1/RS1), on the region of the 'service areas' around the sites (AS2/NS2/RS2). Those areas were part of the construction sites, mainly used for transportation between the quarries and the construction sites. A test case was investigated in the agricultural periphery (AS3/NS3/RS3).

The Roman Byzantine building stones quarries were discovered and mapping was done on each 'service area' (AS1/NS1/RS2) of the case studies, over a rocky spur and its slopes. In total, 141 quarries were mapped. Archaeological evidence includes various findings of quarrying and dressing waste processing and numerous stones chisel marks. The lithostratigraphic columns mapping of the selected sections at the stone quarries, show that each site may be characterized by local bedrock formations which affected quarries morphology.

Seven prototypes of building stones were classified in each of the three sites (AS1/NS1/RS1), based on typology and sedimentology of about 250 building stones in every site. Emphasis was given on examining the types of stone used to build public and religious buildings, private houses and water installations.

The constituents of the microfacies were examined in order to link between the geoarchaeology, rock and stones survey results; the quarries on one hand and the building stones on the other. 67 rock hand specimens were sampled. The distribution of rock examples cover comprehensive exemplification of the rocks work. The petrographic thin sections (slides 30µm and slices 0.7-0.5 cm) were analysed and allowed to identify the major micro-fossils and additional carbonate elements, with the component's physical arrangement. This sedimentology paleontology fingerprint serves as a unique mark attributable to specific rock layer, making feasible the matching between building stone and quarry.



Contemporary use of the path between the quarries and the sites, has destroyed most of the important ancient traces. To reconstruct the ancient route, I suggest integration between the archeological remains found in the field and “least cost path” digital surface modeling.

The findings and the results of this research allow us to locate the stone quarries which provided the majority of raw materials to build the Roman Byzantine sites Avdat, Nessana and Ruhebeh. Additionally, the findings allow us to determine with certainty that the sources of a ruin's sites building stones existed at these quarries. On several cases, the specified bedrock layer used to extract the specific building stone can be found.

The discovery of the stones quarries which were used by the planners and builders to construct the main urban settlements in the Arabian Province and Palaestina Tertia, is a significant contribution to the archaeological study of the Roman-Byzantine Negev. The findings will enable to identify previously unknown broad geographical areas as Late Antiquity sites, as well as to open a new path for future research of many ancient quarries, scattered across the Levant and Israel.

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## **7.2 Byzantine monasticism in the Negev: Physical, architectonic, and socio-economic context**

**Rachel Bernstein**

The goal of this research was to better understand the socio-economic context of monasteries and the lives of monks in the Negev Desert primarily during the Byzantine period and in the beginning of the early Islamic period. The research aimed to identify common characteristics among Negev monasteries in the socio-economic aspect of their existence, and to compare them with other regionally defined centers of monasticism, i.e., the Judean Desert and Gazan monasteries.

The researcher used a variety of techniques, including aerial images, written sources, as well as critical review of monastic structures, both through surveys and drawing, and *in situ*, to determine the function of these structures. The research was also particularly interested in the relationship between monasteries and their surroundings of built space, environment, climate, and topography. A few case studies of exemplary monasteries in the region were used, with references to other known monasteries in the Negev that have shown similar characteristics.

It was hypothesized that such an examination illustrates that a uniqueness of the socio-economic context of Christianity and particularly monasticism within the Negev region existed. A complete analysis of the characteristics of Negev monasticism aided in enriching the picture of early monasticism in Palestine, and particularly in contrast to the well-known monasticism of the Judean desert.



The research showed that there were unique characteristics of Negev monasticism, particularly the monks' prominence in towns, administration (within the towns and with the empire at large), as well as their economic status.

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### **7.3 Ancient water cisterns on the Negev Highlands along the Makhtesh Ramon – Mishor haRuhot axis: Geoarchaeology and spatial simulations**

**Gabriel Ore**

One of the most impressive ancient installations in the Negev Highlands are the open-cisterns, which are located mainly in the southern and high part of the region and are concentrated along a prominent axis that passes throughout the area. These cisterns raise many questions, particularly regarding the date of their construction and the relatively high number of units in relation to the low number of sites associated with each of the historical periods to this day.

The issue of their efficiency, in comparison to the other types of cisterns in the Negev in general, is also unclear since they lose a very large amount of water by daily evaporation. A recent study on the open-cisterns properties and their spatial correlation to periodic sites shows a conspicuous connection to settlement sites from the Early and Middle Bronze Ages. It turns out that these cisterns, along with their hillside runoff channels and revetting limestone walls, were well planned and placed in relation to the precise and consistent slopes, bedrock and structure of their runoff catchments. It seems that the sparse nomadic or semi-nomadic population, who settled intermittently in this marginal zone throughout the periods, does not match the technical and organizational abilities required to construct the open-cisterns.

A comprehensive explanation to these discrepancies is apparently related to an incentive provided by one of the central and economically powerful rulers which invaded or influenced the area from time to time. Since early times, trade routes have been a vital lifeline for the existence of kingdoms and empires. Therefore, investment in setting up installations, their maintenance and protection, along the roads to support the trade caravans crossing them has always been vital.

This work attempts to presents the plausible possibility that the open-cisterns' enterprise was financed, planned and constructed by an external government that was involved in the area sometime during the Early and the Middle Bronze Age. Its purpose was to serve commercial routes for the transfer of copper and other goods such as asphalt, originating in the Dead-Sea, throughout the Levant. Since the cisterns were the only water source for tens of kilometers around, their necessity for caravans crossing this region was as critical as it is for any population that has ever lived in the area until modern times.

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#### **7.4 Environmental history of Central Asia deserts between 19-21 centuries**

**Zohar Tzofnat**

The Kyzylkum Desert, located in Kazakhstan and Uzbekistan, and the Gobi Desert in Mongolia and China are among the main dust and aeolian aerosol sources in Central and East Asia and South Mongolia. These arid and semi-arid landscapes are also at a high risk of desertification processes. During the 19-20 centuries, radical changes in government policy, land use, and farming technologies occurred in Central Asia. These anthropogenic factors, alongside environmental and natural changes, created a severe environmental crisis in specific areas and triggered desertification processes that severely impacted the local and global environment. Currently, a research lacuna exists regarding the environmental history of these areas.

In this study, I focus on the Kyzylkum and Gobi Deserts, seeking to attain access to the geographical area and archival data — which may be challenging due to official policy. I aim to collect and create a database of the environmental history of specific areas in the Kyzylkum and Gobi Deserts based on the archival files of Russian Tsarist and Soviet, and British explorers who crossed, mapped, and surveyed the area of the Kyzylkum and Gobi Deserts during the 19-21 centuries. Studying the environmental history of these areas during this period will contribute to our understanding of changes in vegetative cover and water bodies in the Kyzylkum and Gobi Desert areas. Moreover, the proposed study may yield a methodological breakthrough by developing a methodology that can be used to detect similar processes in other regions. This study may increase our understanding regarding the nature and historical course of changes in these areas and can serve as an additional tool for revealing the history of degraded environments.

