The design of a wellness center for orphans in Idlib, Syria

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ABSTRACT: Syria has reached its seventh year of war, with its future decimated and its citizens searching for hope. For those who stayed, their lives, lifestyles, customs, and historic legacy are uncertain. This research focused on providing orphans located in Idlib, Syria with a holistic mixed-use facility that provides for well being, education, health care, and spiritual needs, while using the culture's vernacular architectural history. The research used the Integral Framework as a rigorous methodology to guide analysis of the problems and identify solutions. The framework provided a systematic means to research experience and well being, performance, systems and culture at multiple scales to help ensure the process was not just broad, but also deep, meaningful and holistic. The site has the capacity to house 500 children, with services that include a Montessori-style school for ages 3-12, a medical and dental clinic, an urban farm, soccer field, and bakery. Holistic wellbeing is enhanced by water and food security, energy supply, economic growth, ecological experiences, and resilient architecture. The project is an important symbolic representation of hope for Syria's future generation and reconstruction. This project's location in Idlib was primarily chosen for bridging the coastal and central regions, becoming a refuge for many displaced Syrians escaping the regime. By assessing the past and current problems, the wellness center will provide a model for environmental stewardship and restorative design.

KEYWORDS: Syria, Biophilia, Sustainability, Sustainable Design, Integral Framework

INTRODUCTION

March 2011 marked the beginning of the Syrian Civil War, when courageous Syrian teenagers from Dara'a wrote on a wall, "the people want to overthrow the regime." The teenagers had become inspired by the Arab Spring uprising that led Tunisia, Egypt, and Libya to revolt against their own regimes (CNN, 2016). As a result, authorities imprisoned and tortured the students, and refused to return them to their families. Since then, peaceful protests emerged in Dara'a, leading other Syrian cities to follow. Today, the Assad forces and its allies have attacked civilians, violating all human rights. The war has led 5 million Syrians to evacuate to neighboring countries, Europe, and the U.S.; 6.3 million have been internally displaced (Kenneth, 2019). Many cities in Syria are drastically affected by the civil war through destroyed infrastructure, declining populations, and wavering economic conditions and resources. Thus the aim of the project was to create a resilient biophilic wellness center that acts as an agricultural, economic, and architectural model for rebuilding Syria.

This model, to address such comprehensive issues, must be designed holistically to refrain from recreating the problems of the past and resolve the problems that have arisen since. A holistic approach will help to create a project that serves the community, increases costefficiency, increase service-accessibility, decrease stigmatization and suffering, and most importantly, to serve the children. Therefore, a typical design process would not be adequate in creating a long-term solution for the people of Syria. A project supported by holistic research can fully acquire viable results bridging theory and practice. To accomplish this, a design approach was used that includes the Integral Framework (DeKay, 2011; Wilber, 2000). The Integral Framework uses a four-quadrant system, which is similar to viewing a topic through four different lenses: experience, culture, performance, and systems, as illustrated in Figure 1.

	INTERIOR	EXTERIOR
UAL	UPPER LEFT	UPPER RIGHT
INDIVIDNI	l Intentional (subjective)	IT Behavioral (objective)
LECTIVE	WE Cultural (intersubjective)	ITS Social (interobjective)
T 0 1	LOWER LEFT	LOWER RIGHT

Figure 1. Integral framework. Source (DeKay, 2011; Wilber, 2000)

Additionally, within each quadrant, the past and present problems are explored through multiple scales from global to local. This approach attempts to ensure that most (if not all) aspects of the topic are addressed without any social, economic, experiential, or ecological problems being excluded.

1.0 PROBLEM

2.1 Experience

The experience quadrant explores physical and psychological well being as a result of the personal experience of the built environment conditions that developed as a result of multiple phenomena. Before the war, Syrians suffered from a lack of rainfall, population influx, crumbling infrastructure, and the mismanagement of natural resources. These dire conditions brought rural communities to a state of poverty resulting in a massive migration to cities. Figure 2 shows that water and adaptive capacity was most vulnerable (Werrell, Femia, Sternber, 2015).

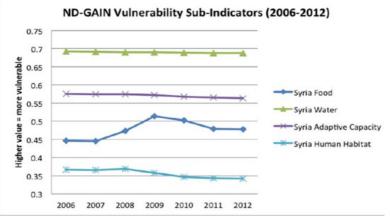


Figure 2. Syrians vulnerability to multiple forces. Source: (Werrell, Femia, Sternber, 2015)

As a result of the war, Syrian children have suffered psychological and physical stress from witnessing the death of a family member, the destruction of their homes, fleeing their neighborhoods, and living in dire conditions. These children have lost everything, and their future has become unstable. Studies have shown that traumatic experiences from the war

provoked a spectrum of psychological problems including: fear, difficulty sleeping, sadness, grief and depression, isolation from family and friends, aggression or temper tantrums, nervousness, hyperactivity and tension, speech problems, and somatic symptoms (UNHRC, 2013). Many children have attempted suicide to escape the horrors they have endured, and others have turned to self-harm and taking drugs (Taylor, 2017). Syrian children are seen as the hope for the future, but at the same time their well being has been diminished. The horrors they endured will have a long-term affect on their development and psychological well being.

Mental health services inside Syria have become all but impossible to provide due to the scarcity of mental health specialists. The adults' well being is highly affected, which in turn makes it difficult for children to have proper support. As adults face mental health disorders, there is a stigma associated with seeking help, limiting those who are actually treated. The International Medical Corporation suggests making mental healthcare part of the general healthcare to help combat the stigma of visiting a psychiatrist (Karaspan, 2016).

2.2 Culture

The culture quadrant explores the built environment's repercussion on Syria's rural and urban communities. Farmers in rural communities build their homes using modern building techniques that unfortunately cost more, creating an unnecessary strain on families. Rural housing projects were funded through government loans with interest rates that would take 15-25 years to pay back, and was equal to half the farmer's income (Jiroudy, 2012). "The government is paying an inflated price for an imported item and low-income dwellers are trapped in a high-debt poor housing long term situation" (Jiroudy, 2012, pg. 1).

As these issues were occurring in the rural outskirts of cities, urban centers had their own architectural problems. Marwa Al-Sabouni, an architect located in war-torn Homs, explained how the built environment had also laid the beginning stages for war. She postulated the "brutal unfinished concrete blocks, aesthetic devastation and divisive communities that zoned communities by class, creed, or affluence," had brought state fragility to Syria (Doroteo, 2016, pg. 2). The government created a master plan (see Figure 3) to rebuild Homs, which has the same problems as before.

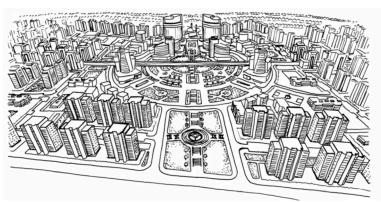


Figure 3. Government Master Plan of Homs. Source: (Doroteo, 2016)

Those problems included an industrial modernized architecture influenced by western invasions which is unsuitable and detracts from Syria's heritage and culture (Doroteo, 2016). It included skyscrapers, and Le Corbusier's building principles of modernization devoid of any historical influence (Doroteo, 2016). Rebuilding in this way repeated the cycle of disconnecting the community. Planners wanted to modernize cities and widen streets, but people wanted to restore their neighborhoods and preserve the character of the narrow streets (Aleppo Project, 2015).

2.3 Performance

The performance quadrant provides quantitative results for water and food supply, energy consumption, attack on healthcare facilities and schools, carbon emissions, agriculture, and the number of orphans. While the country was experiencing one of the longest droughts from 2007 to 2012, the Assad regime had been subsidizing water-intensive crops requiring flood irrigation techniques. This resulted in the waste of 60% of water consumed (Werrell, Femia, Sternberg, 2015). The lack of water supply resulted in crop failure of 75% and livestock loss of 85% (Werrell, Femia, Sternberg, 2015). Regarding energy, oil and natural gas were the prominent resources before the war, but during the war Syria's oil supply was disrupted, dropping to nearly zero, leaving residents without a source of energy. This decreased the associated GHG emissions, but this not a sustainable nor desirable means to reduce emissions. Healthcare facilities and schools have been the main targets of attack with 336 medical facilities destroyed, and 1 in 4 schools damaged or destroyed (BBC, 2016 and Nolan, 2016). With the number of attacks rising, the war has resulted in 600,000 Syrian orphans, exceeding the humanitarian and service efforts. (Daily Sabah, 2016). These quantifiable results aid with setting the energy, water, and food production results for the project.

2.4 Systems

The systems quadrant investigated the water supply, agriculture, and economy in Idlib, Syria, to identify the problems on a local scale for the project. Idlib relies on water springs and groundwater wells for its potable water, which is distributed via pumping stations (Alshamli, 2016). After the conflict, air raids damaged most of the pumping sites, incurring expenses and difficulties in attaining water (Alshamli, 2016). Before the conflict, the production of goods and agriculture brought 7 billion Syrian pounds to the city. The two major crops of Idlib are olive trees and figs, which are manufactured traditionally into olive oil and dried figs (Syrianet, 2015). Today there has been a major fluctuation in prices depending on resource availability.

3.0 SOLUTION

The problems discussed in each of the quadrants above were addressed systematically. The experience and well being of the children were addressed by the types of spaces and services provided, which are set within a biophilic campus. Performance issues were addressed through the exploration of water conservation, natural ventilation, and daylighting. The systems of the site were addressed through the harvesting of rainwater, solar power, and the development of agriculture on site. Finally, culture was instilled in the site by employing vernacular architecture techniques, forms, and aesthetics. The master plan shows how the design created cohesion between the landscape and buildings as seen in Figure 4. The project creates a layout of all the services, with additional emphasis and simulations of energy performance and water conservation on the school building only.

3.1 Biophliia

Biophilia, a hypothesis proposed by Edward O. Wilson, explains humans' innate affiliation and connection with nature, which is a trend growing in popularity. Studies supporting the theory are multiplying, thus building an ever-increasing case to apply biophilic design in projects. In the case of Syrian orphans, biophilia would transform the lives of orphans physically, psychologically, and emotionally from the chaos of war they endured.

3.2 Wind Towers

Natural ventilation was investigated as a technique to improve performance (see Figure 5). A vernacular technique for thermal comfort, the wind tower was simulated using IES (see Table 1). The results were iteratively tested, until proper sizing was reached to provide natural cooling. It was also evident that natural cooling may be limited during the hottest times of the year due to Idlib's climate, and backup systems would be required.



Figure 4. Site plan. Source: (Author, 2017)



Figure 5. Performance, apply resilient principles suitable for the region to build a self-sufficient wellness center. Source: (Author, 2017)

Table 1. Two-story wind tower – trial simulations

Two-story Wind Tower										
Trial Final	Size Two wind tower, one for each classroom wind tower Size 0.9m x 2.1m Opening: 1.5mx2.1m	Simulation	Scale 0.3 m/s	Conclusion Air flow reaches both classrooms Air flow reaches both						
				classrooms						

3.3 Daylighting

Daylighting allows for a building to save on energy and improve children's performance and experience. To allow the proper amount of daylighting, the window to wall ratio was calculated and simulations were run using Radiance. The results show that a window with a light shelf and clerestory windows allow for proper daylighting (Figures 6 and 7).

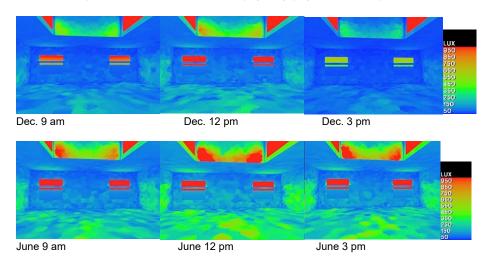


Figure 6. Clerestory for winter/summer. Source: (Author, IES, 2017)

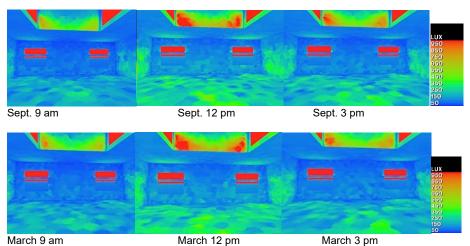


Figure 7. Clerestory for fall/spring. Source: (Author, IES, 2017)

3.4 Vernacular Design

The decision to place the site in Idlib was based upon several factors: to bridge the gap between urban and rural contexts; provide shelter and well-being for the orphans; synchronize traditional solutions with modern technologies; and incorporate personal childhood memories of Syrian summerhouses. Vernacular design informs the climatic solutions for the buildings, while modern technology enhances the energy and water efficiency systems. The building was designed according to the resources available in the area in an effort to provide "appropriate technology". Idlib's streets are filled with pointed arches, stonewalls, intricate motifs, domes, and awnings. Syrian architecture needs to be revived and its techniques honored for its application to achieve holistic sustainability.



Figure 8. Celebrate the history and culture of Syria. Source: (Author, 2017)

3.5 Water

Rainwater harvesting could only occur during the rainfall season, which is between November and March. The rainfall from these months would be retained on site to provide water during the dry season. Table 2 shows the amount of rainwater that could be retained on site (175316.42 liters), which meets the demand (518859.73 liters). The amount of water leftover is approximately 37854.12 liters, which could be used for irrigation. Overall, the annual percent savings from using municipal water is 74%.

Table 2. Rainwater harvesting

Month	Rainfall cm/ month	Total rain on site (liter)	Total rain collected (liter)	Rain for dry season	Supply for dry months
January	6.5	356144.71	33353.90		
February	4.74	260152.57	24363.97		
March	3.25	178072.35	16676.93		
April	1.12	61212.37	16676.93		
May	1.37	75124.26	7035.60		
June	0.33	18085.48	1693.74		
July	0	0.00	0.00		
August	0.02	1112.94	104.21		
September	0.27	14746.60	1381.06		
October	0.11	5843.01	547.21		
November	0.97	52865.24	4950.97		
December	15.49	848626.10	79476.08		
Annual Rainfall	3.09		15895.20		
Total Indoor Water Needed/Month			33943.79		
Total Rainwater Collected in 2016			175316.42		147631.06



Figure 9. Create a collaborative and fast revitalization process in Idlib to ensure a safe haven for children. Source: (Author, 2017)

3.6 Solar Energy

After energy conservation and natural ventilation strategies have been met, solar energy was selected to meet the remaining energy loads, and solar calculations were completed for the school. The school rooftop area alone is not enough to hold the required number of photovoltaic panels; so additional roofs on campus were also used. The total available roof area was 528.71 m², allowing for 330 panels to be installed. The solar panels produce 127,119.65 KWH of energy, which provides more energy than the building needs. The building's energy consumption was determined on Sefaira. After the daylighting, natural ventilation, u-values and r-values were added to the settings the building required 96,936 KWH of energy. Based on the results the school building surpasses net zero energy consumption.

CONCLUSION

The Integral Framework is an approach to design which attempts to include multiple aspects simultaneously and move closer to holistic solutions by exploring issues through four different lenses: experience, culture, performance, and systems. Well being was achieved by improving the experience of the city, connecting with the architectural heritage and creating a peaceful biophilic space for healing. Performance was improved by adding resilience via an off-grid decentralized pv system, energy efficient buildings using passive daylighting and cooling techniques. Systems were addressed through water harvesting methods, and cultural issues are addressed via vernacular design and providing badly needed physical and psychological services. Often, overlaps between quadrants were unearthed, leading to solutions with the potential to become truly holistic, such as one element simultaneously serving all four diverse quadrants, and to bridge the quantitative and qualitative, such as the school building. The building of the orphanage is a catalyst for a bright and sustainable future in Syria. Its strategies provide a prototype for construction of the city. The center becomes a place where the orphans heal, learn, and grow. The elderly will become optimistic about Syria's future plan. Wars eventually subside and people will be ready to work.

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