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Ecolodge Design and Architectural Education:

A New approach for Design Studios

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Abstract

While the incursion of Mass-Tourism has been a serious threat to the sensitive Ecosystem, following the principles of Ecotourism may allow the natural landscape to be better maintained and respected than before its introduction. Using renewable energy resources, sustainable water and waste management practices and the preservation of local culture and traditions are all important design considerations of an Ecolodge which makes its conceptual design distinct from the design of any other conventional touristic project. Therefore, educators of future architects face the challenge of adjusting their pedagogical strategies and restructuring their design studios within this aspect to align with the global increased awareness of Ecotourism and sustainability.

The primary objective of the study is to present an example of a design studio pedagogical process for designing an Ecolodge. It also shows the resulting students' projects and the students' feedback on the overall learning experience of designing an Ecolodge in two different touristic locations in Egypt. In general, the study relies on two main approaches. The first one is the literature review, which is necessary to provide a theoretical background on Ecolodge design objectives, the regional and international Ecolabeling and the local development standards and regulations that affect the studio-based learning experience. The second approach involves the design of a questionnaire to investigate the students' responses and feedback about their design experience regarding the Egyptian "Green Star Hotel" Ecolabel and local governmental design considerations in the context of designing Ecolodges in Egypt. The paper also suggests how the project's teaching process may include other supplementary components (such as invited guest speakers, field trips, and practical workshops concerned with vernacular building techniques) to be considered as a guide model for Sustainable Architecture Education

Keywords: Architectural Education, Design Studio, Ecolodge Design, Ecotourism, Sustainable Architecture, Ecolabelling, Vernacular Architecture

I. INTRODUCTION

The design of an Ecolodge differs from any other conventional touristic project for several reasons. In compliance with the "International Ecolodge Guidelines", an Ecolodge is frequently found in remote touristic areas; thus, they are the last locations to get governmental financial resources in electricity and potable water supplies, local roads, etc. This issue is creating a special challenge to the Ecolodge owner or manager who must reach a certain level of sustainable development by providing support to local communities in a continuing development program and setting a land-conservation program in position with a minimum of outside assistance. Awareness is one of the prominent strategies that will create successful Ecotourism practice in the same context, and it is up to the Ecotourism owner or manager to provide it [1].

However, it is still remarkably surprising to consider the integration of regional tourism planning, without exploring the strategies that generate ecological and social considerations. The planning of any touristic destination varies according to the underlying social and environmental factors, guidelines that can prevent the misuse of local sensitive ecosystems and the development a set of standards for limitations of acceptable change [2]. Unfortunately, Ecotourists still depend on conventional accommodations, rather than Ecolodges, for a substantial proportion of their travel experience. This fact may be explained partly by the lack of Ecolodge alternatives in many touristic areas.

In any Ecolodge design, the architectural style does not compete against the natural landscape and the environment but should be cordially unified with the surrounding. It is also important to take into consideration the vernacular architectural forms since these have arisen from a long progression of adaptation to the natural surrounding as well as being harmonized with the landscape and the environment [3]. Certainly, they offer excellent touristic experience in spectacular natural locations, but Ecolodges must also support local communities, by connecting their guests to local cultures on a genuine level.

The introduction of sustainability concepts to the design studio, the core of the architectural curriculum, has long been regarded as a key issue in architectural education. Yet, undergraduate programs' contradictions and the need of a comprehensive integration persist. Nevertheless, the fact remains that there is a significant gap between the academic content in the architecture schools and the current demand for sustainable building's designs in the local Egyptian building market and tourism sector [4]. Thus, the integration of Ecolodge design and Ecotourism awareness in architectural education curricula is highly important.

II ECOLODGES: EXPLORING OPPORTUNITIES

II. I Concepts and Definitions

The term "Ecolodge" was officially launched at the first "International Ecolodge Forum and Field Seminar" held in 1994. Formal discussions at this conference produced a Sourcebook dedicated to "The Ecolodge's Planners and developers" [5].

To be able to define an Ecolodge, it is essential to start by defining Ecotourism. Based on the "Ecotourism Society", an Ecolodge can

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be defined as an industry label applied to recognize a nature–dependent touristic facility which meets the idea of Ecotourism [5]. The "International Union for Conservation of Nature" defines Ecotourism as an environmentally accountable travel and inspection to relatively undisturbed places, in order to appreciate, study and value nature (and any associated cultural aspects – both historical and contemporary), that endorses conservation, has low visitor effect, and delivers active socio-economic contribution of local residents" [6]. It was also defined as a responsible travel to environmental areas that preserves the nature and improves the welfare of local communities [5]. Therefore, an Ecolodge should do the same thing by struggling to protect the ecological and cultural context in which it they are built.

The outline of an Ecolodge can vary considerably from tented camps and huts, to sumptuous spa retreats and being 'sustainable' does not mean being rustic or luxurious. Essentially, an ecolodge must offer its guests an educational and participatory experience. Therefore, Salama defined the Ecolodge as a small-scale facility that merges with its settings, offering guests an environmental understanding of the natural and cultural context around them" [7].

Due to the efforts of international organizations like the "International Ecotourism Society" (TIES), Ecolodges exist in different surroundings and countries all over the world, such as Panama, France, Tunisia, Kenya, Australia and others (as shown in Fig.1). There are all categories of Ecolodges varying from the ones that focus on adventure tourism (such as mountain-climbing, river tours, etc.) or on nature discoveries' travel (such as understanding about surrounding Flora and Fauna) or district history from a local expert.

Ecolodge design must include two essential components: conservation of neighboring natural areas along with offering benefits to local communities. According to the (TIES), an efficient Ecolodge should [8]:

1. Provide comfortable accommodation and public spaces which reflect the vernacular design and the local culture.
2. Preserve a natural environment that has been carefully maintained.
3. Utilize locally sustainable and/or recyclable construction materials.
4. Present food bought from surrounding local farmers
5. Use renewable energy resources and water/waste management techniques.
6. Offer opportunities for interaction with local residents, administrators, and guides.

Ecolodges are of specific interest to the sustainable development community, because they are multiscale enterprises that can generate a variability of positive economic development effects in highly rural, biodiverse regions, where other categories of development under consideration are often damaging the environment [9].

II. I Ecolodges in Egypt

Various Egyptian natural areas are already undergoing massive touristic development as they are the subject of rigorous development strategic plans. Unfortunately, these plans may be beyond the bearing capability of some of these stunning yet sensitive and vulnerable environments. If uncontrolled, Mass-Tourism may invade many areas of natural and cultural importance leading to irreversible damage in these areas of biological and cultural diversity as well as significant sources of national income for Egypt.

Fig. 1. Examples of Ecolodges in different surroundings and countries (Photos taken by the author)

- Jungle Area: Safari Park , Nairobi, Kenya (on the left side).
- Desert Area: Matmata, South of Tunisia (on the right side)

The beginning of official attempts toward acknowledging the Ecotourism concept in Egypt launched in 1996. Efforts included the recognition that all affected parties should be involved in the creation of sustainable tourism policies and strategies. Consequently, a decision was taken by "Egyptian Tourism Development Authority" (TDA) to create a set of guidelines which relates to the local environment and the cultural and economic frameworks: the Egyptian "Green Star Hotel" (GSH) [10]. The Green Star initiative mostly aims at helping touristic projects reduce their energy and water consumption by 20 to 30 percent, while expanding their use of renewable energy by 25 percent and increase the awareness of their guests and staff equally on sustainability issues. Various features of hotel design and operation are regulated by the GSH Program including: architecture and landscaping, gardening and beach area, food and beverage/kitchen, waste and water management, energy reduction, training and instructions, sustainable management, housekeeping, and finally guest information [11]. The different criteria of this Ecolabel are complemented with objectives designed to suit the local Egyptian environment. For example, because of the region's particularly arid climate, there is a strong emphasis on the importance of water preservation. If all the mandatory criteria are respected, and based on how serious the commitment for sustainability is, the touristic project can obtain 3, 4 or 5 *Green Stars* [11]. Beside the national Ecolabelling, Egypt also follows some international Ecolabelling certifications. They are: the "Green Globe", "EU Ecolabel" and "Earth Check" certifications. Each of these certifications has its goals, standards, procedures, and rating structure or levels [12]. In general, the design of Ecolodges in Egypt tends to be a difficult option for architects. The TDA identifies an Ecolodge's recommended physical areas (dimensions and standards) as shown in Table 1.

According to the TDA, an Ecolodge obliges the designer/owner/operator to [10]:

1. Use existing energy and water consumption reduction technologies.
2. Use local design and construction techniques and building materials. It also must have minimal effect on the natural surroundings during the construction phase.
3. Practice sustainable solid/liquid waste disposal, including recycling and sewage treatment.
4. Avoid the use of all hazardous and toxic materials.
5. Provide informative educational programs and tours for its guest.
6. Make a substantial influence on the local economic development by implementing fair wage measures and the use of local providers.
7. Evaluate environmental impacts of all construction materials and any related operation.
8. Contribute to the sustainable local community development through education programs and academic research.

Table 1. Recommended Ecolodge's physical areas (dimensions and standards) as identified by the "Egyptian Tourism Development Authority" TDA. Source: the Author based on [13]

Ecolodge Criteria	Suggested Dimensions and Numbers	Design Considerations and Standards
Total Number of Units	The number of units varies according to the project's location and size. The preference is generally for smaller 30-40 units' facilities. It is suggested that the maximum allowed size of an Ecolodge should be limited to 70 units.	✓ The overall size of the site should be studied as larger sites can support more units at a lower density ✓ Density of vegetation, landforms, and topography that offers privacy and a sense of separation between units and clusters should be considered ✓ Preferences are given to clustering, with larger amenities being divided into small clusters of 20-30 units each
Accommodation Density/ Built Areas	4-6 rooms/feddan (4200 m^2)	✓ The main elements of the Ecolodge (accommodation units, food and beverage services, and utilities) should be contained within 10 percent of the total surface of the project. ✓ The remaining 90 percent may contain strategically located recreation areas, access and maintenance facilities, and landscaping for screening, aesthetics, and environmental enhancement
Building Types and Height	It can consist of an all-inclusive lodge structure (semi-detached or independent)	✓ One unit/one floor bungalow or cabin ✓ One unit/two floors bungalow or cabin
	Building's maximum height is 2 floors	The 2 floors design option has a smaller footprint which may provide interesting spatial arrangements and can offer a better view from the unit
Building Techniques	The use of simple building techniques to increase the opportunity of using local labor	✓ Use of local materials and traditional construction techniques ✓ Adaptation of traditional tools to meet the requirements of a modern building
Energy Conservation and Monitoring	1. The use of renewable energy or co-generation schemes (solar, wind, thermal, or fuel cell) 2. Energy management systems 3. Real time metering and sub-metering to establish load profiles throughout the Ecolodge 4. High-efficiency thermal water heaters appliances (including propane) and instantaneous water heaters 5. Waste heat/energy recovery systems	✓ Solar panels should be used to heat water and generate electricity for selected appliances ✓ Thermal or Solar water heaters are to be used in each sleeping unit and bathroom ✓ High efficiency appliances are necessary to reduce the energy load when using renewable energy systems and must be used throughout the Ecolodge including sleeping units, kitchen, maintenance, and housekeeping

Ecolodge Criteria	Suggested Dimensions and Numbers	Design Considerations and Standards
Setback from Road (Inland Desert Site)	Minimum setback with no screening is 1 km	Requires an adequate setback to provide a sense of isolation in the desert wilderness environment
Room Size	1. **Standard Ecolodge**: A medium-priced room is approximately 26-30 m^2 2. **Deluxe Ecolodge**: Approximately 35-40 m^2 3. **Ecolodge suite**: More than 40 m^2. it has 2 bedrooms and shares a common area with a larger salon and balcony 4. **Eco-tent unit**: approximately 25-38 m^2	✓ All Ecolodge units require a private outdoor area ✓ A kitchenette adds another third to the size of the unit ✓ Room components and areas: 1. Living area: 30-40 % 2. Sleeping area: 20-40% 3. Bathroom/Dressing area: 15-20%
Administration and Service Areas	Approximately 45-60 m^2per room for all the facilities	Facilities to be considered are: ✓ Lobby, offices, hallways, storage, and retail spaces ✓ Restaurants and lounge ✓ Health center/exercise room, sauna, skin treatment and massage room ✓ Reading room, a multipurpose room and/or resource center
Food and Beverage Areas	About 1,1-1,7 m^2 are required for each guest	Approximately 50-60% of the seating area may be on a covered outside deck
Walking and Interpretive Trails/ Parking Stalls	1. Recommended Average width: 1,2-1,5 m 2. Should provide views to special attractions of the site 3. May Control views with vegetation and landforms	✓ Should include the following: 1. Interpretive signs identifying local plants 2. Seating areas with sun protection 3. Natural walking surface using crushed local gravel or flat stones ✓ The proposed size of Parking stalls is: 1. Automobile: 2,5 x 5,5 m 2. Motor coach 3,5 x 12 m 3. 4x4 vehicles: 3,5 x 6,0 m 4. Smaller truck or camper: 3,5 x 6,5 m

Ecolodges provide an immersion into Egypt's mixed sceneries and cultures. While the "Green Star Hotel" criteria is used to define Ecolodges in Egypt, many entrepreneurs have established eco-friendly, moderate touristic projects across the country that use renewable energy resources, rely on waste segregation and composting, grow their own organic food, use vernacular architecture and local building material in the construction of their lodges, and benefit the local community in the same time. This category of Ecolodges are more preferred in the European market as it offers up a tough-to-beat mixture of cultural experience in a low-impact establishment [14]. These Ecolodges vary in size and types as shown in the examples in Fig. 2. Basata, which was built in 1986, is one of these moderate touristic projects. It is the first Ecolodge built in Egypt in the southern part of Sinai between the 2 cities of Taba and Nuweiba. Its Visitors may either camp out or stay in the bamboo and reed-made cottages. Buildings and cottages are constructed in harmony with the Sinai landscape using only natural materials and traditional techniques. In addition, using only natural wind patterns, there is no need for mechanical ventilation or any other type of artificial cooling. Basata also supports the local community in different ways: they follow the concept of a "Circular Economy" by empowering the local Bedouins and integrating them to become a vital part of the project. The Ecolodge serves the local society indirectly by building a school to instruct the Bedouins, who cannot travel long distances to the nearest school [15].

On another level, semi-permanent safari tent camps are becoming more popular because of market demand and tourists' preferences. They claim that these tents' based Ecolodge offer them a chance to be "in closer contact with nature". These "Eco-camps" are also needed to be able to provide visitors with accommodation adjacent to unique heritage villages or national protectorate/parks of special interest. They typically consist of portable tents for kitchen, dining area and toilets/showers. Electricity can be supplied through solar powered batteries [16].

Unfortunately, the variety of existing Ecolodges in the Egyptian market passes from basic to luxury, there is a "gap" between community-run, basic amenities and high-end Ecolodges, with a shortage in mid-priced ecolodges [9].

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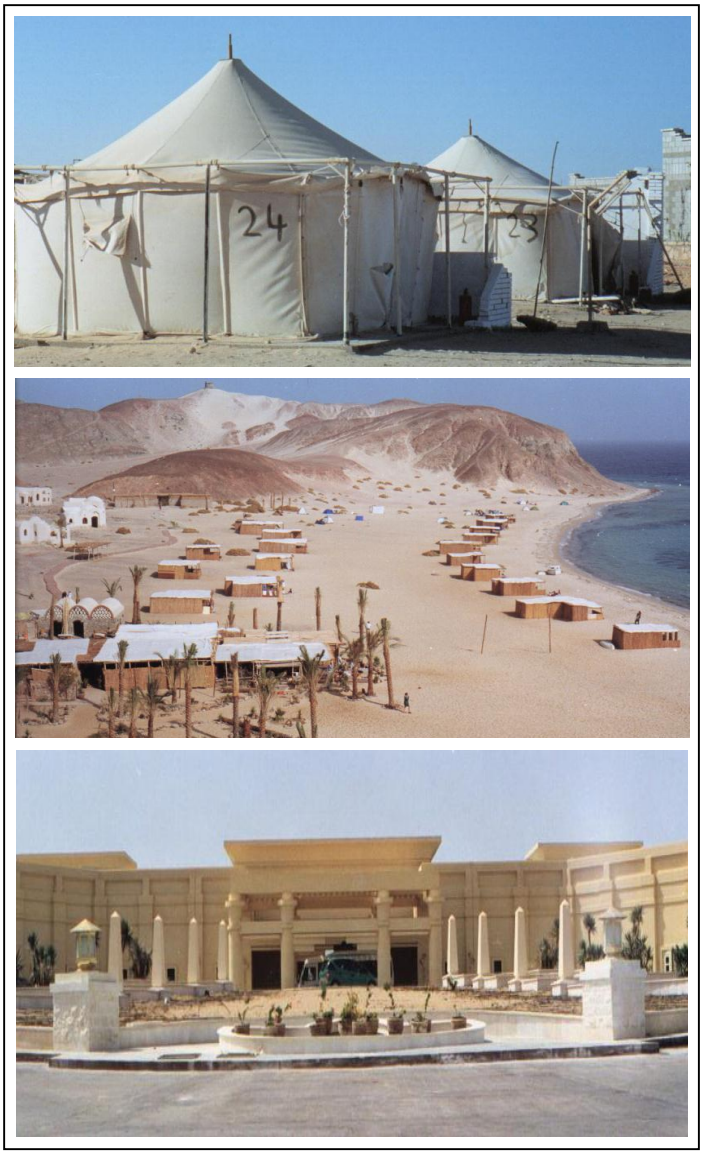

Fig. 2. Examples of coastal Ecolodges in Egypt
(Source: the Author)

- A semi-permanent tent camp: Sharm Elnaga Camp, Safaga, Red Sea (the upper photo)
- A resort/village: Basata, Nuweiba, Sinai, Red Sea (the middle photo)
- A 5 Stars Hotel: Sheraton Soma Bay, Safaga, Red Sea (the lower photo)

II.III Teaching Ecolodge Design: Potentials and Challenges

In general, contemplating sustainable design in the design studio requires a high degree of integration of technical and environmental strategies in the basic goals and techniques of the studio. Currently, there is no clear tutoring for fully integrating sustainable design within architectural programs and curricula [17]. Few educators in university faculties focusing on the sustainable design field tried to describe the principles, aims and pedagogical strategies of an Ecolodge design's teaching experience. Salama [18] limits the principles of Ecolodge design to two: the first is building "less" through the minimal required areas that can accommodate the Ecolodge activities. Intensive site analysis studies must be conducted before this stage using five major factors: the overall ecological context, topographical characteristics, climatic conditions, natural and cultural sights and attractions, and lastly positive and negative views. Each factor must be translated to design constraints and responses to establish a set of planning and design requirements specific to the Ecolodge's site.

Designing an Ecolodge differs from the typical design of any other conventional touristic project. International and local Ecolabeling systems such as environmental assessment systems must be considered to preserve the natural environment in addition to the economic and socio-cultural aspects of the Ecolodge site [19]. This paper describes a teaching experience conducted by the author which investigates the design experience of an Ecolodge in 2 touristic sites in Egypt. The design studio at the core of this paper focused on the conservation of the primeval natural environment and traditional culture of these touristic places through the implementation of various key values of economic, environmental, and cultural sustainability as an essential aim to follow.

III. THE ECOLODGE PROJECT'S STRUCTURE AND DEVELOPMENT

The Ecolodge project's program was proposed, among other important national projects, on the list of the graduation projects of the academic year 2019-2020 at the Architecture Department, Faculty of Fine Arts, Helwan University, Cairo, Egypt. The primary objective of this comprehensive project was to introduce to the students a new area of interest to sustainability which is the Ecological design of touristic projects. the students were introduced to passive vernacular designs and environmentally sensible strategies used in this type of projects. The students were also introduced to examples of international, regional, and local best practices focusing on the Egyptian context.

The focused group were 24 students who chose this project out of a total number of 210 students. Later, the 24 students were split into 3 groups with 3 different Professors specialized in the subject. The design and implementation tasks were carried out during a total period of 13 weeks (the second term of the academic year). The schedule was designed so that the first 5 weeks would cover all academic lectures, theories and analysis' presentations made by the instructors and students in a classroom environment followed by 6 weeks for a design development exercises and a one-to-one direct mentoring and supervision. The final 2 weeks would be given over to the last details and refinements of the final version/submission of the project.

Unfortunately, due to the COVID19 global pandemic crisis, all universities in Egypt were temporary closed after the first 5 weeks of the project and the remaining activities and development of the project were carried out online using the following program/software:

1. *Google Classroom* which was used to create, distribute, and grade the assignments by the Group Professor and an assigned Teaching Assistant. It was also useful in streamlining the process of sharing files and presentations between the instructors and the students

2. *Zoom software* which was used for one-to-one meetings and group video conferences exploiting the screen sharing service of the project.

III.I Defining the Project's Teaching Pedagogy

The project was divided into 3 phases and included theoretical lectures, group presentations, and one-to-one mentoring and tutoring in the faculty's campus and later online. A sequence of exercises, presentations and assignments was developed over the project's duration to fit within an overall studio strategy and schedule. The teaching team defined the time commitment of each assignment and identified whether it is part of a greater studio investigation or a separate study needed for the chosen location of the project. A review of the different assignments and related submissions aligned with the other graduation projects' topics was also set.

III.I.I The Project's Program

The 2 suggested locations of the project were chosen according to the classification of touristic regions of such projects in Egypt as follows:

1. Desert Regions: The area of Saint Catherine in the Southern part of Sinai Peninsula. This location offered the opportunity to explore unspoiled natural beauty within the historic/religious background of the Sinai mountain area. It also represents a challenging opportunity to build in an arid mountain area and benefit from the best practices of similar regional Ecolodges' project in the Northern Africa region and Turkey.

2. Coastal Regions: Zaafarana area, in the Red Sea governate, beside the governmental wind farms. This location offered the opportunity to focus on the Red Sea's overwhelming local variety of marine flora and fauna, with more than 1, 000 species of fish, and investing it in the Ecolodge design and tourists' attraction while also respecting the local regulations of coastal development. It also offered the prospect to benefit from the direct supply of a renewable energy resource from the wind farm in Zaafarana area.

As the project is focused on the environmental impact of its design logic, including the natural and social environment of local residents (if any), and the participation of the surrounding people in the operation of the Ecolodge as an important aspect for the success of the project, student were encouraged to demonstrate this influence in their designs. In turn, these general objectives were translated into the Ecolodge architectural program and different zone's components. It was also suggested that the proposed program could be alternated and changed, to some extent, according to the students' designs requirement or scenario. The program entailed 4 main zones as follows:

The Residential Zone which includes the following**:** 25 single in-suite rooms, 50 in-suite twin rooms, 40 triple in-suite rooms with the ability to be transformed into a quadruplet rooms if needed, services area and storage for each group of rooms according to the design. 12 Houses: every house includes 2-3 bedrooms with different sizes in one separate building with communal bathrooms and a kitchenet. A camping area with its service area and separated toilets and showers (maximum 20 tents).

The Entrance and Reception Zone which includes the following**:** The main building that encompasses the following: Reception area, valet services section for guests, a first-aid clinic, 4 shops selling local traditional products, 4 administrative offices, Security office, Meetings and Seminars center, and related services.

The Sports and Cultural Zone which includes the following**:** Scuba diving and water sports center (in the coastal site) - a center for climbing and mountain Hiking (in the mountain site), a general local entertainment and culture activities' area (depending on the design), 3 restaurants and cafeterias (the trend of self-service is preferred) , 2 kitchens, 4 different sports courts, open-air gathering or open-air theater, 3 workshops for traditional productions in the region, a children's area (outdoor and indoor), a setting for relaxation, meditation and reflection, additional outdoor areas designated for nature-based activities.

The Service Zone which includes the following**:** Water treatment station, a desalination center (in the coastal zone), a service area for the treatment of solid waste and the site central utilities, renewable energy power supply zone according to the chosen location the area, residence of the staff and is divided by post/function (20 workers, 4 managers and 12 employees), 3 warehouses divided by use and finally a parking space.

III.I.II Design Considerations and Objectives

The Professors engaged in the graduation project agreed on applying the project's objectives on all levels of the design from the urban and architectural design till the internal design of the project components. Nevertheless, the students must succeed in connecting the 4 known pillars of sustainability: the economic, the social, the environmental and the cultural aspects. In this context, the student is correspondingly free to choose the suitable strategy for such use under the condition of the full application of the Egyptian 'Green Star Hotel' Rating System with the occurrence of some flexibility in his/her design. In order to guide the students in developing the final design alternatives, the project's main objectives and design considerations according to the "Greens Star Hotel" criteria together with the site investigative studies were combined to establish a guiding tool for defining design requirements that can map out the required proximity relationships between the buildings for each chosen site as explained in Table 2.

III.II Theoretical Base and Lectures/Presentations

During the first five weeks, the students were introduced to the main theoretical approach which was based on best practice case studies that illustrate not only Ecolodge's sustainable design but the application of different theoretical principles for passive vernacular building design suitable to Egypt and other countries in the same climatic zone and/or similar cultural background. Passive cooling approaches were also discussed as one of the proposed sites was in Saint Catherine mountain area which is known for its very cold weather during the winter season. Students were given two lectures about the project's context and were encouraged to investigate further the information given in the different lectures.

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Table 2. The project's main objectives and design considerations based on the "Green Star Hotel" criteria and the chosen site. Source: the Author based on [11] and [20]

Objectives' Cluster/Green Star Hotel Criteria		Project's Main Objectives	Main Design Considerations of the Chosen Site	
			Zaafarana Coastal Site	Saint Catherine Mountain Site
Environmental Objectives	• Design, Architecture and Surroundings • Energy • Water • Waste • Environmental and Sustainable Management	• Provide the simplest technologies that incorporates energy conserving strategies • Integrate sustainable design constraints such as: climatic conditions and topographical features • Using natural landscaping and indigenous species vegetation. Preservation of existing trees and Rainwater creeks • Grey water and sewage treatment and recycling • Provides careful handling and disposal of solid waste	✓ Positive interaction with the site's natural resources and characteristics (coastal line, contour lines, etc) ✓ Avoiding rainwater brooks coming from nearby mountains ✓ Using natural strategies of recycling water such as" Constructed Wetland" technique ✓ Using coastal plants suitable for hot-dry climate in the project's landscape	✓ The resilience of the building design to both very cold weather in the winter and hot one during the summer season. ✓ The use of efficient vernacular construction/operational methods such as rainwater reservoirs ✓ The effect of the mountain architecture on the design ✓ Using Drip irrigation and local site-specific plants
Socio-Cultural Objectives	• Guest Information • Training and Instructions • Gardening and Beach Area • Food and Beverage/Kitchen	• Provide awareness for visitors on traditional and natural features, wildlife, and local culture • Provide a sense of belonging and ownership among the tourists by promoting cultural attractions and activities. • Introducing local cuisine and planting its ingredients as part of the landscape design •Provide opportunities for the demonstration of local arts crafts and traditional culture of the region	✓ Promoting the needed awareness about the Red Sea's marine diversity of Flora and Fauna through the proposed activities ✓ Identifying regional endemic plants using educational signs in the landscape design ✓ Introducing marine activities such as organised fishing trips, scuba diving and mountain climbing in the proposed activities	✓ Promoting the importance of Saint Catherine monastery through organized activities and designed spaces ✓ Integrating traditional (Bedouin) construction materials and techniques. ✓ Introducing local Bedouins lifestyle, and traditional food in the proposed activities/facilities
Economic Objectives	• Design, Architecture and Surroundings • Training and Instructions	• Enhance economic awareness through the most efficient use of local resources and building materials. • Profiting from the site's main positive views and the best use of natural attractions • Raise the local standard of living by involving the local population in the operations of the ecolodge.	✓ Proposing economical construction techniques and regional building materials ✓ Use of nearby Wind Energy from "Zaafarana Wind Farm" in addition to other Renewable energy resources ✓ Designing all the residential units to Equally benefit from the sea view	✓ Using local building materials including stone that can be obtained from nearby mountains for walls, reed, palm trunks, and local tent fibre for roofs. ✓ Helping the Bedouins to preserve their traditional life and providing them with employment opportunities in the project

The first lecture focused on Ecotourism principles in general and Ecolodge design and its regulating international and regional Ecolabelling with a special focus on the Egyptian "Green Star Hotel" constraints and exposure. Examples of successful Ecolodges constructed in similar areas as the proposed 2 sites for the project in Egypt (*Basata* Ecolodge in the Red Sea area,

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Anakato Ecolodge in Aswan and *Adrere Amellal* Ecolodge in Siwa Oasis) as well as regional Ecolodge examples (*Chennini* Village and Hotel *Marhala* in Matmata in the southern part of Tunisia and *Cappadocia* Hotel in Turkey). The second lecture dealt with modern sustainable design strategies and the use of recycled and natural building materials in the architectural and interior design of similar coastal and mountain projects. Students were introduced to *SMOG* Eating Materials, the use of natural recycled materials and renewable energy resources. Examples from the PowerPoint presentations/lectures can be seen in Fig.3 and 4.

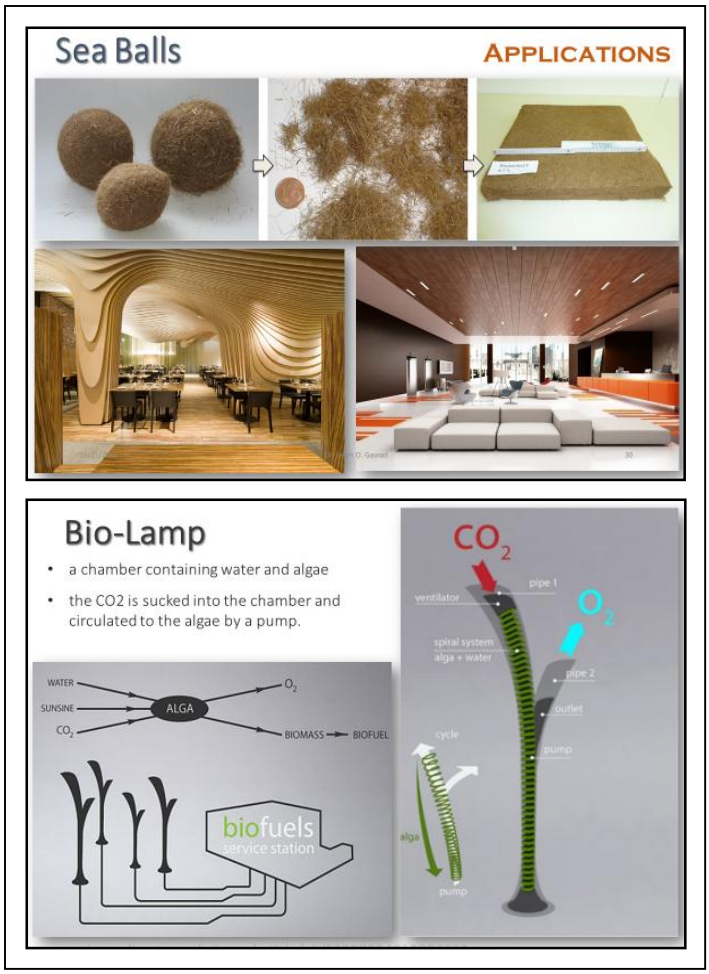

Fig. 3. Examples from the second lecture's PowerPoint presentation.
The use of natural recycled materials in the interior and landscape design (Source: the Author)

Fig. 4. Examples from the first lecture's PowerPoint presentation.
The Ecotourism principles, international and regional Ecolabelling, Cappadocia Hotel in Turkey, Adrere Amellal Ecolodge in Siwa Oasis (Source: the Author)

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Following the theoretical based lectures, the students were requested to submit a 20 minutes long presentation describing the chosen site's climate, natural resources (Fiona and Flora), local residents' culture, and finally the traditional building methods and local materials as illustrated in Fig.5. Different groups of 5-7 students presented to their professors and the rest of the students the required information on the 2 proposed sites.

In the consecutive 2 weeks, the students managed the theoretical based information they had gained from the presented lectures and groups' sites analysis presentations they had attended, in addition to their own research on similar projects and site's characteristics, and presented an individual primary proposal describing their passive design strategies, adopted vernacular architecture tools, the building materials, the proposed renewable energy resources along with the construction techniques they plan to follow and the impact of the local culture on their future chosen site's project as illustrated in Fig.6. It was agreed that this proposal would be counted as an important component of the final submission of the project.

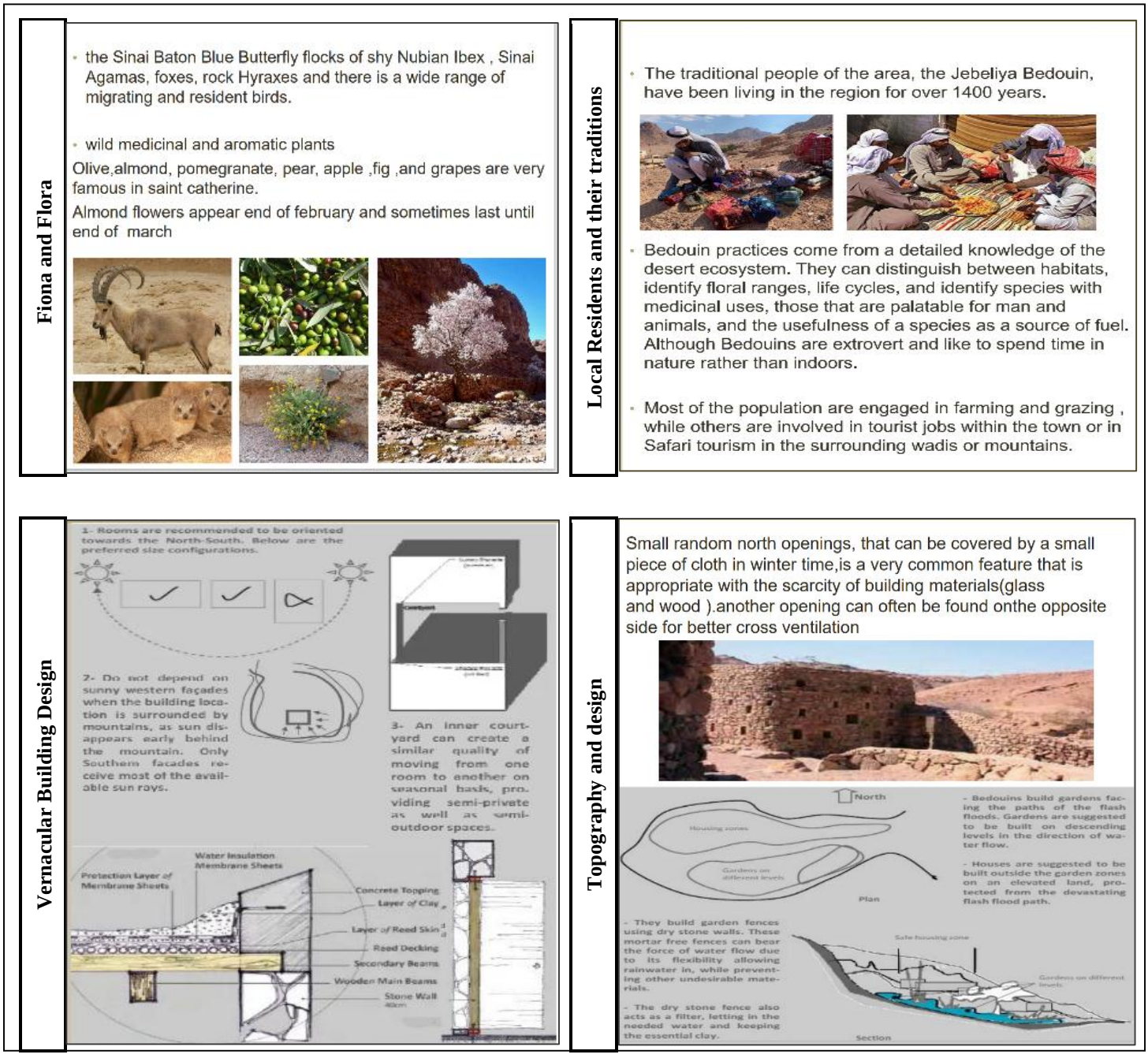

Fig. 5. Part of a student's presentation: Saint Catherine climate, natural resources (Fiona and Flora), local residents' culture, and traditional building methods and local materials

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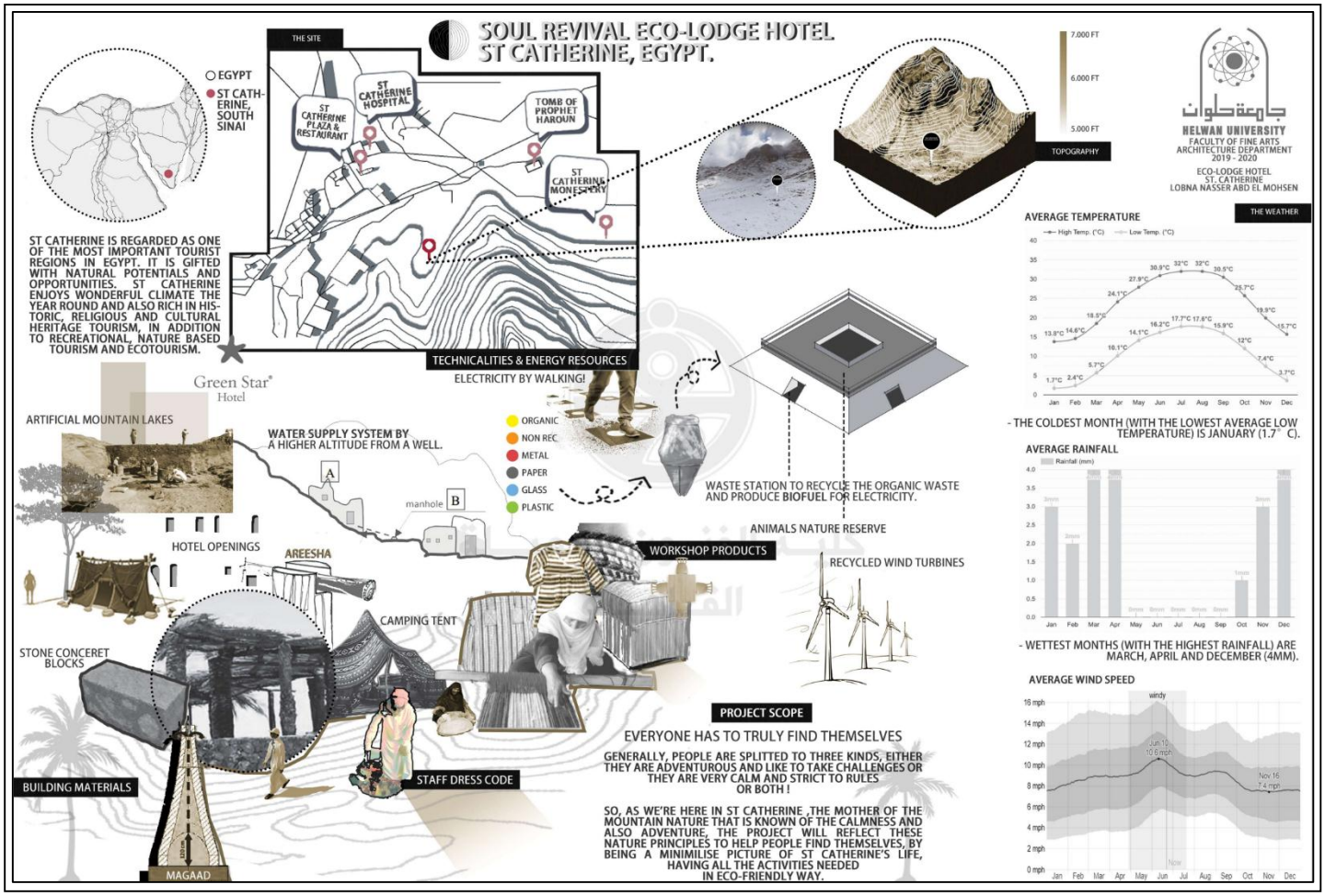

Fig. 6. Part of a student's primary design describing the chosen passive design strategies, building materials and the construction methods, renewable energy resources, and the impact of the local culture on the design of the Ecolodge (Saint Catherine site)

III.III Development and submission of Design projects

Over the consecutive five weeks, individual tutoring took place in groups over the "Zoom" software for the first time in the Architecture Department due to the COVID19 pandemic crisis. The 24 students who chose the Ecolodge project out of 4 other projects were divided in 3 groups. Each group was tutored by a Professor and a Teaching Assistant at least twice per week. The development of the individual designs' proposals was based on comments and feedback from the class Professor, the teaching assistant, and the rest of the students in the group as well who did comment on each other's proposals through peer review. During that phase, the students were given direct feedback on how to passively design in a mountain area while preserving the topographical features of the site, and how to maintain the same approach when designing on the shore line of a sensitive coast such as the Red Sea. They were also guided to design the suitable technical methods for waste, water and drainage systems using passive ecological solutions (Zaafarana site) or the traditional techniques of the local residents (Saint Catherine site). Several discussions took place on the energy production and reduction in addition to the protection of Flora and Fauna in the 2 sites. The students were advised to adjust their designs accordingly to meet passive standards of the Egyptian "Green Star Hotel" criteria and/or other international Ecolabelling if needed. In the end of this phase, the students developed their design skills towards a better understanding of the connection between the program and design requirements, the vernacular building methods and materials, the economic feasibility of such projects, and the users' comfort standards while enjoying the whole experience. Students were also expected to give a name to their Ecolodge project. The proposed name would describe the theme adopted in the design of the project.

III.III.I Project's Final Submission

At the closure of the development stage of the project, the students submitted the final design online (via Google Classroom) in the form of a 6 slides' PowerPoint presentation and a video of a 'walk through" their projects. Students were requested to explain how they developed their design concept through detailed plans, elevations, sections, and 3D shots. Parts from some projects from both sites are viewed in Fig. 7.

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Fig. 7. Examples of final submission of the project: Zaafarana Site (the upper photo) and Saint Catherine site (the lower photo)

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III.III.II Evaluation Process and Criteria

A variety of processes of evaluation were used by the faculty members to assess the final students' work including qualitative and quantitative main assessments criteria such as: the project's form and graphic representations, the clarity of design intentions and strategies, the analysis of the basic site potentials and limitations and finally the impact of applying the Ecolabelling criteria on the design. The student's physical presentation of the project was also an additional assessment criteria regarding the discussion of the project's design in connection with the particular problem statement and investigative passive strategy used. Secondary assessment criteria included the following:

1. Distribution and clustering of accommodation units to maximize the benefit from the local scenery.
2. Relationship of accommodation units to other main functional area of the project.
3. Preservation of the natural context and the correlation between the building and main environmental resources.
4. Investment of the traditional culture, building techniques, and local materials in the design.
5. Suitability and functionality of buildings in relation to the entertainment activities related to the chosen site.

III. IV Students Questionnaire

An investigation of students' responses and feedback to the various given resources/lectures and design challenges, especially with the online education due to the challenging COVID19 epidemic circumstances was then needed. The questionnaire was conducted after the completion and the submission of the final graduation project in July 2020. The students were requested to respond to a *Google Form* questionnaire using an already sent invitation.

It is also worth mentioning that another questionnaire took place targeting the overall number of senior students (210 students) and was focused on the evaluation of the distance learning experience.

III.IV.I Questionnaire design

The questionnaire was designed to generate qualitative and quantitative data. 22 students in total (31,2% male and 68,2% female) from 3 teaching groups participated in the survey. The questionnaire was composed of two sections:

1. **General Considerations:** In this first section, the students were asked about the reason behind their choice of the Ecolodge Project over the remaining 4 graduation projects, the effect of the studied local/regional and international examples on their design, the selected general passive design techniques used in their design, and finally the outcome of local cultural surrounding on the project (as shown in Fig. 8).
2. **Project's Detailed Technical Design:** In the second section, they were asked about the selected building materials and renewable energy resources, the preferred solid and water waste treatment, and finally the used furniture materials (as shown in Fig 9).

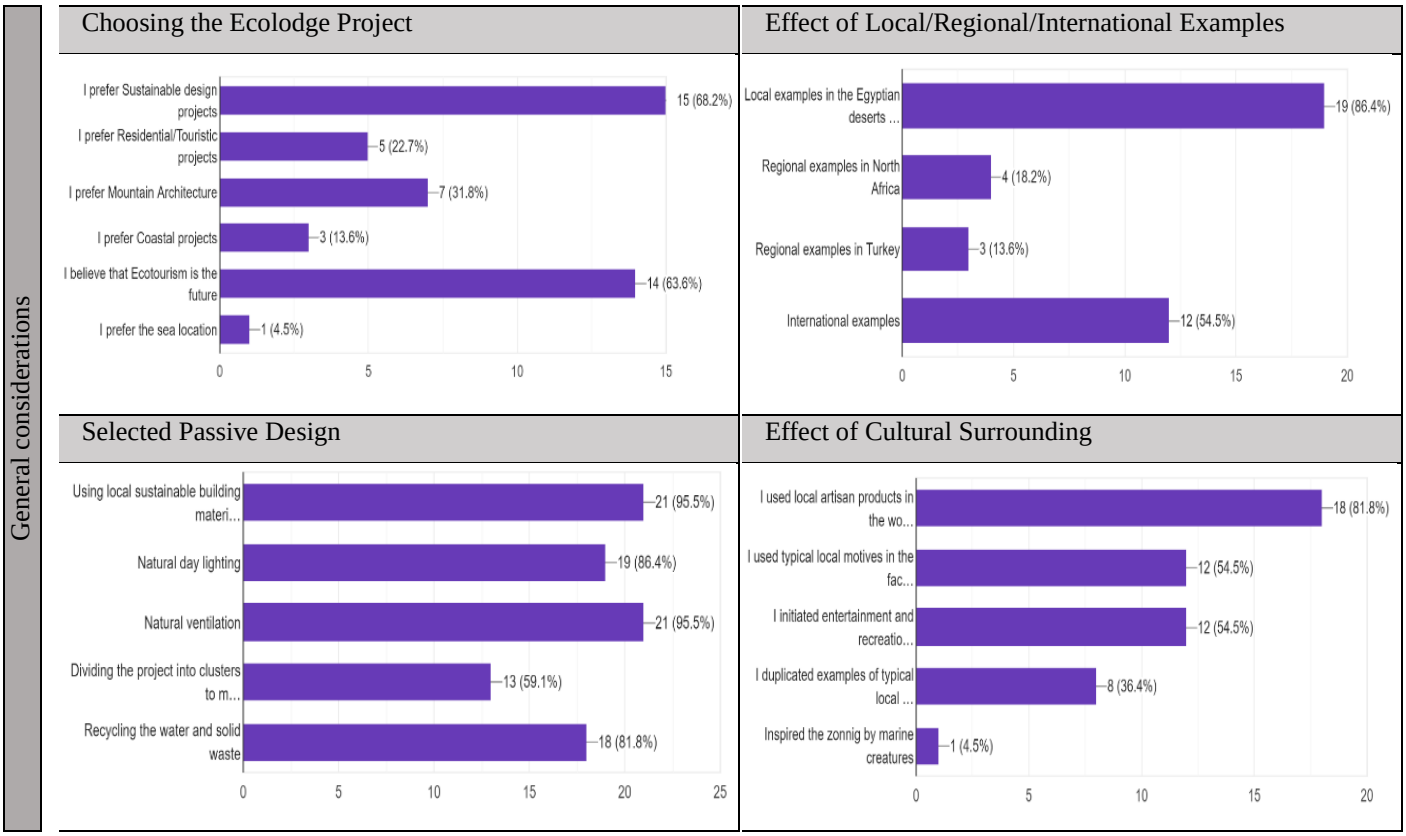

Fig. 8. Part of the results of the "General Considerations" section of the students' Questionnaire (prepared by the Author)

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III.IV.II Students' Questionnaire Responses

According to the questionnaire's results, only 31,8% of the students have previously visited/stayed in an Ecolodge. As many as 77,3% of the students stated that they are aware of the importance of the 'Ecolabelling/Accreditation systems" on the Ecolodge's design while the remaining portion were only 'partially' aware of such an importance. However, 95,5% of the students said that they used the Egyptian "Green Star" accreditation/rating system in designing their projects. As for the choice of the site of the project, half of the students selected the Zaafarana coastal site on the Red Sea while 36,4% chose the Saint Catherin Mountain site.

The remaining 14,6% were given the privilege of selecting any site in Egypt as they were highly academically ranked students. When questioned about the academic resources which helped the students the most, the majority of the students (86, 4%) stated that they mainly depended on related Internet sites, while 77,3% of the students acknowledged the importance of the professors' presentations/lectures during the theoretical phase as their main resource, 49,9% depended on architectural books and journals and only 22,7% benefited from their colleagues' group presentations during the academic year.

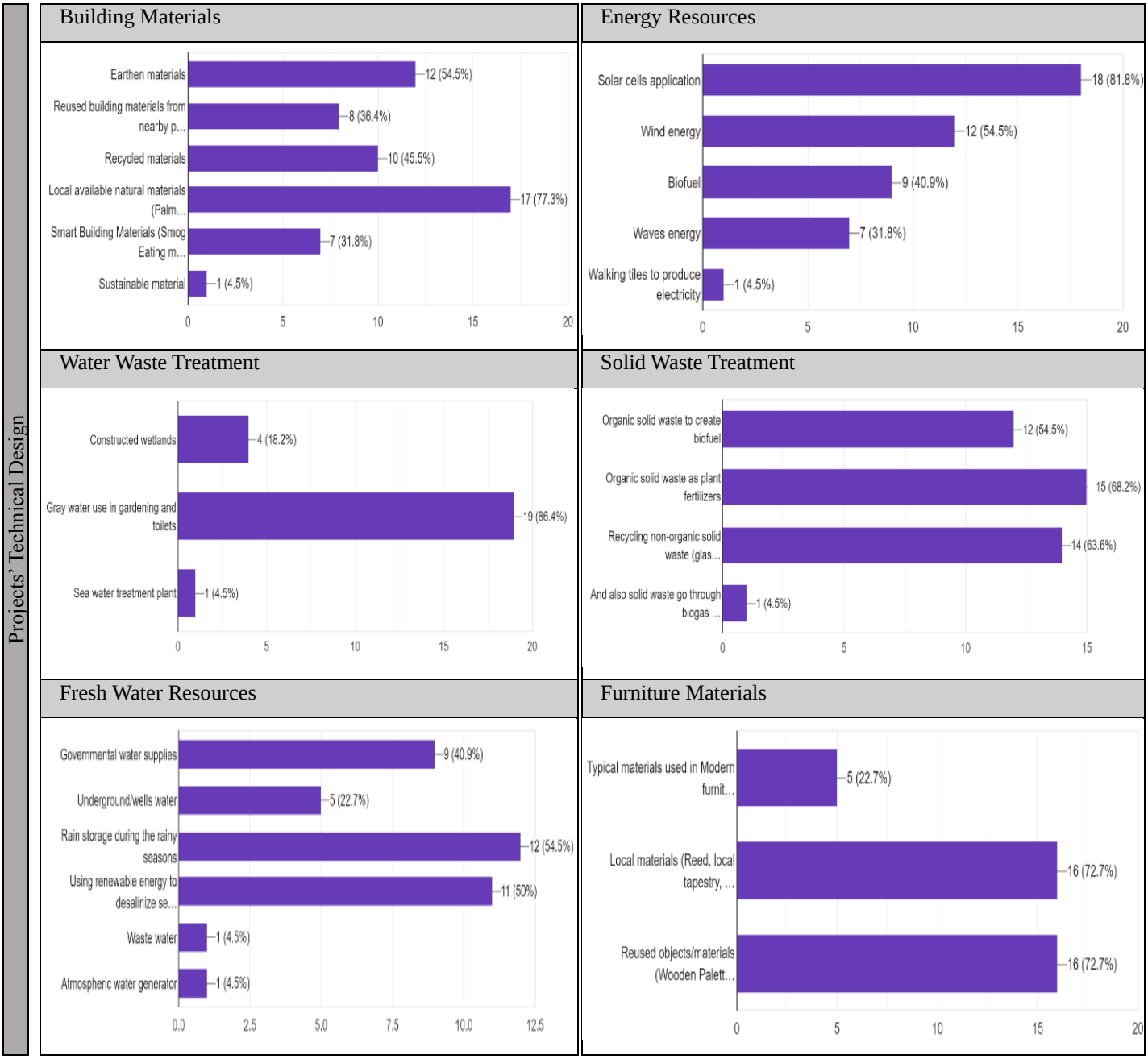

Fig. 9. Part of the results of the "Project's Detailed Technical Design" section of the students' Questionnaire Survey (prepared by the Author)

It is worth noting that while designing the questionnaire, the author allowed the students to introduce additional applied design tool/strategy in different questions by adding another answer's option under the name "other" which some students already used.

The main results of the "General Considerations" questionnaire have shown that the students chose this Ecolodge project over the other 4 proposed graduation projects because they mainly prefer sustainable design projects and they do realize the importance of Ecotourism in the future. As for the effect of local/regional/international successful examples of Ecolodges on their design, the majority of the students (86%) were influenced by local examples in the Egyptian deserts and shores and only 54,5% of the students appreciated the effect of international examples. Different passive design strategies have been almost equally selected by the students in their designs. On top of these strategies came: the use of local sustainable materials, applying natural ventilation and daylighting's principles and finally recycling the water and solid waste. The students also acknowledged the effect of cultural surrounding on their designs by mainly designing workshops and shops for local artisan products. They also equally used typical local motives in the facades and initiated entertainment and recreational activities related to the cultural history of the area in dedicated entertainment areas.

As for the main results of the "Project's Detailed Technical Design" questionnaire, the majority of the students (77,3%) confirmed the use of local available natural materials such palm trucks, and reed. Earthen materials came second (54,5%) followed by recycled materials (45,5) while the use of modern sustainable building materials such as "Smog Eating" materials, integrated solar cells in the glass windows and other materials were the least used. When choosing the energy resources, 81,8% of the students preferred the application of Solar Energy in their design while 54.5% chose the application of Wind Energy (especially in the Zaafarana site), 40,9% of the students preferred the local generation of Biofuel and finally 31.8% added the application of the Waves (Tides) Energy. When they were asked about the Water Waste treatment applied strategies in their projects, the use of Grey Water in gardening and toilet flashing came first followed by using "Constructed Wetlands" strategy. Regarding the Solid Waste treatment, the usage of organic solid waste as plant fertilizers came first while recycling non-organic solid waste (such as glass and plastic) came second and using organic waste to create Biofuel came third. As far as the Fresh Water resources, 54,4% of the students preferred the use of traditional methods of rain storage during the rainy seasons (especially in Saint Catherine site), half of the students used renewable energy to desalinize sea water (mainly in Zaafarana site), 40,9% went with the conventual way of getting the project's fresh water supplies from the "Governmental Water Company" and 22,7% of the students ideally chose the use of underground/wells water (preferred by Saint Catherine site). Moving to the details of the interior design of the project, especially the selection of furniture materials, 72,7% of the students equally chose the use of Local Materials (Reed, local tapestry, etc.) and Reused Objects/Materials (Wooden Pallets, bottles, trees trunk, etc.) while 22,7% of the students just chose Typical Materials used in Modern furniture.

III.V Problems/Challenges Encountered

In general, the Design Studio is a "Social Environment" where the interaction between students and studio instructors represents the backbone of design education [21]. In the Design Studio, live communication enables free exchange of views and a personalized teaching experience which focuses on individual differences with respect to the skills and learning abilities of the students [22]. Therefore, organizing, teaching, and mentoring the graduation project using the Online form of education was quite complicated, especially regarding the communication or rather the direct contact and promptness of giving the feedback to the students.

At a similar level, successful educational experiences in other Architecture schools have confirmed the importance of related field trips and off-campus workshops in serving as important learning tools in similar sustainable design projects. Dabaih et al. [15] described their educational experience using theses 2 educational tools, where the students could see real examples of passive design approaches using locally available materials. They organized several guided tours with tourism and architecture experts and owners of various Ecolodges, such as the Basata Ecolodge on the Red Sea coast, known to be built using sustainable materials, which allowed the students to see examples of a successful eco-friendly design. Visits to the local Bedouin communities in Sinai also enabled the students to get an insight into the native culture and vernacular architecture of the area. They also presented the students to a local recycling factory and organic farm, where they were introduced to the processes of sorting and recycling waste, and how a variety of recycled materials including plastic and glass bottles can be reused in the construction industry. Unfortunately, similar field visits couldn't be organized in the critical period of the COVID19 pandemic in Egypt and the students had to mostly rely on the theoretical information and presentations in the graduation project as previously explained via the students' questionnaire.

Finally, the project's Professors also faced a pedagogical problem with the students who had the tendency to just copy designs from successful local and regional Ecolodge examples rather than fitting them to the needs and constraints of one of the chosen project's sites. This problem was rather broadened due to the lack of direct communication in the Design Studio between the professors and the students during the online stage of the project.

IV. CONCLUSIONS AND RECOMMENDATIONS

This paper presents a case study focused on teaching Ecolodge design to senior architecture students, in a partial online format, as their graduation project. It mainly aims at shedding the light on the significance of combining the sustainable design of touristic projects and following the constraints of international Ecolabelling while respecting the local culture and traditions. Ensuring the applicability of this educational approach in teaching future architects to be able to work in a rapidly transforming market will require certain significant and viable pedagogical changes. These changes may include developing future teaching scenarios and learning environment.

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On a different level, the Ecolodge project's pedagogical experience showed that it was not easy to introduce online teaching and mentoring to architecture students in their graduation level for the first time. However, if this experience would be applied during regular architectural education which is based on physical interaction, the project's educational process may also include the following:

1. Inviting guest speakers and experts who may be specialized researchers and academics in Ecotourism and Sustainable Design, professional architects who designed similar projects, local Ecolodges' owners and managers, etc. This step should come in an intermediate phase of the design following the Professors' academic lectures.

2. Organizing field trips to comparable Ecolodge projects which have already applied the Green Star Hotel criteria in Egypt. The visits can also include other ecological projects which may possibly contribute to the sustainable design of the students' projects.

3. Seeking the feedback of different stakeholder at the intermediate stage of the project. The targeted group of stake holders may be local resident/Bedouins or local touristic authorities' and municipalities officers.

4. Organizing parallel workshops for sustainable building techniques such as Earthen architecture as a supplementary resource.

In conclusion, the exploratory Ecolodge design graduation project described in this paper could be considered as a model teaching and learning experience in a similar context. A proposed Ecolodge design's academic plan describing the project's phases and resources is presented in Fig. 10.

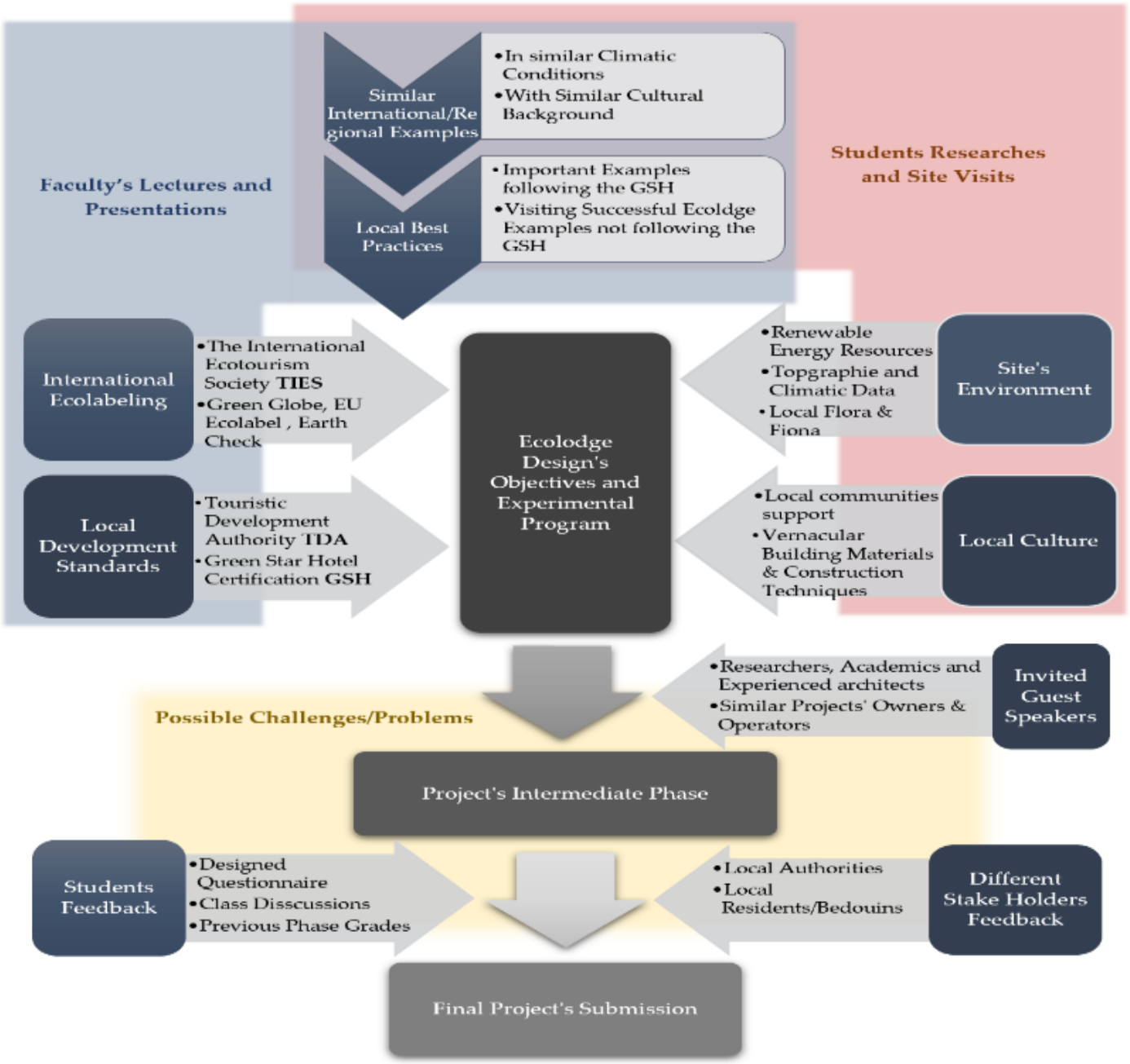

Fig. 10. A proposed academic plan describing an Ecolodge design project's academic phases and resources

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