

“Concept of Green Buildings, Rules and Regulations (Building Codes), Which Is Required to Complete Building Processes, in Order to Confirm the Quality of Buildings”

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Abstract. Hashemite Kingdom of Jordan considered one of the most advanced rapidly country in expansion of housing, and neighborhoods, because of a lot of reasons, mainly the safety situation and stability are the most important reasons in the region, in addition to the simplicity and comfortable life, since the Jordanian people are considered very hospitable, people are very kindly there, life is very simple, not complicated. a lot of families, and visitors comes to visit and enjoying the green parks with beautiful trees at mountain areas, this issue gives them the deep thinking about trees and the green, and what benefits will got later, so it might be the first step of thinking about the using of trees and plants as a material may use in building which will gives them the impression of comfortable and relaxations, Jordan valley considered as a very beautiful area for recreation in both season summer and winter, so this kind of green buildings is very flexible to be build, it's quite possible in everywhere in Jordan upon to the rules and regulations of building, they have enough resources, qualified people to ability to adapt comfortable with requirements of green buildings design which consider very important in saving energy and other benefits to fulfill the requirements need of people and society in general. Jordanian government always support the officials' people, and the decision makers in different sectors to apply such kind of advance knowledge, and developments. So now the green buildings sector consider very important in Jordan, the rules and regulations used in building and constructions give the citizen the right to have his own comfortable, and healthy house which is friendly to the environment. Where attention has been paid rapidly for highly quality buildings in Jordan, such as hotels, facilities, services, roads, parks, universities in the private sectors, and others. Wherever these construction procedures whether used in common buildings or the areas which will use system of green buildings, because of environmental, climatic reasons in that area, which is characterize by comfortable temperatures in summer and winter. Finally the aim of this paper is to encouraging, and support citizens, and people thinking deeply to use such kind of green buildings design system on their life and their own construction projects in order obtaining a lot of benefits.

Key Words: Green Buildings Rules, Jordanian Green Building Council, Jordan Valley Region.

I. INTRODUCTION

In this work will spot the lights on the definition of green building, which is shown clearly in the following questions.

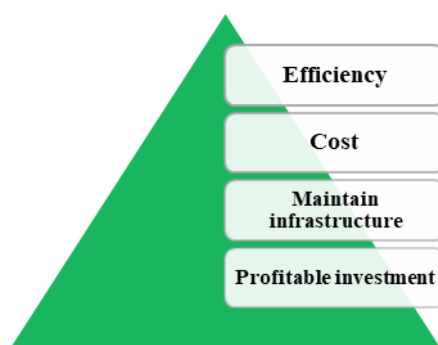
While there are a lot of ways in defining the meaning of green buildings, so professional people and engineers usually use a special designing rules and regulations, with private codes of green building in order to confirm its benefits. This rules including the building materials and tools used to reduce energy, water consumption, and minimization of toxic materials (thereby improving indoor air quality), and increasing the use of recycled materials. Jordan has Green Building Council (GBC). A Non-Governmental Organization, or (NGO) founded in 2009 in Jordan. The (GBC) is an established member, and part of the Middle East and North Africa (MENA) Regional Network of the World (GBC) since 2012. Jordan (GBC) is a Green Business Association. Jordan is considered a very wealthy area with other resources in spite of no wells of petroleum there. These sources considered as different facilities such as tourism and education, and so on, Jordan has a lot of private universities,

with a lot of international and foreign students comes from different neighborhood countries comes to study in Jordan, that means those students need special houses with a comfortable conditions, in addition to green trees, agricultural plants to produce and feeding country, and surrounding areas, as well as tourists who visits tourist attractions area, whether historical or religious monuments, or for the sake of education in Jordanian distinguished universities. In order to promote these sectors, it is necessary to activate the elements of attraction in general, this well done will enhance the economic sector and increase of abundance of job opportunities in the Jordanian society. Jordan in all of its directions is considered a hotspot of attraction, where there are winter and summer tourism places in both season, where the Jordan Valley, Aqaba and the treasury in Petra, as well as the Citadel mountain and the Roman amphitheater in Amman, the Monuments of roman and columns in Jerash, and others tourism places in Irbid, Madaba and the rest of the Jordanian cities and different places.

II. RESEARCH OBJECTIVS

2. 1. The officials Jordanian and visionaries, thought-leaders and change-makers are demonstrating real green leadership across Hashemite Kingdom of Jordan. Through this vision, Jordan is considered a member at the committee of Middle East and North Africa (MENA) region. Jordan is characterized by many economic elements that help in the designing and construction process of green buildings, but it is necessary to keep pace with the developments and requirements of such buildings by providing the incentive structure for the desired development later, like the smart buildings, in order to confirm the principles of sustainability later, taking into account increasing the age of these elements which are considered the right of new generations, by increasing knowledge, and using modern technology in buildings in general, and to be sure it's working on the optimal utilization of energy, through green and smart buildings, which design process is an important element in the construction of such buildings. Green buildings is the one that takes into account all environmental considerations in all stages of constructions, the most important one is design, implementation, operation, maintenance, and the main considerations that take into account the design of spaces, energy efficiency, water resources use, and the quality of the internal environment of the buildings, in other word the positive impacts of the building in general on the environment. Most countries are not adopting green buildings concepts, while a lot of countries now have their own special associations such as (MENA), and some other countries are on their way to join in adopting this concept as well. The same is true at the individual level, a lot of investors have noticeably increased their interest in sustainable houses, which means marketing in the language of the business men, and so why are some countries in the world interesting in this type of building?

2. 2. The main reason it considered as they are environmentally friendly buildings in addition to being highly resource efficient throughout their life cycle. This study aims to raise awareness among the citizens, to realized and understand the meaning and importance of green buildings that work to conserve energy and a clean environment, and many benefits that promote the principle of sustainable development within the scope of buildings, of course **C**ost, **E**fficiency, **M**aintain infrastructure, and **P**rofitable investment. As shown in the following figure (fig. 1).



Green Buildings - (Fig. 1).

2.3 Usually special strategies are used to complete and employed green buildings such as construction strategies and green design.

2.3.1 Maximizing natural daylight to reduce the needs of artificial light.

2.3.2 Utilizing an energy-efficient lighting with motion sensors.

2.3.3 Utilizing roofs with special design which has light colors, or roofing with vegetation.

2.3.4 Reducing of storm water runoff, and reuse the water captured on-site.

2.3.5 Using a water conservation measures by using low-flow plumbing fixtures.

2.3.6 Utilizing a non-toxic materials.

2.3.7 Generating energy on-site with clean or renewable power such as solar or wind.

2.3.8 Using special construction management plans to reduce the quantity of construction- related waste.

Since building green can be accomplished in a number and different ways, rating systems have emerged to quantify the level of “greenness.” Such as **Leadership in Energy and Environmental Design (LEED)** rating system, and others, but LEED is the most widely used and accepted standard today. Since the Green Building Law references LEED as the required standard. Almost the US Green Building Council’s (USGBC)’s rating system is used in buildings, because it’s more closed to the building processes.

2. 4. So, a lot of benefits will obtain by utilizing and employing the green building system and models, some of these benefits is.

1. Environmental Benefits.
2. Health and Community Benefits.
3. Economic Benefits.

Green buildings conserve natural resources, protect ecosystems, improve air and water quality, and decrease waste, and improve the quality of life, and boost of worker productivity, these benefits was shown in (fig 1).

The most often cited benefits of green building is the reduction in energy costs that stem from energy efficiency measures, which also help reduce greenhouse gases.

The following photos (fig. 2), show the roof and walls has enough space to maximizing natural daylight, and roofing with vegetation.



Green Walls & Roofs (Fig. 2)

Green Buildings have benefits not just only to owners, and occupants but also to the larger environment as well. There are some LEED rating systems, each tailored designed for different project types such as. New construction, and renovations building, existing buildings, commercial buildings, core and shells, and schools for educational facilities. Of course special rating system includes a checklist (special green building codes) to assist project teams assess various strategies they can employ to achieve LEED certification.

Each rating systems offer a roadmap to building green, each project team will have to determine the most appropriate and cost-effective strategies for their particular project, taking in account the consideration of designing and construction procedures to confirm the concept of green buildings, which are as the following.

1. Shape and form of buildings.
2. Orientation of the facades.

3. Design of building plan and section.
4. Thermal insulation and thermal storage of roof.
5. Building Materials.

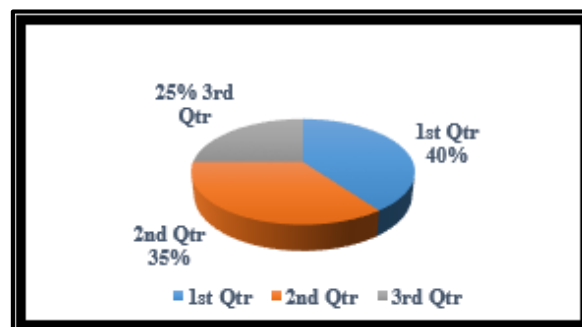
The designer of green building knows, that green building has special construction elements and materials to enhance the benefit of green buildings, so it's too important to know such building materials where the materials come from, where we can find out, how they have been harvested, what the ingredients are, whether they are salvaged, reused or refurbished, a designer needs a lot of knowledge and experience to confirm and employed the concept of green building, these are some of elements that need in such buildings.

1. Utilizing environmentally friendly building materials with high specifications.
2. Utilizing energy efficient equipment and tools.
3. Solar water heating systems.
4. Using of wide glass panels to allow natural light inside the building during daytime.
5. Rainwater collecting.
6. Minimization waste in order to ensuring healthy indoor environment.
7. Maximizing energy use in buildings.
8. Water conservation, and efficient measures.

Of course such as of these factors will confirm the principle of sustainability and green build. In the span of a few years ago, the planning, design, and construction fields have been swept up sustainability and green buildings. Sustainability is about the things that will last for long time such as buildings with long and useful lives, forms of energy that are renewable, and green building which is changing of sustainability into reality. This means that green buildings play an important role in the issue of sustainability and clean environment.

III. METHODOLOGY

3.1 Green buildings are facing environmental challenges benefits, so it needs special care through the designing procedures and construction, even citizens play an important role, and needs to be more educated and awareness to Green buildings is always facing environmental challenges benefits, so it needs special care through the designing procedures and construction, even citizens play an important role, and needs to be more educated and awareness to be familiar with this system of green, when they deal with and to knew how the processes are going as well? So there are three items are very essential in order to success both sustainability and even green buildings systems, which are educated people (human), rules and regulations, and building materials, of course the people mean both professional (designer) and user of systems (people in general) should be educated enough. As shown in (fig. 3). While first quarter represent the most important item which is represent the educated citizen, and professionals and designers, while the second quarter represent the strict rules and regulation used in region and the last quarter is the environmental friend materials which is use in construction.



Green Building Items Fig. 3

Even the well-sited and energy-efficient buildings will reduce carbon emissions in other sectors as well, by using less energy to produce and transport building materials and for people to be transported to and from buildings. Furthermore, the potential benefit of a future stream of reduced energy costs has been viewed as a way to offset the initial investment required to reduce carbon emissions, in general the benefits also will include health, environment, and local economy, so we note that design playing an important role to achieve the ambition of green building in general. As shown in (fig. 4).



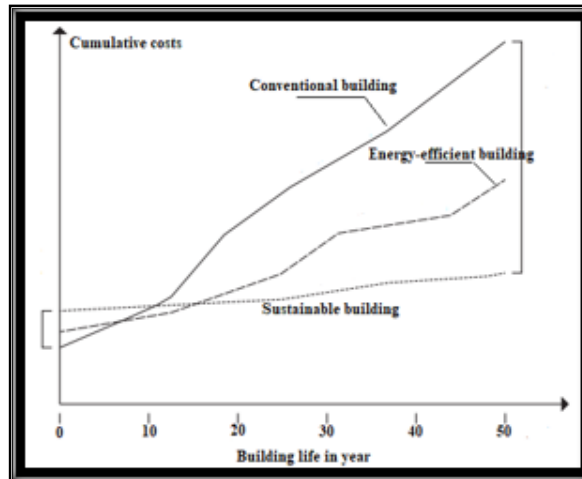
Well-Sited Green Building Fig. 4

So green buildings considered friendly to the environment and society as well. It is well known that concrete is one of the most destructive materials on earth, as it is considered a carbon-intensive material that contributes significantly to greenhouse gas emissions. In order to address these growing environmental and health concerns associated with urban expansion, the concept of the meaning of green buildings is increasing and expanding, through which some modifications are made to design and construction plans, to produce buildings that are safer for the environment and for the people who use them. This is why the designers usually used in designing walls, the wide area curtains walls to reduce the area of concrete and to be as transferred to the energy, and day light, because of local and global population growth which is increased climate threats, and its effect on humans, so rules and building regulations should take in account this conditions to be more strict, It must be increased the awareness of people for such concept of green building. Of course this environmental pollution will increases the depletion of natural resources.

This is the aim of green buildings is to achieve the reduction of eliminates the resulting threats, which impact on the environment. However, there are many potential risks and pitfalls in green building design and construction. so sometimes some people drawn to new products or approaches that claim to be green, but are in fact it's not, and ineffective or costly as to prevent balanced investment in other, more cost effective improvements. Cost and affordability is always playing a central role in building design and construction of green building. This is the engineer responsibility to arrange and balance between both, cost and the building construction. Buildings require a lot of energy to operate, the more developed they are, the more they consume energy and electricity which used in lighting as a main source of energy, and the use of air conditioners and electric fans and so on. So, we can define green buildings as buildings that take into account their impact on the environment and human health in general.

These buildings are part of a global response to raise awareness of the role of human activity in preserving the global climate. Where the green building depends on the design and implementation procedures skills (construction) that would significantly reduce the negative effects on the environment and humankind in general.

So, the advantages of green buildings are that they are energy-saving, maintain the safety and cleanliness of the environment, and have the ability to be energy self-sufficient by using renewable resources, of course the scrutiny of green strategies reveals a variety of improvements that in fact can lower both energy costs and construction costs, fewer light fixtures are required for illumination, the heating and cooling system equipment's which needed will becomes less, up on to the hypothetical view of how the higher initial construction costs of energy-efficient and sustainable buildings can be offset by savings in running costs for long term. As shown in (Fig. 5) which represent the relationship between cost and time.



Relation between cost and time. Fig. 5

So the community in which we build, and the site on which we build, will be as a good media to inform the surrounding people in the area about the advantage of such buildings.

3. 2 Criteria that taken into account during designing processes for green buildings are the following.

3. 2. 1 High quality building design to reduce heat loads, increase natural lighting as well as enhance the presence and circulation of fresh air.

3. 2. 2 Use of energy-efficient air conditioning and lighting.

3. 2. 3 Using environmentally friendly, non-toxic, low waste materials, using recycled materials.

3. 2. 4 The use of the best types of sanitary installations and water pipes, and use of renewable energy sources.

3. 2. 5 Show the effect of development on environment.

In general, we can say that green buildings greatly effect on the environmental, economic and social levels. One of the environmental benefits of these buildings is their dependence on biological and recyclable sources or renewable materials. While the benefits of green buildings lie on the social level due to the fact that they improve the quality of the environment and life by enhancing the health and comfort of individuals due to their use of various insulation techniques such as sound, heat, etc., in addition to improving lighting and energy management. So we now notice that many countries are adopting green building concepts. Also on the individual level, many people and investors have noticeably increased their interest in this type of sustainable home.

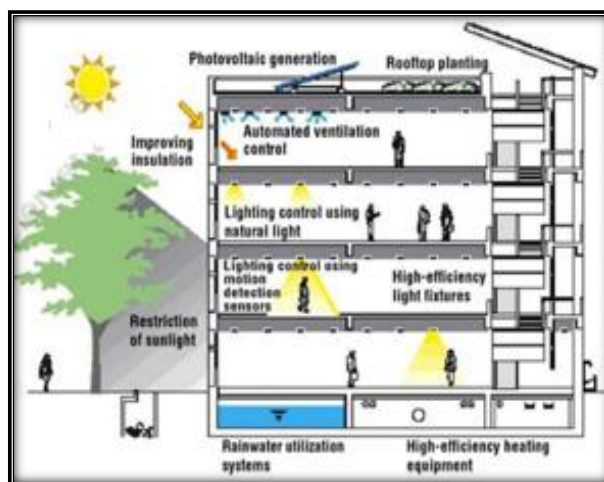


Fig. (6) Conceptual Drawing for Green Building

The diagrammatic drawing in fig. (6). Shown the conceptual details of green buildings which increased the interest in use the type of sustainable buildings. But unfortunately there must be some problems and issues should find the fit solutions to overcome these problems, these are some of problems which cause weakness of green building, and it need to find suitable solutions.

Despite of all these advantages of the green building system and despite the strengths of this system, there are still some weaknesses points as well, which considered as disadvantages of the system.

3. 3. The main disadvantages of green buildings.

3. 3. 1 Location.

Since these buildings depend on the sun for energy, they need a privileged location that facilitates access to the sun's rays, and this may sometimes require placing them on the opposite side of other houses.

3. 3. 2 Shortage of used material.

In this kind of building, special kinds of building construction material used to achieve the aim of such green buildings, so in most countries they still suffered from the shortage of used material which used in green building construction. The materials need to construct these buildings, sometimes become too difficult to obtain, especially in urban areas where preserving the environment is not the first priority of its residents. Even in case of shipping and transportation these materials will increase the cost of the construction.

3. 3. 3 Lack of air cooling systems.

These kind of buildings operate on heat to generate energy, therefore it's not designed for hot areas because they do not have any air cooling systems, so there will be a need for air conditioners, which will make these buildings irrelevant to the concept of “eco-friendly”.

3. 3. 4 The construction processes take long time.

Green building design processes depend on special methods that take into account all the surrounding environmental conditions, which requires the need for more time than other methods.

3. 5 High cost of construction.

Green building construction needs more cost than normal buildings because it depends on a lot of natural materials, which may not always exist. As it is known that each system has advantages, disadvantages, weaknesses or strengths, for green buildings we can say that it is a practical idea that can be implemented in the study area to solve the housing problem as a result of the nature of the climate there, and what also helps in solving this problem is the availability of environmental conditions and building materials.

Despite of many benefits of green buildings, there are some disadvantages must be taken into account, and they cannot be relied green buildings in solving housing problems as a radical and final solution.

Green buildings have contributed to reducing respiratory and other diseases, and to raising awareness of the importance of improving the air inside green buildings by controlling and reducing pollution sources.

4. This study was completed by using special kind of questionnaires prepared for such case of green buildings, the study focused on effect of their sustainability, in addition to personal interviews and meetings with different categories people, both public and officially people in different positions. According to the random surveys, the majority of people in Jordan valley region are satisfied with the government's achievements and performance for improving tourism sector. And their effort in developing of the area in general. Since building green can be accomplished in a number of ways, rating systems have emerged to quantify the level of “greenness.” Sometimes multiple of green design and construction strategies are employed in green buildings, such as maximizing daylight to reduce the need for overhead lights, and minimizing storm water runoff and reusing captured water on-site, or using light colored roofing or roofing with vegetation.

Over the years, we have seen building construction continue to grow in complexity and change under the influence of emerging technologies. To meet these challenges a number of new software programs have emerged that are having a positive impact on the entire design, planning and construction community, among them is introduction of BIM software which is the latest development in computer-aided design and which is being touted by many industry professionals as a lifesaver for complicated projects, because of its ability to correct errors at the design stage and accurately schedule construction amongst other attributes. (BIM) embraces 3D modeling concepts, information database technology, and interoperable software in a computer application environment that design professionals and contractors can use to design a facility, simulate construction, and accurately estimate the project's cost. This software of “building information modeling (BIM) facilitates a new way of working collaboratively using a model created from consistent, reliable design information – enabling faster decision-making, better documentation, and the ability to evaluate sustainable building and infrastructure design alternatives using analysis to predict performance before breaking ground.”

This is an indication that such smart programs of Building information modeling must be taught and used in university curriculum. Architectural engineers with such building information modeling can adapt by understanding that architecture builds critical thinking, which is applicable across a lot of fields, and should leverage their interests and aptitude's to explore what avenues are available, to fulfill the market needs upon to new health requirements, even if they fall outside traditional practices of designing, since engineering offices begin to pivot and take a deeper look at their existing service offerings convenient to market needs, they also should look

to how their office is structured to take on work, through a new qualified engineering working staff, to deal with the new rules of the architectural design that achieve the market requirements, this can help increase profits and reduce risk, as well as identify actions that reduce vulnerability, and minimize architectural problems in building making users of building feel more comfort.

Therefore, new technology methods used in green buildings making it easier and more cost effective for designers and engineer in order to incorporate sustainability into their high performance design strategies. Likewise, there are many recommended practices that can reduce the environmental and resource impacts of buildings, and enhance the health and satisfaction of their occupants.

The geography and nature of the study area, the long period of summer in it, the abundance of water, and considering the area one of the most important tourist resources, especially in the winter season, all of these issues will contribute to spreading culture of using the special standards of designing of green (Sustainable) buildings at all of Hashemite Kingdom of Jordan, which will enhance the quality of buildings environment in general.

(Therefore, this culture should be taught in all professional institutes that deal with architecture and building construction.

Furthermore, recent research shows that Leadership in Energy and Environmental Design (LEED)-certified buildings can cut greenhouse gas emissions and water consumption by nearly 50%, while costing 25% less to operate and enjoying nearly 30% higher occupant satisfaction and lower interest rates). So to build environment is an essential part of our lives, necessary to provide spaces to live, work, play, shop and learn. However, the design, construction, maintenance and operation of our built environment have a tremendous impact on the natural environment and resource base. Based on the result of the statistical analysis, it showed that the entire statistical sample confirms and supports the idea of development.

IV. LETRETURE REVIEW & GIVING FEEDBACK

Literature review, through reviewing to some papers, textbooks, articles and references, what we got that most of these articles has same point view, as mentioned in the references, and text, in general the results we got, we can say that most of these studies were very close, but it may have a small gap between them, which is related to the culture of people in some places. And all of them mentioned to the effect of architects in solve such problems. The construction of buildings and other special infrastructures using sustainable technologies and materials is key to this type of Green Building Components.

V. RECOMMUNDATIONS & FINDING

Finally, will see a lot people at the region will use this system when build their homes and communities that used alternative energy sources, to supply their own power; such buildings may operate entirely off the regional power grid, or they may be able to feed excess energy back onto the grid. Means that will increase of energy conservation and raising its efficiency, and they becomes educated enough to recycle, reuse materials, they will careful of siting of using such green buildings, even people will accept to live in livable communities, and comfortable with the environment and weather at that area. Even for health of people, because of indoor air quality, resource conservation in general, and the most important one is water conservation for new generations.

So the list of recommendation should take in consideration.

- 5.1.** Using aluminum weather resistant insulated access panels. Aluminum panels help regulate indoor panel, both temperature and prevent moisture and pests from entering.
- 5. 2.** Using energy efficient wide windows, when designing windows with glazing, in addition to insulation materials used
- 5. 3.** Using an instructions for water conservation, and use a special type of drip irrigation in landscaping.
- 5. 4.** Providing people an opportunities, and building infrastructure helping people to commute to work by using public transit and bicycles.
- 5. 5.** Recycling is very important issue, saving a lot of matters, as energy, economy, while keeping the area and surrounding environment clean and healthy.

VI. CONCLUSIONS

The region is distinguished in many historical, religious, touristic, and medical facilities, many of tourists from all over the world, visit the region in order to enjoy the climate of the region or to worship and practice their religious rituals, or treatment by using mineral outputs materials from sea, this enhances And it increases job opportunities of various kinds, and helps to revive the economic situation, where the Jordan valley are characterized by the plenty of both plant and animal wealth, the region is considered the lowest point spot on the globe earth surface. Implementation of the “green” architecture, the design and build structures will reduced energy use and costs. The residential and commercial buildings account for around 40% of our total energy use, 70% of our electricity use, and confronting the crisis of energy and solve it at the long term, during summer season the area needs more of electrical energy because of the weather, then conservation, waste, and so on. 12% of our

water use. Also, 30% of our greenhouse gas emissions come from structures. The outside temperatures affect the design of building structures. In areas with high temperatures, buildings are insulated and provided with various types of mechanical systems to control the temperature within the structure's habitable areas. Temperature also has a large effect on the structural integrity of a building. For example, buildings that are constructed with a concrete frame and a concrete floor system are detailed at various connections to allow for expansion and contraction of the various concrete elements affected by temperature fluctuations. Sustainable design uses environmentally sensitive design to reduce this negative impact on the environment. Therefore, the culture of architecture and construction of green buildings in that area is very essential for a lot of reasons, environmentally, economy, socially, and aesthetically pleasing.

The built environment is an essential part of our lives, necessary to provide spaces to live, work, play, shop and learn. However, the design, construction, maintenance and operation of our built environment have a tremendous impact on the natural environment and resource base, so we can use consider “Green Building” as a solution for the issue, so there are a lot of cheap materials found in that area, which used in construction of green buildings, such as.

- Earthen Materials.
- Wood.
- Bamboo.
- Insulated Concrete Forms.

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