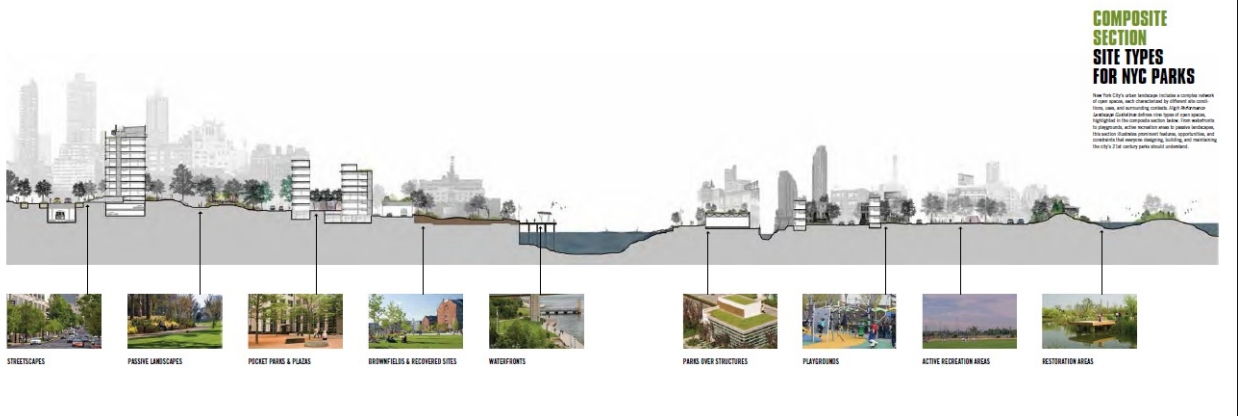


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**The ultimate wish is to see Saudi Arabian people places and spaces to be shaped
in the light of LANDSCAPE ARCHITECTURE**



Summary

Utilization the benefits of soft landscape in housing site can be applied to modify temperatures in and around the dwelling units of housing areas. Shade from trees to roofs and/or windows can improve both comfort and the energy efficiency of Housings so that heating and cooling requirements are reduced. The landscape designers must be involved during initial design process of all housing projects in Saudi Arabia. Landscape design is part of the wider design process, allowing interaction between the building orientation, building design, site conditions, and proposed landscape development. This presents the best opportunity for maximizing the landscape benefits to the whole residential schemes. In fact, soft landscaping may be the best long-term investment for reducing heating and cooling costs. An adequate soft landscape design methodology will reduce summer and winter energy costs dramatically, and safeguard homes from winter wind and summer sun, adding to that, it will decrease consumption of water, and fuel for landscaping and lawn maintenance, control noise and air pollution. This paper had covered soft landscaping tips to save energy; and enhance local environment and microclimate; though utilization of some valuable design considerations of planting the right selection of trees and shrubs. Trees and shrubs come in all shapes and sizes. The ultimate wish is to see Saudi Arabian people places and spaces to be shaped in the light of LANDSCAPE ARCHITECTURE.



Choosing where to plant is the first step¹⁴

Follow these guidelines to get the maximum benefit from your new trees.

The first step in landscaping is choosing the best location for your new trees. Before you visit the tree nursery, take a few photos of your home from different angles, and draw a simple map to show how your home is sited. Figure 17, can be considered as a first approach to save energy in Saudi housing projects.

The worst places to plant trees:



A. DON'T plant too far from the house. This tree is providing no benefit to the home, and it could be causing problems for the neighbors.

B. DON'T plant too close to the driveway or sidewalk. Growing root can easily crack through concrete, and low-hanging branches can block the view of pedestrians or oncoming traffic. Also be aware that the area between the curb and sidewalk might be city-owned property; check with your city clerk's office before planting here.

C. DON'T plant large- or medium-size trees under power lines. A storm or even just a brisk wind could easily disrupt electrical service to the entire neighborhood. It doesn't have to be an extended outage to cause problems: branches rubbing on power lines can cause blinks and surges that can damage sensitive electronic equipment.

D. DON'T plant too close to the house. Branches can damage siding, gutters and roofing, and roots can block sewer and drain lines. If the tree is deciduous (leafy), leaves will quickly clog the gutters in the fall.

The best places to plant trees:



1. DO plant the correct distance from the house and choose a size and color to complement your home's exterior.

2. DO plant trees to draw attention to your home and provide seasonal color and spring blooms.

3. DO use shrubs or small evergreens when

4. DO plant small ornamental trees under power lines. Look for species that will be less than 25 feet high at maturity. Planting along the perimeter or fence line.

5. DO plant trees around patios and decks to provide summer shade. A tree for this spot should be a clean tree that will not litter the patio area with fruits, limbs or leaves every time the wind blows

Implementing the principles of soft landscape in Saudi housing projects

By implementing the principles of soft landscape in Saudi housing projects we might be able to make more save energy of people places and spaces. Applying even the most basic principles — proper plant selection and placement for example — can benefit the aesthetics, environment and budget of the typical home landscape. Properly selected plants are healthy plants that have fewer insect and disease problems and, therefore, require less maintenance. Properly sized trees and shrubs need little pruning, and drought-tolerant perennials need minimal irrigation. Aesthetic principles including accent, contrast, harmony, repetition and unity ensure the design is attractive, visually compatible and has a “sense of fit” with the surrounding landscape. Functional principles dictate whether the design will be usable and will meet certain health and safety criteria. For example, drainage must be routed away from the foundation of a home; sidewalks and outdoor spaces should be sized appropriately for homeowner and visitor use; and landscapes should include areas dedicated to private, public, and utility needs towards achieving a sustainable and saver energy housing prototypes in Saudi desert environment. Figure 16, in general, might give a summary of how to achieve save energy housing.

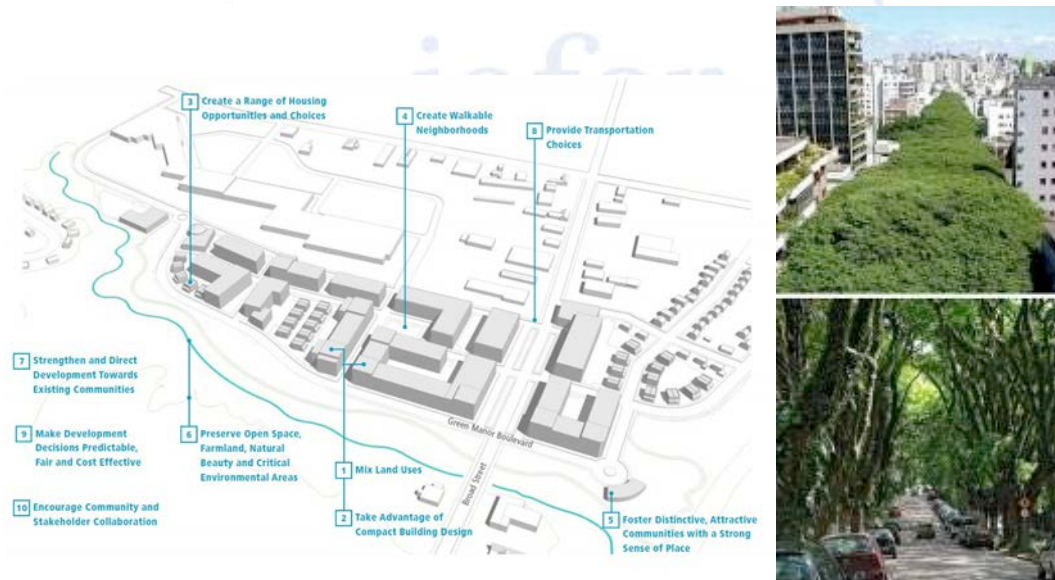


Figure 16: *Concept plans for the site can be developed working with the design brief and site analysis. The site analysis will help to determine the best location for plants and the best contribution they can make. For example, should a windbreak be used to give protection from unpleasant winds and where should it be located? Are there large areas of glass to be protected from glare? Are there large areas of paving that have to be shaded? The brief may have identified the need for a paved courtyard beside the building. The concept plans may indicate the location of a windbreak for winter wind protection and shade trees for glare control. The detailed plan would give the precise configuration of the ENERGY SAVING HOUSING SCHEMES.*¹²¹³

13. Landscape “vertically” as nature does. Placing small plants and groundcovers under small trees under large trees enhances both visual and biological diversity.
14. Creating wildlife habitat draws birds and other animals, which add to the aesthetics of the landscape and offer biological control of unwanted insects.
15. Composting garden waste and applying the resulting organic matter in the landscape improves growing conditions and recycles valuable resources.
16. Using recycled and/or local-source building materials (plastic lumber, prairie fieldstone, etc.) can help develop markets for recycled products, lessen product and installation costs and visually tie developed landscapes to the character of natural landscapes.
17. Manipulating microclimates by using overhead vines, shade structures, and trees enhances the livability of outdoor spaces.
18. Raised beds improve access to plants, make it easier to manage the soil, and improve growing conditions by increasing soil aeration and drainage.
19. Where feasible, use plantings to connect developed landscapes with natural landscape areas. These integrated landscapes are considered more environmentally valuable than small, scattered areas of vegetation.

The logo for 'iafor' is centered on the page. It consists of the lowercase letters 'iafor' in a light blue, sans-serif font. The text is enclosed within a large, faint circular graphic composed of several overlapping, semi-transparent arcs in shades of blue and red, creating a stylized, circular frame around the text.

Enhance landscape microclimates through:

- channeling or screening winds;
- shading structures and outdoor living areas from the summer sun while providing for winter sun exposure; and
- increasing or decreasing humidity (or the perception of humidity) through adjustments in air movement.

These enhancements can lead to lower energy and water use, healthier plants (which are capable of resisting diseases and insects with less chemical assistance), and more usable outdoor living space. Figures 15, illustrated how these principles can be implemented in a typical residential landscape.



Figure 15:

1. Windbreaks and shelterbelts conserve energy, control drifting snow, provide food and shelter for wildlife, screen unwanted views, filter dust and noise, and create microclimates that benefit plant health.
2. Berms (gradually sloped mounds of soil) help define landscape spaces by creating sloping “walls” along pathways or between different areas, elevating plants for better visibility, and improving drainage and growing conditions for plants in poor soil.
3. Ornamental grasses tolerate a wide variety of conditions, provide food and cover for wildlife and offer year-round visual interest. Many of these ornamental grasses are native to the Great Plains.
4. Groundcover plants used on steep slopes eliminate dangerous turf mowing conditions, lessen precipitation runoff and soil erosion, and provide additional visual interest and biodiversity.
5. Grouping similar plants into masses creates a stronger visual impact and interest in the landscape, copies natural plant community structure, and produces stronger edges in the landscape that are important for both aesthetics and habitat.
6. Selectively use higher maintenance turfgrasses in areas of high visibility, access, and use.
7. Use lower maintenance turfgrasses and prairie or adapted grasses in areas of low use and access (not necessarily low visibility).
8. Use organic mulch in all planting beds to increase soil water retention, reduce weeds, visually strengthen bed lines through the color and texture contrast between the mulch and turf, minimize short-term swings in soil temperatures, and enhance soil structure and organic matter content.
9. A properly designed, installed and calibrated irrigation system minimizes uneven or wasteful water application.
10. Group plants with similar water needs to avoid over- or under-watering.
11. Use drip irrigation for shrub beds and other beds to minimize water waste.
12. Properly select plants for the conditions in which they are placed (example: sun and wind exposure, soil type and soil moisture conditions). Properly selected plants will ensure a healthy landscape with minimal need for chemicals or additional management.

social capital, provide locations to plant new trees, create jobs and youth development opportunities, and support public health and community building. Economists have estimated that there is an average property value premium of 10% when parks and plazas are integrated into development, with premiums upwards of 20% along parks.¹⁰



Figure 14: *Parks can increase the value of real estate, promote human health, play a central role in a community's tourism economy, increase community cohesion and social capital, provide locations to plant new trees, create jobs and youth development opportunities, and support public health and community building.*

Environmental Design Principles¹¹ to save energy

Environmental design is the third category of design principles. The focus of these principles is to:

- 1) enhance landscape microclimate;
- 2) increase biodiversity;
- 3) reduce resource inputs and resource waste; and
- 4) maximize reuse of resources.



Figure 13: *Parks can increase the value of real estate, promote human health, play a central role in a community's tourism economy, increase community cohesion and*

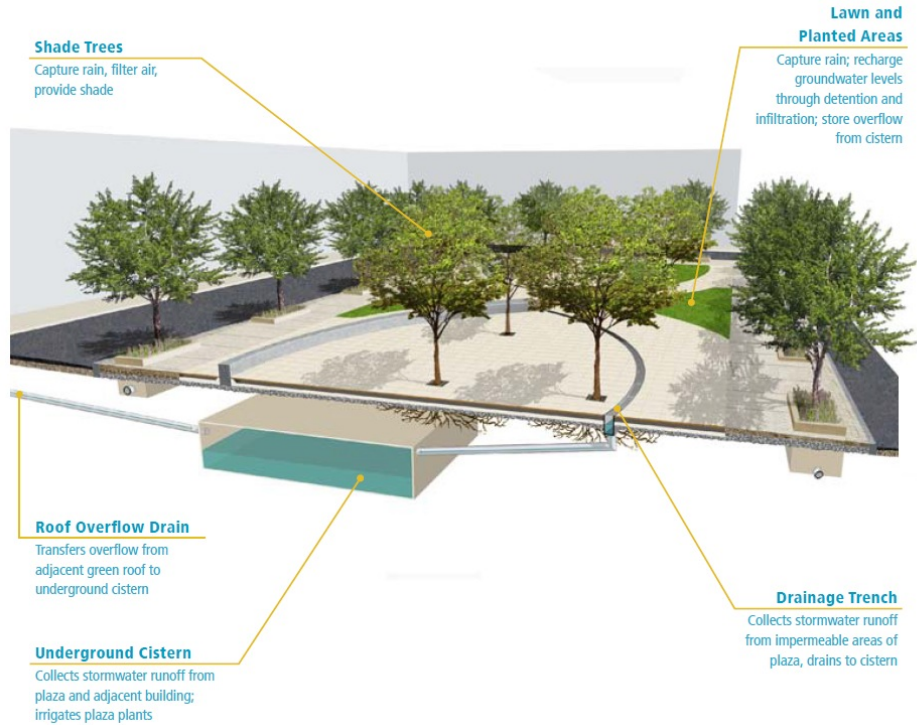


Figure 12: Trees planted in urban plazas create “outdoor rooms” that provide benefits similar to those of green streets. Green plazas can moderate microclimate, reduce the heat island effect, filter air, sequester carbon, reduce energy needs and increase people’s comfort. A U.S. Department of Energy study reports that trees reduce noise pollution by acting as a buffer and absorbing 50% of urban noise. The evaporation from a single large tree can produce the cooling effect of 10 room size air conditioners operating 24 hours/day.⁸⁹

Parks

Parks offer myriad benefits to an urban area. As areas of recreation and respite, they contribute greatly to people's quality of life and can provide shelter and sources of food for wildlife. As areas of increased permeability and vegetation, parks can positively affect the management of stormwater by recharging groundwater and facilitating evapotranspiration. Parks are significant contributors to the physical and aesthetic quality of urban neighborhoods, they provide open space for active and passive recreation, habitat for wildlife, and processes that are significant to natural function, like microclimate management and air filtration. Figures 13 and 14.



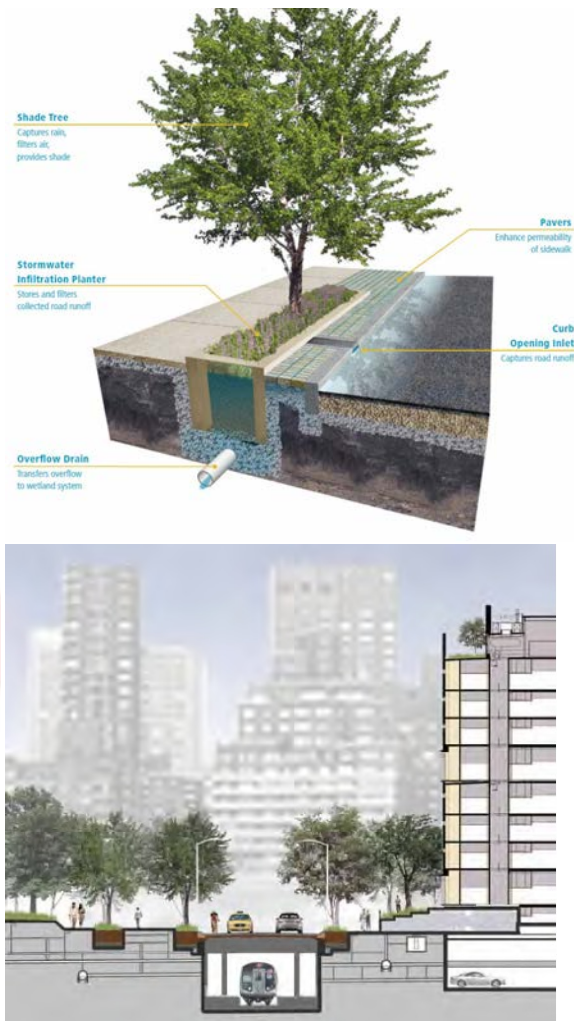


Figure 11: *Added vegetation or special paving can make streets more attractive and safer. People prefer streets with trees and greenery. Thus, green streets can attract more pedestrians who subsequently feel safer, as streets with more people have less crime. A successful green street in combination with a trail network encourages walking and biking and connects neighborhoods, reducing the environmental impacts associated with automobile traffic. Make Bigger Planting Spaces... Balance the size of paved and soil areas. Make Space for Roots. Design spaces for roots under the pavement and utilize different approaches to root space design as conditions change.*

Green Plazas

Plazas that take the form of public squares and landscaped parks serve as locations for people to rest, gather, and move through. Plazas typically include components like benches, shade trees, planters, sculptures, paving, and lawns. Plazas within the housing site will not only provide urban open space for people, but they also can assist buildings and streetscapes in managing roof and site stormwater runoff through tree cover, permeable surfaces, rain gardens and underground cisterns. A green plaza's trees will absorb and filter rainfall. Its permeable surfaces ranging from lawns and plantings to modular pavers will increase the absorption of rainfall into the ground, helping to maintain groundwater supply. Surface runoff from the plaza can be directed to trenches that transfer the stormwater to the underground cistern to later irrigate the plants in the plaza. Figure12.



Figure 10: *Green roof systems can be integrated with other green technologies. For example, green roofs and solar panels enhance each other's efficiency. Green roofs help cool ambient temperatures and allow solar panels to operate more effectively in hot weather. Solar panels shade vegetation and slow evaporation from green roofs, making it less likely that the vegetation will dry out.*

Figure 8: *The appropriate use of vegetation in the built environment is a major influence on the quality of human life and in creating a healthy environment. Trees, shrubs, herbaceous, and aquatic plants filter pollutants in the air and water, mitigate wind and reduce solar heat gain, and stabilize soil*



Figure 9: *By employing leading technology and design, green buildings tend to have higher market values and can sustain those values for a longer period of time than non-green buildings because they are outdated less likely to become.*

Green Roofs

Green roofs, which are elements of green buildings, are simply vegetated roof covers with lightweight soil and plants taking the place of otherwise conventional flat or pitched roofs. Green roofs provide multiple benefits like reducing ambient air temperature, energy use and utility costs, cleansing air and water, extending the life of a roof, and creating more bird habitat. Figure10. Green roofs help reduce the urban heat island effect. ⁶⁷Figure10.

Green Streets

Urban areas are dominated by impervious surfaces: roofs, roads, sidewalks, and parking lots. These surfaces block rain from soaking into the ground and collect oil, metals, and other contaminants that are carried directly into streams and other waterbodies. Green street networks manage runoff through their capacity to store, convey and filter stormwater. When designed as a system of roads, sidewalks, trees, planters, cisterns and vegetated medians, green streets within the housing sites will be able to manage all the rainfall they collect. Trees, as components of green streets, can moderate microclimate by slowing winter winds, funneling summer breezes, providing shade, and reducing the heat island effect, which increases people's comfort and reduces energy needs. Trees also sequester and store atmospheric carbon. Their leaves enable evapotranspiration and filter pollution from the air. Figure11.

Selected types of plants

Selected types of plants can be strategically positioned to protect the building from the harsh extremes of summer sun and chilling winter winds, improve comfort both inside and outside the home, and reduce the need for supplementary heating and cooling. Deciduous trees and vines can be ‘designed’ to shade exposed indoor and outdoor living areas in summer, while still allowing the sun through in winter. Low shrubs and ground cover around the home can reduce reflected heat and glare. Dense trees and shrubs can be positioned to deflect strong winds and channel cooling summer breezes. Landscape design can be integrated with housing design to modify summer and winter temperatures, improve comfort and save energy. Figure 7, illustrates how effective landscaping can enhance energy efficiency.

Benefits of using soft landscape

The appropriate use of vegetation in the built environment is a major influence on the quality of human life and in creating a healthy environment. Trees, shrubs, herbaceous, and aquatic plants filter pollutants in the air and water, mitigate wind and reduce solar heat gain, and stabilize soil to prevent or reduce erosion. These plants also create animal habitat, help filter and absorb storm water runoff, and may help mitigate carbon emissions. Efficient use of plants can reduce energy needs. Plants provide an effective counterpoint to the built environment and create places of beauty. The cumulative effects of these attributes are essential to balancing the effects of humans on the land. Furthermore, the native plant communities of a region provide some of the strongest cues to the unique identity of a place and generally require less maintenance and irrigation. The collaboration of design and science is critical to the creation of a healthy growing environment.

In terms of managing stormwater, green infrastructure can be defined as man-made systems that mimic natural functions. Green roofs, bioswales, bioretention ponds, permeable pavements and all ways to turn hard asphalt surfaces into green ones.⁴ Design principles of “Sustenance, Culture, and Movement” play vital roles in the functioning of cities across the globe. By flowing and bending these exemplary foci together. These foci are described as: “Sustenance” is the local food, health of places, and environmental conscience of the livable community. “Culture” is the celebration of identity and community that stimulates body and mind in a livable community. “Movement” is the pedestrian activity and public transportation that encourages healthy lifestyles and community interaction in a livable community.⁵Figure7.

Green Buildings

Building “green” means seeking more sustainable solutions to reduce the energy, water, and other resources our built environment consumes. Green buildings provide additional benefits from construction to occupancy. By taking advantage of local and regional materials, the construction of green buildings helps conserve natural resources while also stimulating local and regional economies. The integrated design approach needed for green building ensures all building systems are considered together at the same time, maximizing efficiencies and reducing operating and capital costs throughout the lifecycle of the building. By employing leading technology and design, green buildings tend to have higher market values and can sustain those values for a longer period of time than non-green buildings because they are less likely to become outdated. Figure9.

large part in controlling energy use indoors. Therefore, in addition to the beauty of landscape plantings, it is important to consider the entire landscape plan in relation to energy conservation in the housing areas.

Planting for summer shade

Because of the movement of the sun across the sky in summer, the plants most functional for providing summer shade are those planted to the south and southwest of the home.

The best trees for summer shade, which also produce minimum shade in the winter, are those with spreading branches and few fine twigs. Trees selected for this use should mature large enough to throw shade on the roof of the house on a midsummer afternoon. In some locations where space is too limited to plant trees for shade, vines may be used. Deciduous vines are most effective on southern and western walls. Where clinging vines cannot be used, twining vines may provide needed shade. They may be trained onto trellises placed near but not against the walls. In some locations, overhead structures such as arbors may serve a dual purpose by providing shade to patios and at the same time casting shade on walls and windows to keep the indoors cooler. Figure6.

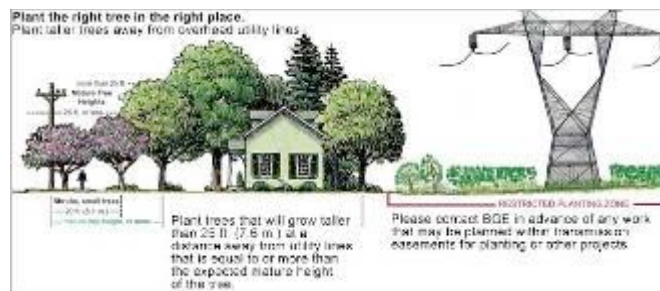


Figure 6: The key When planting trees is to select the right kind of tree for the location.³

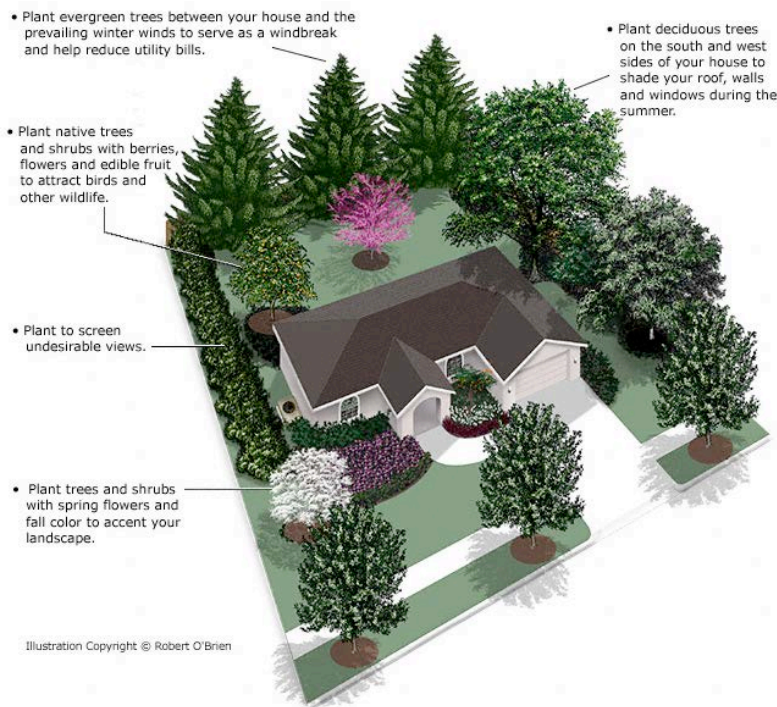


Figure 4: The use of soft landscape materials to control wind speed and movement is important for climate control and energy efficiency "Trees Produce oxygen Sequester carbon Fix nitrogen Distill water Provide habitat for a multitude of species Accrue solar energy for fuel Make complex sugars into food Create microclimates Self replicate And at the same time they provide shade and cool.

Sun and shade

The use of plants to control wind speed and movement is important for climate control and energy efficiency, but plant location in relation to the sun is also important. Choose and place plants so they do not form a barrier when direct rays of the sun are needed for warmth in winter but so they provide shade for the house from the intense heat of the sun in summer (Figure 5). Deciduous trees with heavy shade cover in summer but with open branching and complete loss of leaves in winter are the best choices to achieve this result.

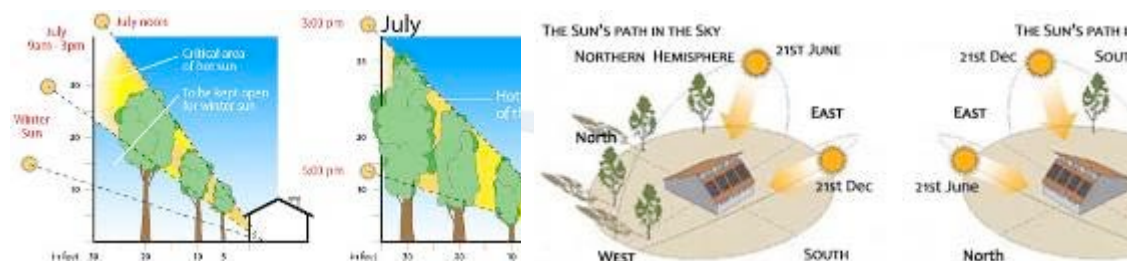


Figure 5: Where ideal orientation is not possible, as is often the case in higher density urban areas, an energy efficient home can still be achieved with careful attention to design. Soft landscape design can to improve the energy efficiency of the building, enhance the appearance and value of a property, and provide screening for privacy. Although outdoor landscape plants are pleasing in themselves, they can also play a

- They are most effective when plants branch to ground level.
- The wider the planting, the more effective the windbreak.
- When planting more than one row, stagger the plants.
- When using only evergreen plants, two or three rows are adequate.



Figure 3: Trees provide many benefits to all of us, every day. They provide cooling shade, block cold winter winds, attract birds and wildlife, purify our air, prevent soil erosion, clean our water, and add grace and beauty to our homes and communities. Did you know that just three trees properly placed around a house can save up to 30% of energy use? This is according to the U.S. Forest Service Center for Urban Forest Research.²

Diverting air movement

Although windbreaks function primarily by reducing the impact of the wind, they also shift air movement. The ability of plants to divert air streams provides the greatest benefit during the summer months. Increasing the air flow through streets and open spaces within the urban fabric, and in playgrounds, patio and other living areas that will improve summer comfort, and reduce the need for air conditioning. Garden structures such as screens and fences may influence air movement, but plants add a cooling factor as water evaporates from moist leaves. Place plants to be used for channeling breezes around the house in that direction away from the home. Deciduous trees on the southwest side of a house reduce indoor air temperature in summer and increase indoor air temperature in winter. Figure 4.



Figure 2: *Soft landscape design can help save energy. Landscaping is an easy and economical way to increase the energy efficiency of the constructions, enhance the appearance and value of a property, and provide screening for privacy. Although outdoor landscape plants are pleasing in themselves, they can also play a large part in controlling energy use indoors. Therefore, it is important to consider the entire landscape plan in relation to energy conservation in all housing schemes.*

Winds and windbreaks

The use of windbreaks for winter climate control around the household can reduce winter fuel consumption by 10 to 25 percent. Windbreaks can reduce wind velocities as well as deflect wind movement. The effectiveness of a windbreak is determined by the number of rows of plants, type of plants, height of plants, prevailing wind speeds and proper maintenance. Most effective windbreaks are planted in U or L shapes. Where there is plenty of space, a windbreak should be planted to extend about 15 meters beyond each corner of the area to be protected. The most effective area of a windbreak is at a distance from four to six times the height of the trees, depending on wind speeds. Points to evoke in development a windbreak: Figure3.



Figure 1: *Example of some housing sites in Saudi Arabia: Almost no soft landscape was provided which will increase the use of energy for cooling or heating of dwelling units.*

No doubt, any housing project that was not so fully utilize the advantages of soft landscape principles will be inadequate, and might increase deterioration of local environment. Unfortunately, some Saudi housing schemes were not adopted any landscape solutions, due to lack of landscape architects within the initial planning and design process. Therefore, this paper will highlight the importance of landscape architectural professional as the main discipline to save environment and to promote health and convince for all citizens of Saudi Arabian environment.

Soft Landscape Plantings for Energy Savings

The high cost of home heating and air conditioning encourages efforts to reduce housing energy consumption. Although outdoor landscape plants are pleasing in themselves, they can also play a large part in controlling energy use indoors. Therefore, in addition to the beauty of landscape plantings, it is important to consider the entire landscape plan in relation to energy conservation in the home. Figures 2, illustrates how could soft landscape design increase the attractiveness of the housing projects.

A properly designed landscape can make a home significantly more energy efficient and reduce air pollution, including greenhouse gases. It can also cut heating and cooling bills by as much as 40 percent ... An energy-conserving landscape utilizes trees, shrubs, groundcovers, and vines to provide cooling summer shade as well as insulation against heat loss in winter.¹

Introduction

Saudi Arabia had witness massive developments in almost all aspect of cityscape. Due to the rush housing projects demands, which resulted in producing inadequate residential schemes, that's lacks public recreational areas, in appropriate streetscape and dangerous traffic systems. Among those vital problems was the lack of green open spaces, more energy consumption. From examining some local housing sites, the researcher notes the following negative aspects, such as:

- 1- The lack of using sufficient soft landscape materials near or around housing projects.
- 2- Inappropriately, most of traffic roads median planted with trees, shrubs and flowers.
- 3- No enough or continuous pedestrian walkways.
- 4- Roadside pavements planted with planters in the middle of pavements which force and exposed pedestrian to walk in dangerous and inadequate automobiles traffic circulation's system.
- 5- Some public gardens were poorly planned and designed; even more no shade trees were provided.
- 6- Some housing areas were overcrowded.
- 7- Lack of children playing areas almost in all housing areas.
- 8- Some remaining parts of open spaces of traffic roads were poorly planned and designed as a public gardens,
- 9- The use of public car parking as recreational areas.

It seems from above mentioned points, that some housing projects were imperfectly planned and designed, which cause "Gray Environment". These formulate sick buildings and consumed huge amount on electricity for air-conditioning. Therefore, this paper can be considered as an approach to solve to, a large extent, the above mentioned points through the use of "*soft landscape design*" to save energy and in return, promote health, convince and welfare of the society. The following photos might represent- to some extents- the actual style of some Saudi housing projects, figure1.

*An Approach to Enhance the Use of Soft Landscape Principle's to Save Energy in
Housing Projects in Saudi Arabian Cities*

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0086

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Abstract

The purpose of this paper is to encourage the application of landscape principles as an approach to save energy in housing projects in Saudi Arabian cities. The ultimate goal is to increase the decision makers' awareness and appreciation of the importance of soft landscape principles to reduce energy consumption. Many concepts and guidelines are presented as well as a comparative studies between some advanced cities such Japan, Hong Kong USA, and Australia, whose findings would assist environmental designers to enhance the microclimate in and around residential schemes. However, short notes on some desert landscape principles will be briefly mentioned due to their importance in overall urban fabric of the city components. That is to say, this paper will addresses importance of landscaping as "a cost-effective", and yet an eye-pleasing ways to lower energy bills. And that can be achieved through utilizations of planting trees, shrubs, vines, grasses, and hedges, as well as the use of some native plants and hard landscape elements .This paper concluded the importance of landscape architecture as a crucial mean to mitigate microclimate environment around and within housing projects, in regarding to climate, Site, and design considerations', through the application of landscape strategies of various climactic regions of Saudi Arabian environment.

