Landscaping to Conserve Energy: Annotated Bibliography

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In the last few decades, the ability of landscaping features to improve the energy efficiency of residential, business and public buildings has garnered increasing attention, both in the scientific and professional communities. Unfortunately, the amount of attention paid to this subject tends to fluctuate with the price of the oil which fuels most of our energy needs. As petroleum prices begin a renewed upswing, interest in this subject has also been reawakened. Surprisingly, some literature on the subject predates widespread public awareness of energy related issues, particularly articles in the popular home and gardening press concerning the use of vegetation for microclimate modification.

This bibliography is an attempt to create a clearing house for a great deal of the literature relating to energy conservative landscaping which has been promulgated through extension programs, professional journals, books, and popular periodicals. Each citation is accompanied by a short commentary about its content, emphasis, and/or target audience. The literature is presented in three main categories:

- Landscaping for Energy Conservation, Florida (material produced in, or largely restricted in application to that state)
- Landscaping for Energy Conservation, Outside Florida (material relevant to other areas of the country or general in application)
- Microclimate, Human Comfort, and Modelling (material with indirect application to low energy landscaping, including theoretical research geared primarily to a scientific audience)

Within each of these three categories, material is further grouped by type of publication: Research and Refereed Journal Articles; Cooperative Extension and Government Publications; General Articles; and Books, Monographs and Reports.

It should be kept in mind that university and government publications may go out of print after a few years. Consequently, some of this class of publication listed below may only be available from large institutional libraries.
LANDSCAPING FOR ENERGY CONSERVATION, FLORIDA

(*) = currently being revised

Research and Refereed Journal Articles


Precise guidelines for using plants to minimize energy inputs for home cooling in hot humid areas, particularly during peak load hours, taking into consideration whether the residence will be primarily air conditioned or passively cooled. Energy and financial costs of maintaining the plantings are comprehensively analyzed. Parker, J.H. 1981. A comparative analysis of the role of various landscape elements in passive cooling in warm, humid environments. Pp. 365-368 in Proc. Int'l. Passive and Hybrid Cooling Conf. Miami, FL.


Energy flow analysis of three different residential landscapes, including energy consumed for installation and maintenance, with indications of which designs minimize fuel consumption and negative environmental impacts. Parker, J.H. 1982. Do energy conserving landscapes work? Landscape Architecture 72:89-90.


A report on the benefits of vegetation for passive energy conservation using mobile homes under varied Florida conditions as the model system. Shlachtman, P.J. and J.H. Parker. 1985. The effect of vegetative landscaping on the time dynamics of residential heat

An experimental study to determine the effect of landscape plantings on the time dynamics of heat transfer, interior comfort conditions, and cooling energy requirements for a residential building in the southeastern United States.

**Cooperative Extension and Government Publications**


Explores the means by which plants can be used in conjunction with structural features of the home to reduce energy consumption in Florida, including planning recommendations for new subdivisions. Research to date is summarized. *Barrick, W.E., R.J. Black, and M. Niederhofer. (no date). Landscape Designs to Save Energy at Home: Microclimate Modification.* Univ. Florida Energy Extension Service Bulletin EES-4.

Low cost methods of using plants to significantly reduce cooling costs in summer and heating costs in winter. A few design aspects of new home construction are discussed as well. *Barrick, W.E., R.J. Black, and M. Niederhofer. (no date). Landscaping to save energy at home: Trees for Northern, Southern, and Central Florida.* Univ. Florida Energy Ext. Serv. Bulls. EES-1, 2 and 3.


Limiting water use in the home landscape with conservative irrigation practices, mulches, soil improvement, and drought tolerant plants. Buffington, D.E. 1982. Economics of residential landscaping features in Florida: Orlando and vicinity, Jacksonville and vicinity, Panama City and vicinity, Pensacola and vicinity, Miami and vicinity, Tallahassee and vicinity, Tampa and vicinity, West Palm Beach and vicinity, Daytona Beach and vicinity. *University of Florida Cooperative Extension Service Circulars No. 517-525.*


Each of these 11 publications provides tables of azimuth angles and shade factors for the covered area, as well as instructions on using this data to determine effective position and optimum height of shade trees and shade structures. Flinchum, D.M. (no date). A guide to selecting existing vegetation for low energy landscapes. *Univ. Florida Coop. Ext. Serv. Circ. 489.*


Annotated lists of plant materials suitable for use as ground covers in North, Central and South Florida. Height, cultural requirements, color, landscape uses, and other information are supplied for all species listed. General guidelines are given for using ground covers as energy saving alternatives to turf or solid surfaces in the home landscape.

General Articles


How to use landscaping to reduce energy consumption in the south Florida home.

Books


Addresses the unique strategies for energy effective landscaping around homes which will be primarily cooled by air conditioning. Workman, R.W. 1980. *Growing Native: Native Plants for Landscape Use in Coastal South Florida*. Sanibel Captiva Conservation Foundation. Sanibel, FL.

Guidelines for obtaining and utilizing native plants for energy conserving landscapes.

LANDSCAPING FOR ENERGY CONSERVATION, OUTSIDE FLORIDA

Research and Refereed Journal Articles


Experimental study in which the amount of sunlight penetrating the canopy of five shade trees was measured in both winter and summer as a means to determine the optimal choices for year round energy savings. Heisler, G.M. 1974. Trees and human comfort in urban areas. J. Forestry 72:466-469.


Experimental study of the shading and passive cooling effects of an ivy sunscreen covering a west facing wall, and a dishcloth gourd sunscreen on a
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Discusses the ways that vegetative landscaping can be used to reduce both energy consumption and demand associated with space cooling needs. Parker, J.H. and S. Panzer. 1986. A model energy conservation landscape ordinance for reducing cooling requirements. Proc. 11th Nat’l. Passive Solar Conference. Boulder, CO.


A model for determining the degree to which deciduous trees affect the heat budgets of various type of residential structures with either solar or conventional heating systems. Wagar, J.A. 1984. Using vegetation to control sunlight and shade on windows. Landscape Journal 3:2435.


A photographic procedure to accurately determine the degree to which various deciduous trees block incoming, winter solar radiation during their leafless period. White, R. 1955. Landscape development and natural ventilation. Landscape Architecture 45:72-81.


Balancing shading requirements with solar energy collection.

Cooperative Extension and Government Publications


This publication discusses planting trees around the home to reduce heating and cooling costs. Anonymous. 1985. Using trees to reduce urban energy consumption: transferring technology to users.


Low energy landscaping in Texas, including a list of recommended trees. White, R. 1954. Effects of landscape development on the natural ventilation of buildings and their adjacent areas. *Research report 45,* Texas Eng. Exp. Station, College Station, TX.

**General Articles**


The author calls on the landscape design industry to adopt basic principles of passive energy conservation in new residence planning, and offers a few recommendations for site evaluation and microclimate considerations. Flemer, W. 1974. The role of plants in today's energy conservation. *Am. Nurseryman* 139:10, 59.


A guide to matching landscape designs with local ecological parameters, geared primarily to water conservation concerns, but including discussion of wind control and heat load reduction. Langewiesche,


Energy conservative landscaping in and regions.

**Books, Monographs and Theses**


A well documented and illustrated overview of how plants interact with the human environment, including — but not limited to — their use for...

A homeowner's guide to using landscape plants to reduce seasonal heating and cooling costs in the home. Westergaard, C.J. 1982. The relative ability of various shade trees to block or filter direct solar radiation in the winter. MLA thesis. Cornell University, Ithaca, NY.

Analysis of the degree of sunlight penetration through the canopies various landscape trees during the winter, when passive solar heating is desirable.

MICROCLIMATE, HUMAN COMFORT, MODELLING

Research and Refereed Journal Articles


An expression to estimate heating or cooling degree days accumulated on the average above or below a given temperature and for a given period of time. Akbari, H., H. Taja, J. Huang and A. Rosenfeld. 1986. Undoing uncomfortable summer heat islands can save gigawatts of peak power. Proc. 1986 Summer Study on Energy Efficiency in Buildings, Santa Cruz, CA.


A computer program for determining length and direction of shadows based on variables of geographical location and time of year, for use in optimally positioning shading elements in the landscape.

Books and Monographs


First, we found that two-thirds of studies were conducted in only three countries, three coral species were more heavily studied than others, and only 4% of studies focused on earlier life stages. Second, slightly more than half of all heat-stress exposures were less than 8 d in duration, only 17% of experiments fed corals, and experimental conditions varied widely, including the level and rate of temperature increase, light intensity, number of genets used, and the length of acclimation period.

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1. Alan W Meerow. R. J. Black. Annotated Bibliography Samples. Summary: This handout provides information about annotated bibliographies in MLA, APA, and CMS. Overview: Below you will find sample annotations from annotated bibliographies, each with a different research project. Remember that the annotations you include in your own bibliography should reflect your research project and/or the guidelines of your assignment. As mentioned elsewhere in this resource, depending on the purpose of your bibliography, some annotations may summarize, some may assess or evaluate a source, and some may reflect on the source’s possible use. The energy-conserving landscape strategies you use should depend on which region you live in. These landscaping strategies are listed by region and in order of importance below. Temperate: Maximize warming effects of the sun in.

Before you start landscaping, you must first develop a plan. The components of your plan could include deciduous trees and plants, coniferous trees and plants, earth berms, walls, fences, sheds, and garages. This section will help you create a landscape plan before you plant around your existing home or before you begin construction on a new house. An annotated bibliography is a piece of formal academic writing and follows the general rules for all academic writing: The writing structure will depend on the lecturer’s requirements for the task. The bibliographical information may be descriptive (see points 1-3 below); or descriptive+evaluative (see points 1-5 below). The paragraph should follow this order: Descriptive steps 1-3. When you compose your annotated bibliography, consider each part of the annotation. Sentence starters can help you to focus your thoughts on these questions. Descriptive steps 1-3. Descriptive and evaluative steps 1-5. The primary purpose of this annotated bibliography is to assist those interested in the conservation of concrete by identifying specific resources on the subject. Additionally, by examining the literature on conserving concrete heritage, it will promote understanding of the current state of knowledge of the subject, demonstrate the scope of current technical information available in the field, and assist with identification of gaps in the existing literature and research. This annotated bibliography covers mass concrete, reinforced concrete, cast-in-place concrete, post-tensioned prestressed... It explores the rela-.