


Innovative Renewable Energy
Series Editor: Ali Sayigh

Ali Sayigh
Antonella Trombadore *Editors*

The Importance of Greenery in Sustainable Buildings



 Springer

 Springer

springer.com

1st ed. 2022, VIII, 352 p. 365 illus., 338
illus. In color.

Printed book

Hardcover

109,99 € | £99.99 | \$139.99

^[1]117,69 € (D) | 120,99 € (A) | CHF
130,00

eBook

93,08 € | £79.50 | \$109.00

^[2]93,08 € (D) | 93,08 € (A) | CHF
104,00

Available from your library or
springer.com/shop

MyCopy ^[3]

Printed eBook for just

€ | \$ 24.99

springer.com/mycopy

Ali Sayigh, Antonella Trombadore (Eds.)

The Importance of Greenery in Sustainable Buildings

Series: Innovative Renewable Energy

- Presents leading-edge research in green building, sustainable architecture, and renewable energy
- Covers a broad range of global approaches to the use of greenery in sustainable building design
- Contains case studies and examples to enhance practical application of subjects presented

This book covers the important aspects of greenery in buildings, both in the landscape and within buildings, examining how greenery improves comfort and appeal in sustainable buildings. The book is part of the World Renewable Energy Network's drive to encourage architects and builders to use greenery as much as possible in their design to reduce energy consumption and provide a pleasant appearance and pleasing aspect to their buildings. It shows and demonstrates how widespread the use of greenery is in buildings, and the books 17 chapters were chosen from 12 different countries representing a truly global look at the use and benefit of using greenery in buildings. This book is aimed at architects, building construction authorities, urban planners, and policymakers to encourage the use of greenery in their future buildings and explain why it is important to do so.

Innovative Renewable Energy

Series Editor

Ali Sayigh, World Renewable Energy Congress, Brighton, UK

The primary objective of this book series is to highlight the best-implemented worldwide policies, projects and research dealing with renewable energy and the environment. The books are developed in partnership with the World Renewable Energy Network (WREN). WREN is one of the most effective organizations in supporting and enhancing the utilisation and implementation of renewable energy sources that are both environmentally safe and economically sustainable. Contributors to books in this series come from a worldwide network of agencies, laboratories, institutions, companies and individuals, all working together towards an international diffusion of renewable energy technologies and applications. With contributions from most countries in the world, books in this series promote the communication and technical education of scientists, engineers, technicians and managers in this field and address the energy needs of both developing and developed countries.

Each book in the series contains contributions from WREN members and cover the most-up-to-date research developments, government policies, business models, best practices, and innovations from countries all over the globe. Additionally, the series publishes a collection of best papers presented during the annual and bi-annual World Renewable Energy Congress and Forum each year.

More information about this series at <http://www.springer.com/series/15925>

Ali Sayigh • Antonella Trombadore
Editors

The Importance of Greenery in Sustainable Buildings

 Springer

Editors

Ali Sayigh
World Renewable Energy Congress
Brighton, United Kingdom

Antonella Trombadore
DIDA Department of Architecture
University of Florence
Firenze, Firenze, Italy

ISSN 2522-8927

Innovative Renewable Energy

ISBN 978-3-030-68555-3

<https://doi.org/10.1007/978-3-030-68556-0>

ISSN 2522-8935 (electronic)

ISBN 978-3-030-68556-0 (eBook)

© Springer Nature Switzerland AG 2022

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Introduction

Greenery is as important to buildings as its walls are because it requires natural lighting and gives beauty to naked walls and yards. Greenery reduces energy consumption in buildings. Moreover, shrubs, plants, and green grass make the inhabitants cheerful and indirectly reduce stress. Greenery acts as an absorbent of toxins and a provider of oxygen.

The old saying in the Middle East is “The three most beautiful things in life are: Water, Greenery and a Beautiful Face.”

Whenever architects and builders have integrated greenery within the facades of their buildings or in the various spaces or on the roofs, plants have contributed to the physical and mental well-being making indoor spaces healthier.

This book is part of the World Renewable Energy Network’s drive to encourage architects and builders to use greenery as much as possible in their design to reduce energy consumption and provide a pleasant appearance and pleasing aspect to their buildings. It shows and demonstrates how widespread the use of greenery is in buildings. The 12 chapters were chosen from 12 different countries representing the use and benefit of using greenery in buildings.

Chapter 2 consists of two parts: Part I deals with green facades and vertical walls while Part II shows how urban farming can create a circular economy and benefits to the occupants based on their experience in Italy.

Chapter 3 provides useful guidelines for the use of greenery in the Municipality of Bahrain, while Chap. 4 describes the thermal aspects of green walls in reducing energy consumption in buildings of Bahrain.

Chapter 5 delves into vernacular architecture of courtyard housing with greenery considering it as a natural resource specifically in hot arid climates such as that of Iran where it provides cooling.

Chapter 6 has been written by three eminent architects, two from Mexico and one from Spain, outlining the importance of vegetation in buildings.

Although most chapters are related to a hot arid climate where cooling is a priority, Chap. 7 demonstrates the use of greenery to create a micro-cool climate in buildings.

Professor Abounaga in Chap. 8 describes the importance of urban farming in improving lifestyle, viability, and buildings in the cities. The chapter mostly describes the Egyptian scenario.

Chapter 9 discusses the use of green-roof housing design and its importance.

Chapter 10 again outlines the complementarity between vernacular and urban green architecture and patios in achieving sustainable contemporary architecture in Argentina.

Professor El Adli and his co-author concentrate on an integrated approach to planning sustainable green cities in Egypt.

Professor Scudo and his two associates, in Chap. 12, write about multiscale greening of buildings with a discussion on tradition and innovation of the built environment.

Professor Battisti in Chap. 13 envisages a green dream in regenerating cities through nature. In Chap. 14 the author is looking forward to the day when photosynthesis powers buildings.

Professor Zeiler writes, in Chap. 15, about the new development in the Netherlands towards the implementation of greenery in sustainable buildings in the country.

Chapter 16 is devoted to the importance and advantages of using greenbelts in a major complex such as the International Islamic University in Malaysia.

Finally Chap. 17 addresses the importance of using trees and shrubs in the Jordanian environment.

Greenery makes buildings alive instead of being a lump of dead construction of steel, concrete, and glass. The more greenery is introduced in buildings the more they become attractive, healthier, and alive.

This book is aimed at all architects, building construction authorities, planners, and policymakers to encourage the use of greenery in their future buildings and explain why it is important to do so.

Brighton, UK

Ali Sayigh

Contents

The Added Value of Greenery for Sustainable Building: The Perspective from the Netherlands	1
Wim Zeiler	
Green Dreams: Regenerating Cities Through Nature	31
Alessandra Battisti	
Greening the Urban Environment: An Integrated Approach to Planning Sustainable Cities—The Case of Greater Cairo	47
Khalid Zakaria El Adli and Noha A. Abd El Aziz	
Urban Vegetation and Microclimatic Comfort in Warm Climates	73
Gustavo Cantuaria and Manuel Correia Guedes	
From Vernacular to Sustainable Contemporary Architecture: Urban Green and Patios	101
Carolina Ganem Karlen	
Rooftop Greenhouses: Smart and Inclusive Design	125
Lucia Ceccherini Nelli	
Urban Green Coverage: Importance of Green Roofs and Urban Farming Policies in Enhancing Liveability in Buildings and Cities—Global and Regional Outlook	155
Mohsen Abounaga and Heba Fouad	
Food in the City: Enabling Integrated Solutions for Urban Agriculture and Food Production in Buildings	231
Michele D’Ostuni, Antonella Trombadore, and Francesco Orsini	
The Role of Natural Factors in Courtyard Houses of Hot-Arid Climate of Iran	255
Syedehmamak Salavatian	

Adaptive Design of Green Facades and Vertical Farm: Examples of Technological Integration of Microalgae for Energy Production in Resilient Architecture 273
Antonella Trombadore, Beatrice Paludi, and Michele D’Ostuni

Significance of Courtyard House Design in the Arab World 295
Falah AlKubaisy

The Use of Vegetation in Hot Arid Climates for Sustainable Urban Environments 311
Jose Manuel Ochoa, Irene Marincic, and Helena Coch

Conclusions 337

Index 341