

# Impacts and Implements of Greening the Libraries

**C. Jayalakshmi**

Research Scholar, Department of Library and Information Science  
Bharathiyar University, Coimbatore -- 641 046

**Dr. R. Sarangapani**

HOD, Department of Library Information Science  
Bharathiyar University, Coimbatore -- 641 046

## Abstract

*Green innovations are becoming increasingly important for information centres like libraries, companies and societies as they are expected to ensure both environmental and economical sustainability. Libraries act as matchless channels to educate and disseminate the Green concepts to the Community. Libraries can convey their skilful green message and educate the society by adopting green information technology enabled concepts in library digitisation. Green library should focus upon recoverable, renewable, biodegradable, endurable, supportable materials and resources. The aim of this paper is to discuss the various factors and practices in greening the libraries and focus on the impacts and implications for sustainable development. Greening of library is pervasive with several components such as green business, green operation, green practices.*

**Keywords:** *Green Information Technology; Sustainable development; Green Library; Green Indicators; Green Innovation in Libraries*

## 1. Introduction

The traditional library practices are mainly influenced by cataloguing, classification, indexing and reference services. Information services were mainly based on print resources and therefore, maintaining the physical library was a challenging task and costly affair involving more manpower. The influx of information technology into the library services eliminated the weaknesses of the traditional libraries to the maximum level. With the development of databases in all subject fields and their integration with OPAC and web OPAC and their availability through web discovery tools, dissemination of information has become all the more easy. This also enabled the libraries and information centres to concentrate more on serving as role models to the community as a whole. As all libraries, irrespective of their type, are trying to become community-oriented, notwithstanding the fact that the communities they serve vary to a great extent, they have taken up the additional responsibility of practising what they preach. They have also taken up the additional responsibility of educating the users with the help of modern tools and technologies. As environmental concerns and sustainable development occupied the centre-stage of community development, libraries have started to play a major role in disseminating the green concepts among the users. This necessitated a discussion on the impacts and implements of greening the libraries by adopting the green concepts,

green design and green indicators. In this paper, the authors try to emphasise how the green concepts can be implemented in the library.

The major features which make a building 'green' are the following: (World Green Building Council, n. d.).

- i. Efficient use of energy, water and other resources
- ii. Use of renewable energy, such as solar energy
- iii. Pollution and waste reduction measures, and the enabling of re-use and recycling
- iv. Good indoor environmental air quality
- v. Use of materials that are non-toxic, ethical and sustainable
- vi. Consideration of the environment in design, construction and operation
- vii. Consideration of the quality of life of occupants in design, construction and operation
- viii. A design that enables adaptation to a changing environment.

## 2. Characteristics of a Green Library

From the features mentioned above, the characteristics of a green library can be deduced as follows:

- i. It reduces the use of water and energy by designing in a way that maximizes the use of natural and renewable resources.

- ii. It integrates actual greenery and vegetation into the building and site using drought resistant and/or native vegetation.
- iii. By maintaining high standards of indoor air quality, it helps to ensure the health of the people who inhabit the building.
- iv. A green library not only takes care of the environment, but also ensures the health and well-being of those who work in it.

### 3. Literature Review

An overall view of the growth of green movement and its adoption in the field of library and information centres is attempted by Vijayakumar (2019). After trying through light on the steps that can be adopted to make the library green, it passes on to examine the green features of the selected libraries at the global level. While discussing the green library initiatives in India, the paper also deals with the three predominant rating systems in India namely Leadership in Energy and Environmental Design (LEED), Indian Green Building Council (IGBC), and Green Rating for Integrated Habitat Assessment (GRIHA). It also highlights the efforts of The Energy Research Institute (TERI) to lead by example.

Citing several studies, Hafit and Abdulla (2017) establish that environmental friendly libraries attracts many visitors as can be seen from the increase in the number of library visits. They have developed a conceptual framework for the implementation of Green Technology in Libraries showing the independent variables and dependent variable in their study. The independent variables would give effect and interrelated to the dependent variable. The independent variables are energy saving, efficiency of resource usage, increasing natural environmental exposure, the reduction of environmental loads and the sustainability of global development. Meanwhile, the dependent variable for this study is friendly environmental library.

Various approaches for green initiatives and the need for green information literacy are highlighted by Malhan and Shivarama Rao (2017). Libraries and information centres should play a strategic leadership role in their institutions and surroundings for adoption and absorption of green technologies and dissemination of information on environment sustainability. In partnership with the IT department, green technology programs such as energy saving software can be tested in the library and labs that save energy can be set up. Green information literacy is key to foster awareness of information resources on environmental sustainability, green technologies and green initiatives. Library and information centres therefore should not only act as testing beds and teaching tools but

also a trigger point for green initiatives. This paper projects an overview of green technologies and through extensive literature survey and analysis portrays the role of library and information centres in environment sustainability. Discusses.

Jones and Wong (2016) in their paper stated that as the library has a long service hour with the need of air-conditioning and lighting, the energy consumption seems crucial. They argue that by installing the motion sensor in the system, the energy used can be reduced to several percentage. The time the lights stay on after a user has moved away was reduced in order to cut down the consumption of electricity. Shut down the computers, photocopiers and printers when library closes has been practice a long time ago. They also discuss instances followed by libraries like disposing of redundant IT equipment and furniture, recycling of all print cartridges and collection of obsolete IT equipment for resale or distribution to charities.

As stated by Pangali (2015), the library has to be a starter for the go green to be implemented with support of the government as well as the community. The author makes an overview of global and national initiatives towards green libraries and offer solutions for the existing libraries to go green.

Choudhury (2012) after making a comprehensive review of the literature produced on green libraries proposes many methods that will pave the way for building and managing green information services to support education and research/scholarly activities. A green information system can produce several economic and environmental benefits resulting from (1) the shared use of computing and network resources, (2) dematerialization, i.e., replacing printed content with digital content, and (3) from better file management. He concludes that a cloud-based green information services can be the most appropriate economically and environmentally sustainable means for promoting education and research in the modern digital age.

Setting the tone for green libraries Antonelli (2008) avers that the time is right for librarians to step up and help communities become green and sustainable. The role of the library is to serve its community. Communities need libraries and librarians to act as role models for sustainability by providing accurate information on all manner of green topics, from alternative building practices to renewable energy options. The time is also right for librarians to support and continue to grow the Green Library Movement.

## 4. Application of Green Principles in Libraries

Application of green principles includes the adoption of green designs, decision making processes and the implementation of the proven methodologies.

### 4.1 Green Designs

At the design stage itself, care should be taken to ensure the following performance targets for the building (Woolliams, 2001).

- Energy (Energy use, Energy source, Clean energy transport)
- Water (Water Use, Water Filtration, Ground Water Recharge, Human Waste)
- Landscape (Integrated Pest Management, Green Space, Native Plantings and Wildlife Habitat)
- Materials (Recycled Materials, Efficient Materials, Salvaged Materials, Local Materials, Durable and Low Maintenance)
- Waste (Recycling and Composting Facilities)
- Construction Practices (Construction Waste, Reuse Topsoil, Vegetation and Watercourse Protection)
- Indoor Environmental Quality (Air Pollutant Emissions, Ventilation Effectiveness and Air Filtration, System Commissioning and Cleaning, Daylighting)
- Economic Performance (Life-Cycle Assessment, Capital Cost Accounting)

Leadership in Energy and Environmental Design (LEED) is a set of rating systems for evaluating the design and environmental performance of buildings, homes and neighborhoods. Devised by the United States Green Building Council, the system provides specifications to projects for environmental friendly actions both during the construction and use of the building. The hallmark of LEED is that it is an open and transparent process where the technical criteria proposed by the LEED committees are publicly reviewed for approval by the more than 10000 membership organizations that currently constitute the USGBC. Details of the rating systems can be had from <http://environment-ecology.com/environment-and-architecture/81-the-leadership-in-energy-and-environmental-design-leed-.html>.

### 4.2 Reduction in Energy Consumption

Main method of adopting green practices in libraries is the reduction of carbon emission. Being a centre of information or knowledge hub, libraries have to make

use of a large number of electronic gadgets which turn out to be a menace in the long run. Every effort should be taken to reduce the consumption of electricity. This can be achieved by turning off the lights, computers and other gadgets while they are not in use. The practice of switching on all the lights, electrical or electronic gadgets including air conditioners needs a rethinking. The staff should be vigilant to switch on the lights and machines as users approach. For this purpose automatic sensors can be used.

Use of green manufacturing computers is also necessary for the implementation of green practices in libraries. Google, Apple, Cisco, HP, Intel, Samsung and a host of other companies have already entered into such projects. Hence, it behoves on the part of libraries to go for such eco-friendly products.

### 4.3 Energy Efficiency

In order to provide the future benefits in using a particular gadget, the Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India introduced the Standards and Labelling Program in May 2006. This programme is one of the major thrust areas of BEE. A key objective of this scheme is to provide the consumer an informed choice about the energy saving and thereby the cost saving potential of the relevant marketed product. (Bureau of Energy Efficiency, 2019). The scheme targets display of energy performance labels on high energy end use equipment & appliances and lays down minimum energy performance standards. Under this program the manufacturers are required to place a label showing how much electricity the appliance will consume under certain conditions. The program is currently running for refrigerators, air conditioners, televisions, geysers, tubelights and fans among the household appliances. The scheme is mandatory for some of the appliances while voluntary for others. However, once we have decided to save electricity and reduce our bills, it becomes mandatory for us to look at wherever these labels are what they tell. The highlight of the labels is the 'STARS'. More the stars, more efficient is the appliance. There are two kinds of labels – big label and smaller label. While for ceiling fans, tubelights, computers/laptops and televisions the smaller labels are used, big label is used for refrigerators, air conditioners, geysers and washing machine. The most important point to be borne in mind is that the labelling program gets updated every year.

### 4.4 Reduction in Carbon Emission

Method of transportation plays a vital role in reducing carbon emission. Carpooling and use of bikes and bicycle are the major means of reduction of carbon emission

in library service transportation systems. Apart from this, green supply chain, eco-design, total solution of environmental management and reverse logistics can also be used in Green practices.

## 5. Cloud Computing in Library Operations

Cloud computing is a sophisticated model that enables outsourcing of all IT needs such as storage, computation and software such as enterprise resource planning through the Internet. The cloud computing infrastructure relies heavily on large data centers and the use of advanced technology, which reduces energy consumption and reduces greenhouse gas emissions. Cloud computing significantly reduces carbon emissions and energy consumption, due to the consolidation of data centers, reducing the infrastructure of data centers such as refrigeration, heating, ventilation and air conditioning systems, and the strategy of cloud computing resources and using it only when needed which contributes significantly to reducing Carbon emissions (Al-Fouri, Al-Fouri and Al-Khateeb, 2018).

Library is like a data centre which consumes large quantity of electricity to run their individual servers. More servers not only mean more expenditure, it also means more carbon emission. As the number of active servers increases to service the upcoming requests, the consumption of electrical power also increases. Simultaneously, there is intensive increase in carbon emission and heat energy also gets wasted. Also, to cool the heated up datacenters, number of air conditioners are employed, which further consumes more electrical power. Since the servers provide services 24x7, they are consuming humongous amount of electrical power to meet the all time demands. This complex scenario points towards hazardous impact of cloud computing system at environment.

Cloud computing can provide the solution to the libraries which could make them a lot greener. It is in this context that cloud computing becomes relevant. The emergence of open access, web technology, and e-publishing has slowly transformed modern libraries into digital libraries. With this variety of technologies utilised, cloud computing and virtual technology has become an advantage for libraries to provide a single efficient system that saves money and time. Every library tends to have certain data which may be present in some other libraries too which leads to a lot of duplication of data. However, if the libraries integrate their data, there would be no more duplication since the libraries would be sharing the common data. The implementation of this technique, though, may not be as simple as it may seem to be. It is here that cloud computing can play its part.

Cloud computing can help libraries collaborate with each other in an easy manner. Every library has its own electronic data resources. If all the electronic data resources are put together in a single place which may be accessed by a group of libraries, the whole electronic data base will become huge. This space which contains all the electronic data can be some cloud, say, a library cloud. This library cloud will contain the digitized data of different libraries and hence, will help libraries integrate their data. The need for maintaining and backing up the data will be no more the responsibility of the libraries since all the data will be stored in the cloud which shall be managed by some cloud provider.

It will also help the libraries in scaling up or down their data capacity whenever required. This scaling up or down is purely a function of need. Hence, the libraries would be consuming exactly the required space. Not a megabyte more! As a result, libraries will not have to predict their future needs and buy space and infrastructure beforehand. This co adjuvant effort of the libraries will not only increase the overall efficiency (since the data will be shared) but also open doors for innovation, make libraries a lot more scalable and help save money as well (Abidi and Abidi, 2012).

HathiTrust Digital Library is a great example which shows us what cloud computing holds in store for the libraries. It is a large-scale collaborative repository of digital content from research libraries including content digitized via the Google Books project and Internet Archive digitization initiatives, as well as content digitized locally by libraries (Hathi Trust Mobile Digital Library, n. d.).

Yuvaraj (2014) lists various ranges of services that can be offered via the cloud computing enabled libraries. The services include:

- Cloud-based access to library collections through the OPAC
- Delivery of services as well as documents as an utility
- Just-in-time during need on demand library services
- Cloud-based recommender system to make user friendly retrieval strategy like Bibliocommon
- Cloud based discovery layers to make the special collections of the library accessible to users which are not catalogued.
- Cloud based software of citation management enables users to share content, form communities and recommend a resource.

- Cloud based efficient management and organization of scholarly communications.
- Cloud based library apps enrich user to access the library data.
- Cloud based Stack Map, shelf-mapping software enable users in mapping the physical location of a book.
- Appealing feature of Cloud libraries services includes global accessibility to vast library resources and the inherent resilience to failures.
- Cloud library services are metered that integrates telemetry as a part of service offerings.
- CAS and SDI services through emails, RSS feeds or web feeds, Social networking websites and blogs
- Cloud based self-service for real time queries
- Global Cooperation in maintaining bibliographic and authority records
- Global collaboration on decision on collection development, preservation and digitization.
- Collaborative management of Cloud resources

## 5. Finding the Solution and Implementation of Green in Libraries

'Reduce', 'Reuse' and 'Recycle' are the three elements referred to as the '3 Rs in waste management hierarchy. Reducing involves scaling down the amount of waste produced and this is the best way to help the environment. Reusing implicates the discarding of throw away culture and thinking of ways you could reuse something, like saving glass jars for storage. Recycling enables the materials one throws away to be used again by making them into new products like converting biodegradable materials into manure. These elements are equally applicable in information centres.

Reduce the carbon emission by the way of using cloud computing help by keeping not only the research data but also all the data analysis interpretation in Library Services. Cloud refers to the transition of local data from one site location behind the firewall to the network space.

Recycle the wastage of the materials by crushing the used books and newspapers in this method and bring to the new form is the best way to bring Green in Libraries.

Reuse tools and content in the new technology definitely make easy access through cloud computing in user device like e-book readers and I-pad. Suresh Kumar and Antoo (2015) have summarized the essentials of adopting the

green policy in libraries in their article "Building green libraries: An investigation."

## 6. Conclusion

Green library concept is catching up in India also. Unfortunately, in terms of priority, library buildings are relegated to the background and even if separate library buildings are planned, most often librarians do not have any voice in the design and construction process. In general, architects, except a few, are not concerned about green concepts and their adoption for obvious reasons. In spite of the adverse scenario, quite a few library buildings have come up in the country. A typical example is the Anna Centenary Library, Chennai which has imbibed many green principles from the National library of Singapore. It is worth remembering that though the library buildings of Madras University and Delhi University have come up before the advent of the green movement, one can see the adoption of the many such principles in their construction.

It is heartening that many software tools have been developed to estimate energy performance and provide strategies for energy savings. LEAP, the Long-range Energy Alternatives Planning System, is a widely-used software tool for energy policy analysis and climate change mitigation assessment developed at the Stockholm Environment Institute. Energy3D is a simulation-based engineering tool for designing green buildings and power stations that harness renewable energy to achieve sustainable development (Energy3D: Learning to Build a Sustainable World, n. d.). It is a NSF-funded free software. It is high time that LIS professionals come forward with such applications which can be easily applied in the design and construction of library buildings and bring them to the attention of the authorities.

## References

- Abidi, F. & Abidi, H. J. (2012). Cloud libraries: A novel application of cloud computing. *International Journal of Cloud Computing and Services Science*, 1(3), 79-83.
- Al-Fouri, A., Al-Fouri S. K. & Al-Khateeb, K. R. (2018). Green cloud computing and environmental sustainability. Conference: ICEPUB-The University of Jordan Library, Amman, Jordan. Retrieved from [https://www.researchgate.net/publication/327281286\\_GREEN\\_CLOUD\\_COMPUTING\\_AND\\_ENVIRONMENTAL\\_SUSTAINABILITY](https://www.researchgate.net/publication/327281286_GREEN_CLOUD_COMPUTING_AND_ENVIRONMENTAL_SUSTAINABILITY).
- Antonelli, M. (2008). The Green library movement: An overview and beyond. *Electronic Green Journal*, 1(27). Retrieved from <https://escholarship.org/content/qt39d3v236/qt39d3v236.pdf>

- Bureau of Energy Efficiency (2019). Retrieved from <https://www.beeindia.gov.in/content/standards-labeling>
- Choudhury, G. (2012). Building environmentally sustainable information services: A green is research agenda. *Journal of the Association for Information Science and Technology*, 63(4), 633- 647
- Energy 3D: Learning to Build a Sustainable World, (n. d.). Retrieved from <https://energy.concord.org/energy3d/>
- Hafit, A. B. & Abdulla, C. Z. (2017). Implementation of green technology in library: A proposed framework. *International Journal of Academic Research in Business and Social Sciences*, 7(12), 507 – 514.
- Hathi Trust Mobile Digital Library (n. d.). Retrieved from <https://www.hathitrust.org/>
- Jones, L., & Wong, W. (2016). More than just a green building Developing green strategies at the Chinese. Retrieved from <https://doi.org/10.1108/LM-05-2016-0041>
- Malhan, I. V. & Shivarama Rao (2017). Strategic leadership and role of library and information centres in environmental sustainability: An overview of green technologies. *International Journal of Library Information Network and Knowledge*, 2(2), 1 -16. Retrieved from <http://slp.org.in/IJLINK/volumes/IJLINK-V2I2-1.pdf>
- Pangail, R. K. (2015). Green libraries: Meaning, standards and practices. *Episteme: An Online Interdisciplinary, Multidisciplinary & Multi-cultural Journal*, 1(3), 3.
- Sureskumar, P. K. & Antoo, K. D. (2015). Building green libraries: An investigation. *Professional Journal of Library and Information Technology*, 5(1), 113 – 122.
- Vijayakumar, K. P. (2019). Green libraries: Leading by example of sustainable development. In K. Mohammed Haneefa and T. M. Vasudevan(Eds.). *Innovations and transformations in libraries* (pp. 1-19). University of Calicut, Department of Library and Information Science.
- Woolliams, J. (2001). Planning, design and construction strategies for green buildings. Retrieved from <https://www.greenbiz.com/sites/default/files/document/O16F22028.pdf>
- Yuvaraj, M. (2014). Cloud libraries: Issues and challenges In Sangeeta N. Dhamdhare (Ed.) *Cloud computing and virtualization technology in libraries* (pp. 316 – 338). USA: Idea Group