Chapter 4
Green Information Centres and Allied Foundations: *The Concern of Environmental Information and Documentation Practice*

Sarmistha Chowdhury, K. S. Tiwary, and Jayati Lahiri Dey

Abstract Green Information Centre is an emerging concept of the information centre, and it is required for the modern information system practice. It is supported with the green and eco-friendly approach and dedicated in the designing, development, management and evaluation of the information systems. Eco-friendly tools, techniques and principles are considered worthy in Green Information Centre over the traditional information centre operation. Green Information Centre is not only the institutions having information solutions but also the applications of the green principles to the allied institutes where information practice is considered as worthy. Once environment-friendly green principal and systems are practised in the traditional documentation, then the establishment is known as Green Information Centre. Such types of information centres are called as sustainable information centre with integrated approach of intelligent concept in environmental management. In addition to the computing and IT, in Green Information Centre the aspects of management science, information studies, information management, etc. are highly associated with green knowledge management. The libraries and similar knowledge resource centres are also these days adopting eco-friendly principles, and this chapter discusses various aspects of Green Information Foundations in brief manner. Here, basic features and functions of the green and eco-friendly information-related foundations are discussed with emphasis on Green Libraries.

Keywords Green information systems · Eco-friendly information management · Green libraries · Sustainable information infrastructure

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4.1 Introduction

The government bodies and associations are moving towards greener and eco-friendly policies and strategic adaptation in different ways. Green information mechanism is the need of hour, and therefore, institutions are putting efforts in developing green and eco-friendly procedure to build organizations greener including eco-friendly and greener information systems [1, 19]. There are multiple ways in eco-friendliness in the organizations, and as far as Green Information Centres and Foundations are concerned, it is dedicated in proper designing, developing and managing green information systems [6, 7]. The applications of computing and information technologies are important in designing and developing green information systems, and in this context, various allied technologies are being used such as—

- Software engineering/technology.
- Communication technology.
- Database technology.
- Web technology.
- Networking technologies.
- Security technologies, etc.

According to the green and eco-friendly approaches in all the green information-related aspects and facets, the principals and procedures of Energy and Environmental Management should be provided. In Green Information Centre and Allied Foundations, some of the concepts and establishments are purely applicable, and here, green strategies are important. As the information centres are of two types, i.e. traditional and computational information management, in all types of information centres and foundations, green principles are applicable [3, 20].

4.2 Objective

The present chapter entitled 'Green Information Centres and Allied Foundations: *The Concerns of Environmental Information & Documentation Practice*' is theoretical in nature and consists with following aim and objectives—

- To know about the basic of the Green Information centres and foundations dedicated in information-related activities.
- To gather knowledge about the Green Information Centre and Green Information Systems emphasizing basic nature, areas and functions.
- To get concepts and knowledge regarding contemporary scenario of Green Data Centre with Green Information Analysis Centre.
- To know about the Green Libraries including its basic features and functions and emerging characteristics.
- To get a detailed overview on latest principles, strategies, policies and development in Green Libraries.

4.3 Information Dealing Foundations with Green and Environmental Approaches: The Basics

Environment is a vital concern for all of us and directly and indirectly associated with us. In different sectors, proper development and sustainability are essential to increase [29, 30]. Sustainability is the capacity for biosphere and human civilization to co-exist sustainability and environment are co related. Like other sectors in the information sector too interaction with environment and sustainability considered as worthy and important [9]. Sustainability is based on three pillars, and these are as follows—

- Economics (this is required in profit).
- Environment (also called as planet).
- Social (also known as people).

Information sector is broad and increasing day by day, and furthermore, it consists with different units and foundations such as data centres, documentation centres, information centres, information analysis centre, libraries and knowledge centre [4, 5, 32]. All these as a whole is called information foundation. Today, in all the areas and sectors environment including sustainability is considered as worthy because better interaction and applications are very much important. It is worthy to mention that Green Information Foundations may consist of the following—

- Green Information Centre (GIC)
- Green Information Systems (GIS)
- Green Information and Knowledge Network (GIKN)
- Green Libraries (GL)
- Green Information Resource Centre (GIRC)
- Green Data Centre
- Green Information Analysis Centre, etc.

The concept of environment, ecology and sustainability are rising rapidly. These information foundations may be called as eco-friendly information centres [10, 13]. Here, Fig. 4.1 depicted various Green Information Foundations dedicated in building of eco-friendly information infrastructure.

4.3.1 Green Information Centre: Basics

Green Information Centre is a kind of information centre supported by and with environment-friendly and ecological principle. Furthermore, such Green Information Centres are dedicated in promotion of green and eco-friendly culture and activities of green principle and management in the information activities such as in collection and selection, use of green strategy in processing of information. In addition to these in Green Information Centres, green method in dissemination of information is applicable. Information centre is dedicated in information-related affairs, and such

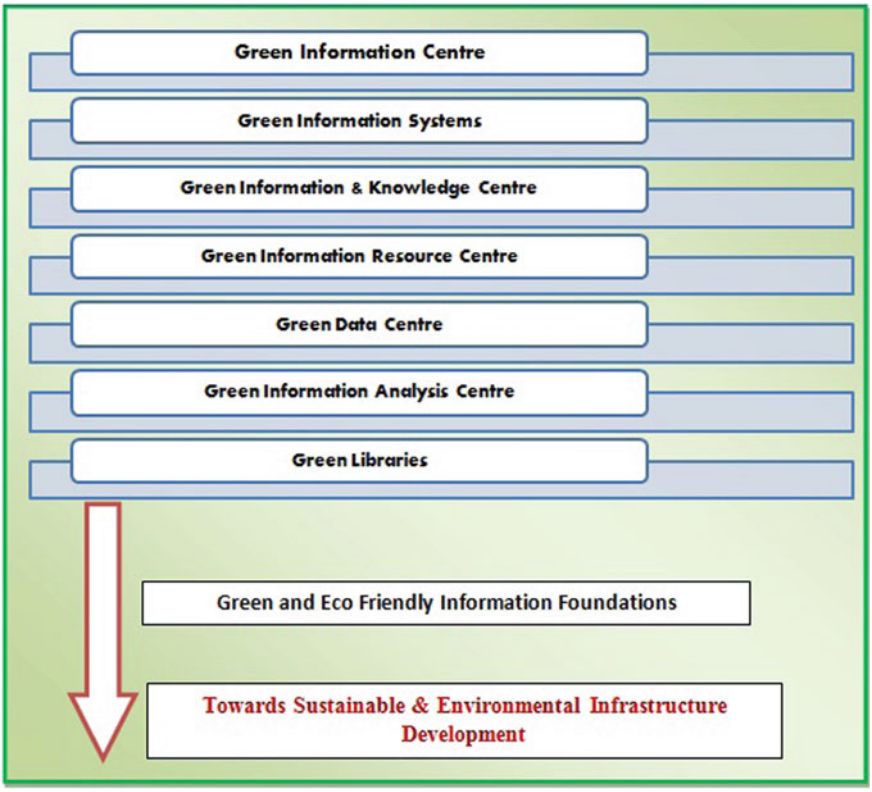

Fig. 4.1 Greener information infrastructure powered by various eco-friendly information centres

activities may be via manual and computational systems. Therefore, green principles, green strategies and methods are applicable in both types of information systems [16, 25].

4.3.2 Green Information Systems: Foundations

Information system is broader concept than information centre, and it is considered as the merger or combination of different types of information centre or similar type of establishments. Information system is a kind of integrated functioning body dedicated in information-related and specific works. As information is required in all the areas and sectors such as health care, business, transportation, education, manufacturing, weather and climatology and so on, information systems and its role are crucial for complete information infrastructure development. Adopting green technology and green computing principles in the information systems leads healthy information infrastructure which is sustainable and healthy [8, 24]. Information system is

responsible in the proper functioning with the connected information centre. Information system can be established based on the territory such as regional, national and international. Moreover, based on the way of delivery information system could be manual and also technological in nature. In information system, various principles of environmental systems, green technologies, energy informatics and other concerns are applicable.

4.3.3 Green Information and Knowledge Centre: Basics

The concepts of Information Resource Centre are emerging but before moving to such area first gather information about the Green Information and Knowledge Centre. Such kinds of centres and establishments are like information centre; however, these establishments also additionally deal with knowledge and resource managements. The Green Information and Knowledge Centre is followed by green principles. The green libraries or green computing and technology principles and procedure are adopted into this kind of Green Information and Knowledge Centre. The nature of electronic information and knowledge systems in such establishments is worthy and increasing [11, 22].

4.3.4 Green Information Resource Centre: Overview

Green Information Resource Centre is a kind of establishment dedicated in information-related affairs. Similar to 'Green Information Centre' and 'Green Information and Knowledge Centre', this kind of centre heavily concerns about the information resource collection and its management. Among the resources important are primary sources, secondary sources and tertiary sources. Green Information Resource Centre consists with knowledge materials like documents, books, journals, encyclopaedias and so on. In addition to information resources and collections these days, such type of establishment concerned about the computing facilities and service. Green Information Resource Centre is dedicated in technological green and eco-management and also eco-friendly traditional document management [12, 21]. Such kind of organization is a part of an organization, or it may be a stand-alone institution. Similar to the Green library-based principles or green technologies, Green Information Resource Centre also depends on such principles and methods. Furthermore, energy management designing and development principles are also applicable in Green Information Resource Centre including knowledge network.

4.3.5 Green Data Centre: Basics

Green Data Centre in another word can be called as Eco or Environmental Data Centre. Today, most of the data centre is computational or electronic or computationally supported. In some context, such type of data centre is also known as cloud centre. However, in respect of traditional information studies, data centre may be manual document based which are connected or merged with the following establishments (and allied foundations and institutions) such as—

- Information centre,
- Information systems,
- Information and knowledge network,
- Information resource centre,
- Documentation centre,
- Information analysis centre, etc.

Such types of Green Data Centre are rising internationally and merging with technological and tools oriented towards environment-friendly approaches [2, 14, 15].

4.3.6 Green Documentation Centre: Basics

Documentation centre is a kind of information-related foundations dedicated purely on documentation activities. Here, the major documentation procedures are primary, secondary and tertiary sources of information. Documentation centre may be established in an organization or company to serve the organization by offering information and documentation need or may be established on different subject/s. Documentation centre directly and indirectly helps in other information centre or libraries. As documentation centre deals with the information activities, it is supported by the manual procedure and also computing and information technologies. Here, green principles and environmental strategies are essential to follow up.

4.3.7 Green Information Analysis Centre: Basics

Green Information Analysis Centre is the kind of information foundation dedicated in analysing data and information using various knowledge organization tools and supporting information technologies. Here, collection of required data is important with proper analysis of information based on various feature and criteria. The 'Green' Information Analysis can be computational or manual [13, 17]. There are different methods and procedure adopted in information analysis, and all these can be followed in Green Information Analysis Centre as depicted in Fig. 4.2.

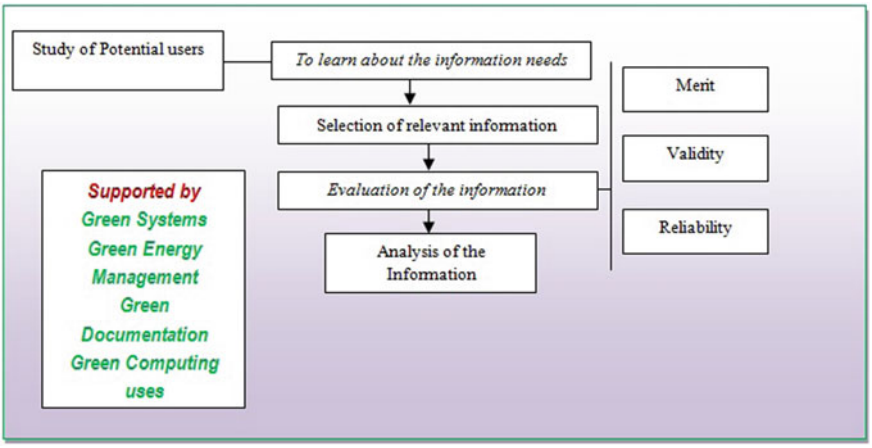

Fig. 4.2 Backbone of green information analysis centre

4.3.8 Green Library: Basics

In the field of library and similar foundations, the concept 'Green Library' is considering and emerging rapidly [10, 23]. Green libraries are dedicated in designing, development of environment and green institution responsible for sustainable library development including energy management (electrical). In the Green Libraries, the natural resources are being used in the building constructions including the activities of the—

- Library shelves,
- Library equipment,
- Documentation tools,
- Tools and products used in the libraries,
- Waste management and disposal (i.e. recycling, etc.).

In recent past, the IT and computing systems and its applications in the libraries are emerged, and in this context, it is recommended to use the green and environment-friendly approaches and systems into the libraries; this is also required to make libraries more greener as well as energy efficient. There are different opinions available on Green Libraries but among these one of the important opinions is provided by Oxford English Dictionary, '*green/sustainable libraries as a library designed to minimize negative impact on the natural environment and maximize indoor environmental quality by means of careful site selection, use of natural construction materials and biodegradable products, conservation of resources like water, energy, chapter, and responsible waste disposal recycling,* etc'.

Within Green Information Foundations, the aspects of Green Libraries are being popular and interestingly rising, and in this context, following parameters are important.

4.4 Green Libraries with Concerns and Parameters

Various parameters are considered as important concern in designing and developing Green Libraries, and among them, few important are mentioned as follows.

4.4.1 Electrical and Similar Systems

The ***electrical system*** is the backbone of the modern libraries. Various sections and divisions of the libraries are also electronic technologies and system integrated. In the libraries, various electronic and electrical products are being used such as lights, fans, speakers and air-conditioning systems. Thus, during non-use it is essential to off all the lights, fans and other electronic products. Furthermore, low power consumption lights such as CFL and LED and fans are essential use having green and environmental factor. It is also essential to follow up the aspects of maintenances.

4.4.2 Building Material and Constructions

Green Library is also normally established in a construction settings, and in this context, ***building material*** should be considered important regarding the use of sustainable material. According to the experts, the proposed green building is expected to be eco-friendly material supported or featured. The construction of the building should be supported by the quicker and renewal materials, and in this context, bamboo can be used and wood can be avoided. Further, it is important to note that the material used in the building recycling facilities or not [27, 31].

4.4.3 Indoor Air Quality

Inside of the library also, it is essential to establish the environmental friendly systems; furthermore, library building should be more and properly ventilated. Air-conditioning machines are being used these days but it is essential to use minimum as much as possible. Different and proper healthy techniques, tools and designing become mandatory in entire library and also for the individual room or section. Therefore, green building concept is useful here in respect of different types of contents and paints, carpeting elements, etc. In a library, there are different sections important; among these important are reference sections and information kiosks; in such places too, following green principles is essential; and it should be followed inside and outside of the building. The green (both natural and technological) inside can

Fig. 4.3 Green libraries and look (a library in USA in left and Anna University Library India in right)

be seen in many international libraries; here, a sample library of USA is depicted in Fig. 4.3 left, whereas right side is an example of Indian green library.

4.4.4 Control and Proper Population

In big and multistored libraries, lot of divisions, and units are common these days, and therefore, proper transportation could be considered as important keeping in mind the increasing population [26, 28]. Thus, in modern library systems nearby parking zone is essential to plan, so that user can use the services effectively and exactly as per the need and demand.

4.4.5 Use of Contents and Documents

Eco-friendly contents and documents like books, journals and periodicals are considered as important regarding developing green libraries. Furthermore, as far as electronic content is concerned such as e-book, e-journal and e-document, the energy management system should be followed. The digitalization of existing products and documents also supports eco-friendliness and green principles.

4.4.6 Green Design

Green libraries are considered as worthy by adopting proper and effective designing or sustainability, and in this context, different models and principles are available to

Table 4.1 Brown suggested green libraries factors

Brown suggested keys for green libraries
Community collaboration
Enhanced daily life
Green material
Green roofs
Raised floor system
Energy efficiency
Natural ventilation
Green power and reveal energy
Indoor environmental quality

be followed. However, brown suggested models and keys in the year 2003 considered as important as depicted in Table 4.1.

4.4.7 Recycling of the Products

Recycling is being considered as most important and timely these days, and therefore, proper steps are essential in different areas like data, documents, plastic products and other managements. Recycling of the documents and books and scanning of manuscript are worthy moves to think in respect of environmental friendliness.

4.4.8 Technological Systems

Regarding information technology and computing, proper and scientific procedure and policies are essential to follow-up, and in this context, the green computing and green information policy are considered as important to adopt. Here, green computing and ICT practice may lead to proper environment friendliness, and in this regard, following can be adopted.

- Products longevity
- Data centre design
- Software and deployment optimization
- Power management
- Material recycling
- Cloud computing and technology
- Edged computing
- Telecomputing, etc. could be used [18, 32].

4.4.9 Social Responsibility and Greenery

Social responsibility is being considered as important in the green designing. And here, it is essential to follow the social responsibility so that libraries can be green and eco-friendly. Emerging trend is environmentalism today, and therefore, social responsibility must be followed up.

4.4.9.1 Good Sanitization System

Good sanitization systems are considered as important to adopt in managing good green libraries including its designing and development. Natural resources are essential to use in different areas like washroom, drinking water etc. Here, reuse of waste including proper water harvesting should be considered as worthy. In proper rainwater systems and management, the approach of the green designing and development is noticeable. Some of the essentials or prerequisite is need to be followed up in this regard.

- In the libraries, polythene and unnecessary plastics are essential to avoid or reduce.
- It is worthy to look as much as natural wind facilities are available with support of green building designing as well as development procedure.
- It is essential to follow more and more eco-friendly pesticide regarding pest control and management.
- Regarding the aspects and functions of stacking, documentation, computerized information centre, use of the network printer are concerned eco-friendliness can be noted. Further here, sharing of the printer could be treated as green library management.
- Refilling of the printing devises is important rather purchasing of the new printing materials.

Gradually, the concepts of green libraries are rising and various nations are involving with various initiative for its proper development. Regarding some notable world-wide libraries, few are depicted in Fig. 4.4 in which green library model is adopted effectively.

Different concerns are rising in developing Green Libraries, and in this regard, various strategies and methods are essential among the users and service providers. In developing green libraries and similar institutions, proper awareness are also solicited.

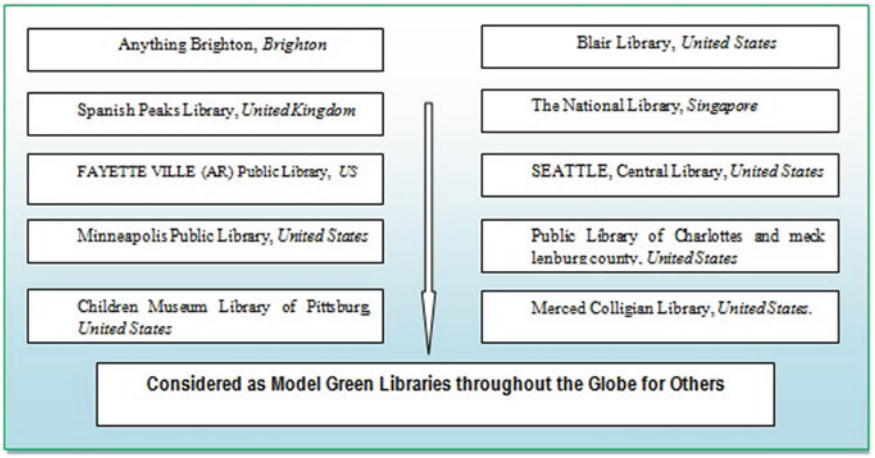

Fig. 4.4 Some of the model green libraries globally

4.5 Conclusion

The concepts of the Green Information Foundations are emerging, and in various ways, green and eco-friendly approaches are rising. Different organizations and institutions are internationally putting efforts in conceptualizing and developing green technology, green computing and Green Information Foundation concepts. Here, technologies, tools, procedure, strategies and mechanism are considered as important regarding green and environment friendliness. Further, proper awareness from different levels is required. Different governmental initiatives, associations and organization's efforts are required in building Green Information Institutions. In most of the corporate, companies and organizations, information centre or libraries become integral part these days; therefore, adopting green technologies, tools, procedure and strategies are considered as worthy. Educational training, awareness and initiatives are important in proper green information mechanism and better environmental informatics practice.

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