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Priti Singh
prtibhu2408@gmail.com

Rajani Mishra
rajanimishra5@gmail.com

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Environmentally Sustainable Approaches in Academic Libraries: A micro-study in Uttar Pradesh

Priti Singh¹, Dr. Rajani Mishra^{2*}

1 Junior Research Fellow, Department of Library and Information Science, Banaras Hindu University, Varanasi, U.P.

2 Associate Professor, Department of Library and Information Science, Banaras Hindu University, Varanasi, U.P.

1 email: pritibhu2408@gmail.com

2 email: rajanimishra5@gmail.com

Abstract:

This study tried to identify environmentally sustainable practices essential for library environmental sustainability within academic libraries in Uttar Pradesh, India. Within the scope of this study, considered only four central universities' libraries of Uttar Pradesh, the researcher used a descriptive method and a questionnaire used as a data collection tool from library staff. Within the study scope sent an online questionnaire to 30 library staff across four central universities of Uttar Pradesh. Only 22 library staff responded to the survey questionnaire. A structured questionnaire was designed as a survey instrument consisting of six main sections; building design features, water conservation, energy efficiency/conservation, waste management, sustainable collection development, sustainable technology. Finally, the obtained data were tabulated for analysis. Results of this study reveal that central university libraries are fulfilling some criteria. This study suggests that it is necessary to understand the importance of environmental sustainability practices by library staff because this understanding can help motivate them to implement sustainable practices in their libraries for environmental sustainability. Further, there may be a scope to think and work on that practices are not being implemented yet to transform their libraries as green libraries or environmentally sustainable libraries and become a role model for others. This study will also help to know the role of professionals towards environmental sustainability.

Keywords: Environmental sustainability, Green libraries, Academic libraries, Environmental concern, University Library, Uttar Pradesh

Introduction:

There is an inevitable interaction between humans and the environment in which they live. The concept of environmental sustainability, which is a part of sustainable development, has emerged as a result of concerns caused by adverse effects such as air and water pollution, greenhouse gas emission, ozone depletion, toxic wastes, deforestation, desertification, and climate change.

*Corresponding author

Firstly, sustainable development used in the 1970s, published by the World Commission on Environment and Development (WCED) titled 'Our Common Future,' is defined as development that meets today's needs without hindering the availability of future generations to meet their own needs (WCED, 1987). For environmental sustainability to be achieved, the damage to the environment must be repaired and minimized, which makes it necessary to change the behavior of both individuals and institutions. As one of the priority issues of the century, environmental sustainability is included in the plans of government and non-government institutions, and many institutions, including libraries, take measures to reduce their damage to the environment (Stark, 2011). In the early 1990s, 'The Green Library Movement' started due to libraries becoming interested in environmental issues (Antonelli, 2008). With the Green Library Movement, the literature on green libraries has begun to develop, and as a result, awareness of the subject has increased. Covering from 1971 to 2012, Green Libraries Bibliography (Project the Green Library) includes 218 publications. Environment, Sustainability and Libraries Special Interest Group (ENSULIB) was established within The International Federation of Library Associations and Institutions (IFLA) in 2008; starting from 2016, ENSULIB to a library every year by Green Library Award and an international meets on this subject in November 2018. This study aims to draw attention to the fact that academic libraries should consider environmental sensitivity and deal with the issue at a conceptual level and contribute to the minimal literature on this subject at the national level. The study will present findings of research conducted on library staff. The situation of central universities' libraries in Uttar Pradesh will reveal from the frame of green libraries.

Literature Review:

The Green Library Movement has started to reduce the impact of libraries on the environment in the early 1990s. The first official document on environmental sustainability in higher education, signed by more than 40 countries in 1990, counted as the Talloires Declaration, which forced libraries, along with other units of universities, to be green, and this was instrumental in the initiation of the green library movement (Antonelli, 2008; 'Talloires declaration,' 2015). The first known studies on the subject were in 1991 by The Wilson Library Bulletin magazine that published an article under a section titled 'Libraries and the Environment Articles' (Antonelli, 2008). There is a visible increase in the number of studies published on this subject today. Energy consumption and saving, one of the first things that come to mind in human-environment interaction, have shaped the perception of green libraries. Green libraries have been considered libraries with green buildings for a long time (Aulisio, 2013). Many studies in the literature deal with green libraries only in terms of building (Mikkelsen, 2007; Al & House, 2010; Edwards, 2011; Barnes, 2012). Undoubtedly, green buildings are an essential element of green libraries. The green building approach means exhibiting an environmental-friendly behavior throughout the life cycle of buildings such as construction site, construction activity, building maintenance, renovation, reconstruction (Genovese & Albanese, 2011).

There are standards and certification systems developed for green buildings. LEED (Leadership in Energy and Environmental Design) is a widely used certification system among the standards mentioned earlier. LEED has been used extensively in the development of the survey applied within the scope of this study. Today, there are many libraries with green buildings around the world. Some of them have platinum and gold certificates. Zhengzhou Library from the People's Republic of China (Xuan & Hongyan, 2011), Cesar Chavez Library from the USA (Cesar Chavez library, 2011), Red Deer Public Library from Canada (Frey and Boulton, 2012), Amsterdam from the Netherlands Public Library (Genovese and Albanese, 2011) and Delft University of Technology Library (Velazquez, 2012), Anna Centenary Library from India (Michler, 2012), Singapore National Library (National Library Building, 2018) can be given as existing examples. The concept of a green library is not just about building. The concept of green library emerges as a concept that has begun to be examined with different dimensions beyond the building based on relevant literature available on this topic. Mulford and Himmel (2010) discussed green libraries under six main headings, which are mostly related to buildings, but also refer to elements outside the building: Sustainable construction site/location, water efficiency, energy-saving, sustainable materials and resources, indoor air quality, innovations in applications and design. Sustainable site/locations are related to the library building's site selection, location, and arrangement. It is related to choosing areas unsuitable for agriculture/greening during the construction phase, positioning the building to make optimum use of sunlight and natural ventilation, and being suitable for public transportation. Water conservations are related to the monitoring of water consumption, prevention of leaks if any. It is associated with the use of water-saving installations and systems that allow gray water and rainwater. Energy-saving includes elements such as the use of renewable energy sources, the preference of energy-saving lighting, the use of motion-sensitive sensors, the choice of double-glazed windows, and measures to save energy. Sustainable resources and materials include such as the suitability or sustainability of materials, tools, and equipment. Waste management provides recycling, reusability, separation of solid wastes, donation of the sorted collection, avoiding the use of plastic, taking measures against paper waste, refilling toner cartridges, and paying attention to local purchasing. Indoor air quality includes using the natural ventilation method, controlling the temperature manually, regularly maintaining the heating-cooling-ventilation system, using ecological cleaning materials, and creating large and empty spaces in the library. Under the element of innovations in applications and design, features such as having collections on environmental issues and organizing awareness-raising activities are emphasized.

Aulisio (2013) pointed out that being green is more than just a building and mentions the duties and responsibilities of libraries in academic institutions. It advocates for the library's leadership in activities that will increase the environmental awareness of staff, students, and academics on campus. Kurbanoglu and Boustany (2014), in their article, described the concept of the green library as green buildings and green information systems, and also green office applications (using less plastic, reducing paper use, setting up printers for two-sided printouts, sorting

recyclable waste), green library services (seeds, garden tools, lending watt-meters, organic farming, training on environmentally friendly life).

However, literature is scarce on sustainability in libraries in India, and environmentally sustainable practices in libraries are mainly unexplored. In the context of Indian Libraries, most studies and articles reveal only theoretical explanations as green library definition and greening library (Parabhoi and Meher, 2017). Chaudhuri (2016), in his research, has suggested multidisciplinary green principles to achieve sustainability for Indian libraries. Very less studies focused on library sustainability action plans or working agendas in Indian libraries (Datta and Chaudhuri, 2018). The shortage of studies on sustainability in libraries created the platform of this study.

Statement of the Problem:

Going green and environmentally friendly or sustainable libraries are serious issues requiring immediate attention, planning, and action; the time and chance are right for librarians to help communities become green and sustainable and take a leading role in environmental protection (Boyden and Weiner, 2000; Fourie, 2012; Miller, 2010). The above literature demonstrates the importance of sustainability awareness, environmental consciousness, and the efforts and actions of library staff. Leadership requires an innovative set of competencies and great motivation to handle the changing shape of libraries. Leaders have to play a significant role in the transformation period of libraries (Aslam, 2018; Brown et al., 2015). However, as Aslam (2018) observed, these emerging trends and issues worldwide are affecting library leadership. I hope that this explorative study will shed light on this area of research and open new vistas for research in the environmental sustainability of libraries. Setting the goals for this study firstly come some questions in mind like do the libraries take environmentally sustainable programs and initiatives are incorporating into their operations and services?

Objectives:

This study aims to identify which practices are implemented in mainly building design features, water conservation, energy efficiency/conservation, waste management, sustainable collection development, and sustainable technology in central universities' libraries of Uttar Pradesh.

Scope and Limitations of the study:

The study focuses on identifying the environmentally sustainable practices have implemented in the central universities' library of Uttar Pradesh. This study was carried out within the library staff of four central universities of Uttar Pradesh, and the respondents hold university librarians, deputy librarians, and assistant librarians. This study was restricted to only four central universities' libraries of Uttar Pradesh as a case study.

Methodology:

Research Design: This study adopted a descriptive survey method to identify the environmentally sustainable practices within the libraries. Study data were collected from university librarians to assistant librarians of central universities' libraries within Uttar Pradesh.

The study population: The study population consists of 30 library staff (University librarian to Assistant librarian) from the four selected central universities. A structured questionnaire was sent to all 30 via online and print form. Out of these 30 questionnaires, 22 were returned, giving a response rate of (73.3%). The total distribution of the study population along with their respective universities is as demonstrated in table 1 below:

Table1: Distribution of the study population

S. No.	Name of the University	Total No. of Selected staffs	No. of Respondents
1.	Banaras Hindu University	15	12
2.	University of Allahabad	2	1
3.	Babasaheb Bhimrao Ambedkar University	4	3
4.	Aligarh Muslim University	9	6
Total		30	22

Sample and Sampling Technique: The entire population of the study was only four central universities' library staffs (who are holding the posts of university librarians to the assistant librarians) that were used as the sample for the analysis. This research study has chosen the purposive sampling technique.

Research Instrument: A structured close-ended questionnaire was designed as a survey instrument. The questionnaire has consisted of mainly six sections; viz 1. Building design features. 2. Water conservation. 3. Energy efficiency/conservation. 4. Waste management. 5. Sustainable collection development. 6. Sustainable technology. From an in-depth literature review on the topic selected the questions for each section. Further, a discussion was carried out with the supervisor to ensure the validity and appropriateness of the questions to be included in the questionnaire.

Method of Data analysis: Collected data from the respondents were tabulated, and a simple percentage analysis was employed to conduct data analysis.

Data Analysis and Discussion of Results:

Libraries' Approaches: Environmentally sustainable (green) approaches of central universities' libraries in Uttar Pradesh have been studied under six sections; building design features, water conservation, energy efficiency/conservation, waste management, sustainable collection development, sustainable technology.

Table 2: Practices Implemented Within the Scope of Building Design Features

Building Design Features	Responses		
	Agree	Neutral	Disagree
1. Use of glass as a facilitator of natural light	19 (86.36%)	3 (13.63%)	0
2. Use of insulated and tinted glass to filter heat gain	12 (54.54%)	10 (45.45%)	0
3. Openings at the eastern and southern side	20 (90.90%)	2 (9.09%)	0
4. Adequate manual shading (Awning)	12 (54.54%)	10 (45.45%)	0
5. Retrofitting the existing roofs with cool roof technology	18 (81.81%)	4 (18.18%)	0
6. Roof with reflective tile/asbestos	4 (18.18%)	14 (63.63%)	4 (18.18%)
7. Special walls for temperature control (Thick wall, Double wall, cavity wall, composite wall)	22 (100%)	0	0
8. Availability of wheelchair	5 (22.72%)	12 (54.54%)	5 (22.72%)
9. Ramp with handrails on at least one side	22 (100%)	0	0
10. Visual warning signage in common and exterior areas	17 (77.27%)	5 (22.72%)	0

From Table 2, approximately (86.36%) respondents agreed on using glass as a facilitator of natural light. Similarly, the majority of respondents agreed on the features like openings at the eastern and southern side (90.90%), use of insulated and tinted glass to filter heat gain (54.54%), adequate manual shading (Awning) (54.54%), retrofitting the existing roofs with cool roof technology (81.81%), special walls for temperature control (Thick wall, Double wall, cavity wall, composite wall) (100%), ramp with handrails on at least one side (100%), visual warning signage in common and exterior areas (77.27%). These features are directly connected with the environmentally sustainable building design of the library.

Table 3: Practices Implemented Within the Scope of Water Conservation

Water Conservation	Responses		
	Agree	Neutral	Disagree
1. Monitoring facilities for Water consumption	12 (54.54%)	10 (45.45%)	0
2. Installations of Rainwater harvesting systems	16	6	0

	(72.72%)	(27.27%)	
3. Usage of rainwater	9 (40.90%)	13 (59.09%)	0
4. Installation of the water reuse system	5 (22.72%)	17 (77.27%)	0
5. Efficient plumbing system	21 (95.45%)	1 (4.54%)	0
6. Use of sprinklers	22 (100%)	0	0
7. Water-free urinals (No-flush urinals / Zero flush urinals / Waterless urinals /air-based flushing system these save water used in the toilet)	8 (36.36%)	13 (59.09%)	1 (4.54%)

Table 3 reveals that the majority of respondents agreed on water conservation practices like monitoring facilities for Water consumption (54.54%), installations of rainwater harvesting systems (72.72%), efficient plumbing systems (95.45%), and use of sprinklers (100%). Respondents remained largely neutral on practices like usage of rainwater (59.09%), installation of the water reuse system (77.27%), water-free urinals (No-flush urinals / Zero flush urinals / Waterless urinals /air-based flushing system these save water used in the toilet) (59.09%).

Table 4: Practices Implemented Within the Scope of Energy Efficiency/ Conservation

Energy Efficiency/ Conservation	Responses		
	Agree	Neutral	Disagree
1. Installation of an automatic switching system in the stack room for infrequent visits	13 (59.09%)	4 (18.18%)	5 (22.72%)
2. Utilization of natural light with the installation of lighting controlled by sensors as well as the use of glass panes in windows	18 (81.81%)	4 (18.18%)	0
3. Usage of artificial lighting (fluorescent light) with high energy efficiency	15 (68.18%)	5 (22.72%)	2 (9.09%)
4. Utilizing renewable energy resources (e.g., solar energy, wind energy, geothermal power, bio-energy, etc.)	13 (59.09%)	9 (40.90%)	0
5. Provision of On-site energy generation mechanism (Solar panel, Biogas, Wind-power, etc.) for the library building's electricity supply.	18 (81.81%)	4 (18.18%)	0
6. Attention to purchasing energy-efficient gadgets	13 (59.09%)	9 (40.90%)	0
7. Usage of necessary measures to reduce the emission of Carbon dioxide	12 (54.54%)	5 (22.72%)	5 (22.72%)
8. Excessive use of Ozone-depleting substances (e.g., air-	15	2	5

conditioners, refrigerators, cleaning products, etc.) is prohibited to protect the Ozone layer.	(68.18%)	(9.09%)	(22.72%)
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Table 4 shows that most practices have been categorized under energy efficiency/conservation implemented in the libraries. Most of the respondents demonstrated their agreeableness on the practices like installation of an automatic switching system in the stack room for infrequent visits (59.09%), utilization of natural light with the installation of lighting controlled by sensors as well as the use of glass pan in windows (81.81%), usage of artificial lighting (fluorescent light) with high energy efficiency (68.18%), utilizing renewable energy resources (e.g., solar energy, wind energy, geothermal power, bio-energy, etc.) (59.09%), provision of On-site energy generation mechanism (Solar panel, Biogas, Wind-power, etc.) for the library building's electricity supply (81.81%), attention to purchasing energy-efficient gadgets (59.09%), usage of necessary measures to reduce the emission of carbon dioxide (54.54%), excessive use of Ozone-depleting substances (e.g., air-conditioners, refrigerators, cleaning products, etc.) is prohibited to protect the Ozone layer (68.18%).

Table 5: Practices Implemented Within the Scope of Waste Management

Waste Management	Responses		
	Agree	Neutral	Disagree
1. Bins are available, accessible, and used by both users and staff.	22 (100%)	0	0
2. Library sells or donates weeded reading materials or printed collections.	13 (59.09%)	9 (40.90%)	4 (18.18%)
3. In house recycling of garbage	5 (22.72%)	12 (54.54%)	5 (22.72%)
4. Prohibit usage of plastic (e.g., plastic cups, plastic bags, etc.)	10 (45.45%)	12 (54.54%)	0
5. Precautions are taken against the wastage of papers.	17 (77.27%)	5 (22.72%)	0
6. Old electronic devices and equipment are repaired and reused.	18 (81.81%)	4 (18.18%)	0
7. Purchase of electronic products from companies that provide after-sales service and maintenance as well as the disposal of the product with a buyback policy	12 (54.54%)	10 (45.45%)	0

Table 5 shows that libraries implemented some waste management practices to strengthen environmental sustainability. The majority of respondents agreed on the techniques like bins are

available, accessible, and used by both users and staff (100%), library sells or donates weeded reading materials or printed collections (59.09%), precautions are taken against the wastage of papers (77.27%), old electronic devices and equipment are repaired and reused (81.81%), purchase of electronic products from companies that provide after-sales service and maintenance as well as the disposal of the product with a buyback policy (54.54%). However, the majority of respondents remained neutral on in-house recycling of garbage (54.54%), prohibit usage of plastic (e.g., plastic cups, plastic bags, etc.) (54.54%).

Table 6: Practices Implemented Within the Scope of Sustainable Collection Development

Sustainable Collection Development	Responses		
	Agree	Neutral	Disagree
1. Prefer hybrid acquisition (print material such as books and magazines and electronic material such as downloadable audiobooks, e-journals, e-books, etc.)	18 (81.81%)	0	4 (18.18%)
2. Selection of material that users mainly use.	19 (86.36%)	3 (13.63%)	0
3. Subscription of other institutional membership to use their rich resources	7 (31.81%)	9 (40.90%)	6 (27.27%)
4. Special collection development (e-resources, audio-visual materials, books, magazines, etc.) to help users in preparations for their prospective professional career	13 (59.09%)	9 (40.90%)	0
5. Collection development policies (e.g., e-resources and print resources) in terms of environmental sustainability	15 (68.18%)	7 (31.81%)	0
6. Selection of Government-funded research databases (DOAJ, ERIC, etc.), e-content, and consortia (INDEST-AICTE, UGC INFONET, etc.)	22 (100%)	0	0
7. Digitization of unique or special reading materials	15 (68.18%)	4 (18.18%)	3 (13.63%)
8. The library considers the increasing Digitization of the storage process.	16 (72.72%)	6 (27.27%)	0
9. The library attempts to balance print, electronic and online resources without unnecessary duplication.	22 (100%)	0	0

Table 6 reveals that sustainable collection development practices are seriously taken within the libraries. The majority of respondents agreed on practices like prefer hybrid acquisition (print

material such as books and magazines as well as electronic material such as downloadable audiobooks, e-journals, e-books, etc.) (81.81%), selection of material that is mainly used by users (86.36%), special collection development (e-resources, audio-visual materials, books, magazines, etc.) to help users in preparations for their prospective professional career (59.09%), collection development policies (e.g., e-resources and print resources) in terms of environmental sustainability (68.18%), selection of Government-funded research databases (DOAJ, ERIC, etc.), e-content, and consortia (INDEST-AICTE, UGC INFONET, etc.) (100%), Digitization of unique or special reading materials (68.18%), the library considers the increasing Digitization of the storage process (72.72%), the library attempts to balance print, electronic and online resources without unnecessary duplication (100%). However, on the subscription of other institutional membership to use their rich resources, respondents remained neutral (40.90%).

Table 7: Practices Implemented Within the Scope of Sustainable Technology

Sustainable Technology	Responses		
	Agree	Neutral	Disagree
1. Shifting computing from local equipment to cloud services to gain significant energy saving	13 (59.09%)	4 (18.18%)	5 (22.72%)
2. Using server equipment rated for lower energy consumption	22 (100%)	0	0
3. Using smaller-profile desktop computers for user access	6 (27.27%)	10 (45.45%)	6 (27.27%)
4. Using innovative telecommuting tools such as instant messaging, video conferencing, and other workflow tools	17 (77.27%)	0	5 (22.72%)
5. Enabling teleworking for reducing transportation emissions	18 (81.81%)	4 (18.18%)	0
6. Usage of open-source software products (such as moodle for virtual learning environments and DSpace and EPrints for institutional repositories)	22 (100%)	0	0

Table 7 shows that the majority of the respondents agreed on the practices under sustainable technology like shifting computing from local equipment to cloud services to gain significant energy saving (59.09%), using server equipment rated for lower energy consumption (100%), using innovative telecommuting tools such as instant messaging, video conferencing, and other workflow tools (77.27%), enabling teleworking for reducing transportation emissions (81.81%), usage of open-source software products (such as moodle for virtual learning environments, and DSpace and EPrints for institutional repositories) (100%). Respondents remained neutral on practice using smaller-profile desktop computers for user access (45.45%).

Conclusions:

Adverse effects of human activities on the environment are increasing gradually day by day. Therefore, the importance of environmental sustainability concepts with sustainable development and minimizing damage to the environment is necessary as the future of humanity and our mother earth. Today many institutions, including libraries, are committed to reducing environmental damage. Attainment of this commitment and reducing the ecological impact of libraries, "The Green Library Movement" has started to spread rapidly environmentally sustainable practices worldwide. Academic libraries are trying to implement or implemented to determine environmentally sustainable (green) practices in our country. The findings of this study are partly related to the environmental sustainability of our academic libraries. Results reveal that the central universities' libraries of Uttar Pradesh have implemented some environmentally sustainable (green) practices in terms of building design features, water conservation, energy efficiency/conservation, waste management, sustainable collection development, and sustainable technology. Some practices remained untouched by the libraries, which results in working more in the context of sustainable or green practices. It shows a lack of support and reward by professionals associations. In the light of findings, try to present some recommendations. Firstly, libraries should provide information and awareness-raising activities on environmentally sustainable (green) practices. There should be a training program for library staff to be prepared for library-specific sustainable services and carbon footprint measurement. There should be a provision for reward on environmentally sustainable (green) practices by professional associations and institutions, i.e., it can play an encouraging role in the spread of environmentally sustainable (green) libraries.

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