Libraries as Agents of Climate Change Literacy

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Abstract:

Climate change literacy can be defined as one's ability to find, understand, and use information and services to make decisions about the environment. In today's knowledge driven economy, citizens face many more challenges navigating the current information landscape than in the past, emphasizing the need to be information literate. For decades librarians have been uniquely positioned to serve the citizens from all age and educational backgrounds. Now it is an opportune time for libraries to communicate the climate change information produced by governmental and nonprofit agencies to ordinary citizens. This paper will investigate the impact that libraries can have on citizens' climate change literacy by drawing upon two analytical frameworks: leverage points and environmental health literacy.

Keywords: Climate Change Literacy, Sustainability, Mindfulness, Leverage Points, Environmental Health Literacy.

Introduction

Climate change is defined as a change in historic climate patterns; this includes average seasonal temperatures and rates of precipitation. Scientists have documented a warming trend since 1880 (Christopherson and Birkeland, 2018: 294). Global average temperature and carbon dioxide levels are increasing rapidly since 1980s according to data from National Center for Atmospheric Research. Reducing greenhouse gas (GHG) emissions is one of the targets in fight to climate change. The Paris Climate Agreement (The Paris 2021), drafted in 2015, provides a broad framework for reducing greenhouse gas emissions based upon voluntary commitments by the world's nations. This landmark agreement committed the world to "limiting temperature increases to 1.5 degrees Celsius" above pre-industrial levels while the goal is really 2 degrees

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The Paris Climate Agreement is the first document which acknowledges the connection between sustainable development and climate change. United Nations Framework Sustainable Development Goals further examined the linkages between climate change and the economic, environmental, and social development.

The 2030 Agenda for Sustainable Development includes a set of 17 sustainable development goals (SDG) with 169 specific targets (United Nations, 2021). The purpose of these SDGs is to encourage every individual to take immediate transformative action towards a sustainable future. Climate change presents a series of challenges such as water scarcity, food crises, and extreme weather events. While global action is essential, local action is also crucial. Local action depends upon access to local knowledge and information resources about environmental sustainability and the roles communities can play. Libraries play a vital role in the health of our communities (Aytac, 2019). This paper investigates the impact that libraries can have on climate change literacy, by drawing upon two additional analytical frameworks: leverage points and environmental health literacy.

Climate Change Literacy

Climate change literacy can be defined as one's ability to find, understand, and use information and services to make decisions about the environment. Achieving the goal of *climate change literacy* is a huge challenge and requires knowledgeable information professionals to enable transformative change in sustainable development within libraries and the communities they serve. For instance, the International Federation of Library Association's (IFLA) has called for more environmentally friendly libraries and argued that now is an opportunistic time for libraries to transform themselves into environmental change agents (IFLA, 2022). The American Library Association (ALA) created the ALA Special Task Force on Sustainability in 2017 in response to IFLA's goal. That Task Force came forward with three core recommendations: a) how the Association may provide leadership and serve as a model for sustainability practices more broadly in the profession, b) how the Association may provide leadership in the adoption of sustainability practices in libraries c) How libraries may provide leadership and serve as a model for sustainability in the communities they serve.

In today's knowledge driven economy, citizens face many more challenges navigating the current information landscape than in the past, emphasizing the need to be information literate. The ever-increasing volume of digital materials and information confronting citizens is forcing a paradigm shift in education and learning.

The integration of climate change literacy provides libraries and citizens with a much-needed toolset to act effectively in this context. Being information literate is more important than ever to build resilience in the post COVID-19 global pandemic. The public is under a constant barrage of information competing for influence through both traditional and social media, and information consumers must know how to evaluate their sources effectively in order to succeed in their studies, work places, and as productive citizens. Climate change has complex scientific dimensions and policy implications which makes it difficult to be comprehended by an ordinary citizen. Libraries would play an agent role to orient ordinary citizens towards more educated

life style decisions. Modern literacy and promoting reading books is an essential aspect for promoting environmental literacy.

Library professionals belong to communities small and large which have made them agents for change in many spheres over the last century. This is an opportune time for librarians to play a role in tackling and mitigating the climate crisis. Libraries should participate in the transition to responsible communities towards no poverty and zero hunger.
To meet this need, the ALA also proposed launching a library certification program similar to the New York Library Association's (NYLA) Sustainable Library Certification. Library associations however, have yet to implement continuing education training for library and archives professionals who wish to local sustainability initiatives such as those foreseen by ALA or NYLA.

We are facing urging crisis. The most critical question is: How to facilitate climate change literacy to reduce carbon emission? Libraries are an effective organization for motivating such behavior because participation in library programs is voluntary, libraries provide high quality information, and libraries support freedom of speech. Patrons are free to use libraries to learn from and share with each other as best serves their individual needs.

In addition to providing high quality information, libraries can also help patrons to choose mental models that make learning and taking action more efficient. Perhaps application of system thinking, such as analytical framework for analyzing life cycle carbon emissions, may help librarians to intervene in the system and help citizens to reduce their carbon emission individually.

Ordinary citizens would also want to learn how to lessen their personal impact on the environment being a sustainable traveler, using clean energy, shopping, or switching to a diet more sustainable. Sustainable and healthy food ingredients such as lentils and mushrooms. Libraries may also distribute recipes for green lentils, mushroom, okra, and most importantly locally grown food. Sustainable diets can contribute to reducing greenhouse gas emissions by eating healthy diet.

According to the recent library science literature, librarian have examined their business operations and explored ways to reduce their carbon foot print by reorganizing their library services. Particularly, Singh and Mishra (2014) focused on the libraries' carbon foot print and focused on the carbon cost of library printing services in a college library setting. In a same vein, Truitt (2009) discussed the carbon footprint of library cooperative services such as cataloging and classification of resources.

National and international library cooperative services such Library of Congress and Online Computer Library Center assisted to reduce carbon foot print of these technical services for decades. Furthermore, he focused on the carbon foot print of national and international library science related conferences and presented suggestions to reduce those in order to decrease carbon footprint of librarians. In an earlier study, Chowdhury (2010) investigated all the resources libraries provide such as books periodicals. Based on her analysis, printing and copying knowledge pieces from these had have larger carbon footprint in the library context. She also compared and contrasted print versus online resources in terms of leaving large carbon footprint. Her research was very timely and guided many policy changes in academic institutions. For instance, college libraries included carbon foot print count as an item in their cost and benefit analysis.

Nowadays, most of the academic libraries would purchase electronic books in lieu of print books and also provide article or book chapter request as a digital copy in order to be carbon cautious. Perhaps an easier way of assessing an individuals' or an institutions carbon footprint is use of a carbon footprint calculator. For instance, EPA's Household Carbon Footprint Calculator can be used to calculate anyone's carbon footprint[i]. The library and information science literature didn't reveal any example of if any type of a library every utilized a CF calculators.

Adapting to environmental consequences of climate change will require collaborative action which involves every stakeholder, particularly libraries. Libraries are perfectly suited for this task with their long and successful history of bringing together diverse citizens under one roof. Librarians have a deep understanding of the gap between ordinary citizens and complex earth and atmospheric science information.

For decades' librarians uniquely positioned to serve the citizens from all age and educational backgrounds. Now it is an opportune time for libraries to convey the climate change information produced by governmental and nonprofit agencies into effective public health knowledge. A healthy environment is one of the top necessities of a healthy community. Another important necessity is to equip citizens with knowledge and resources to successfully adapt to climate change and learn more about mitigation strategies. Libraries can help to reconnect people with nature in order to participate to this transformational change.

Leverage Points

The impact that libraries can have on citizens' climate change literacy can be investigated by drawing upon two analytical frameworks: these are leverage points and environmental health literacy. Dr. Meadows' leverage points briefly presents the key points where we can intervene in any system (1999). This is also known as system thinking in information system research as a research discipline. A system could be as small as recycling system in a residential home. Twelve advantage points in any given system are: Constants, Parameters, Numbers, Sizes of buffers and other stocks, Strength of negative feedback loops, Positive Feedback Loops, Information Flows, Rules of the System, Changing system structures, Goals of the System, and Paradigm.

This mind set can help us to examine library as a system by focusing on individual advantage points by intervening into single nodes. For instance, the goals of the library system (intent) is keeping communities connected to knowledge; therefore, we have to flag the gaps in services and education related to climate change literacy.

Another salient leverage point is to "access to Information (deep leverage point/design)" and libraries have been dedicated themselves to this notion. Therefore, this leverage point would be a powerful leverage point to intervene the library system. Institutional knowledge and how this produced and shared among the different units can be seen as a powerful leverage point to intervene a library system. This is particularly valid point since libraries are the central unit of where and how the knowledge distributed in communities. The challenge is to identify key leverage points within communities and library programming to maximize the intended local changes towards a climate change literate community.

IPCC (2007) report underlined that "frequency and severity" of extreme climate events will have a significant impact on food production and food security. This may disproportionately affect the vulnerable and poor countries. In a similar vein, Siegner (2019) explores places where alternatives to the dominant food system are being advanced, and investigates how such alternatives could be scaled up, better supported, or reinforced through food systems education. For instance, this can be further examined in a typical library system as a leverage point to intervene the library system. Libraries may present a variety of programs to address IPCC's concerns related to food insecurities. Such programs may educate the ordinary citizens from first hand and would help to construct a sustainable society.

Libraries may contribute to aforementioned climate change crisis by focusing on the lack of climate change literacy among citizens. Meadows (1999) provides a useful framework for understanding and strategically using various leverage points within a library system and services. Some examples of Climate Change Adaptation within Library System such as food supply related targets can be seen from Table 1 with corresponding SDGs and targets.

Examples of Climate Change Adaptation within Library System

Academic Library

UN SDGs	Food (Goal 1,2,15)
Target	Food Supply
Goal	Gardening Education
TBL	Saving money, saving Bee's, Wellbeing of citizens
Program Plan	Gardening 101 LibGuide

Public Library

UN SDGs	Food (Goal 1,2,15)
Target	Food Supply
Goal	Gardening Education
TBL	Saving money, saving Bee's, Wellbeing of citizens
Program Plan	Seed Library/Gardening Program

School Library K-6

UN SDGs	Food (Goal 1,2,15)
Target	Food Supply
Goal	what is Gardening
TBL	Saving money, saving Bee's, Wellbeing of citizens
Lesson Plan	How to Grow Seeds?

Table 1. Examples of Climate Change Adaptation within Library System

Mindfulness is another effective leverage points for all communities. According to Kabat-Zin (2003), "mindfulness is awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally." He identified three concepts of mindfulness related to contemplative pedagogy: (1) paying attention on purpose, (2) being present in the moment, and, (3) being non-judgmental. Mindfulness has been practiced for centuries by different cultures and disciplines and entered the field of education as contemplative pedagogy.

Gaelle Desbordes of Harvard (Powell, 2018) studied meditation's effects on the brain by performing functional magnetic resonance imaging (FMRI) scans before and after mindfulness-based cognitive therapy. She found FMRI scans conducted as a part of the experiment "detected changes in the subjects' brain activation patterns from the beginning to the end of the study," (Powell, 2018, p. 2). Harvard Law Library created the "Harvard Law School Mindfulness Society," to facilitate gentle yoga and mindful practice in silence (Simmons and Courtney, 2016).

For nearly three years we have witnessed, and are still coping with, a devastating pandemic. In this environment communities find themselves focused more than ever before on supporting the mental and emotional well-being of citizens. Practicing mindfulness techniques such as breathing, stretching, and relaxation has been encouraged by health experts and by public institutions themselves.

Some fundamental mindfulness techniques such as mindful stretching and breathing can be used in any of the climate change related library programs in a library setting. Mindful stretching consists of gentle stretching activities to enhance the awareness of bodily sensations. This is a moment-to-moment awareness of the sensations that arise as one moves their bodies. Mindful stretching can be done during or before the environmental literacy event in any environment. Mindful stretching happens most constructively in contexts that provide the participants with a point of reference, which generates a sense of 'marvel' or epiphany. Mindful breathing allows users to engage briefly in a mindful moment, thus, helping them to refocus their attention to the present moment. It is an experience of relaxing the body, relaxing the mind, and awakening the spirit by deepening the consciousness. Mindful breathing enables relaxation and entrance into a mindful state where a deeper understanding of health literacy content can be facilitated. Mindfulness is a simple and sustainable strategy that can be used for high impact environmental health literacy (Aytac and Mizrachi 2022).

Environmental Health Literacy Framework

Environmental health literacy is a framework in order to conceptualize how people facilitate climate science information towards their health and well-being. The core content of this framework to visualize the climate change knowledge to community change. In her recent work, Gray (2018) presents three environmental health literacy dimensions: (1) awareness and knowledge, (2) skills self-efficacy, (3) and community change.

The first dimension of Gray's environmental health literacy incorporates awareness and knowledge. This can be simply understanding of why using fossil fuels cause climate change and all the related health consequences. Awareness and knowledge also requires understanding the climate change mitigation and adaptation strategies that related to most of the government and non-profit community programs. The second dimension refers to actions that individuals can take that help them feel empowered. Examples of the second dimension may include growing your own food, changing the type of energy toward clean energy sources, using carbon

foot print simulation tools to comprehend one's carbon footprint, and adopting net zero carbon emission goals. The third dimension of Grays's knits together members of the community so they can achieve even more by working together on collaborative endeavors. This includes coastal adaptation simulations sponsored by local libraries, transit-oriented developments using local governments that strengthen walkable cities.

Davis (2019) employed multiple data collection techniques such focused groups and interviews to contextualize Gray's three environmental health literacy framework. She has presented multiple knowledge concepts related to environmental sustainability and climate change to examine the framework in depth. In addition to these data collection techniques, case studies, storytelling, and role-play simulations can be utilized as well. Storytelling is a powerful strategy to deliver an important message such as climate change and its implications.

Possible augmentation of Gray's three environmental health literacy into a typical library system can be seen in the table 2. Librarians may facilitate library guides, online or in-house exhibitions to spread the knowledge and understanding of climate change. They can collaborate with government officials to promote lectures and panels on climate change mitigation and adaptation strategies. Communicating climate change would need support of librarians who are trusted public servant communities.

Libraries as a System
Library and Information Services (LIS)

Dimensions	Area of Focus	Gray's Env. Health Literacy
Web-Based LIS	LibGuides	Awareness and Knowledge
	Online Exhibitions	Awareness and Knowledge
In-Library Education	Gardening/Garden Club	skills self-efficacy
	Composting	skills self-efficacy
	Seed Library	skills self-efficacy
TownHall Meetings (Guest Speakers)	Climate Change	awareness and knowledge
	Alternative Energy	awareness and knowledge
In-Library Exhibitions	Net Zero Energy	awareness and knowledge
	Sea Level Rise	awareness and knowledge
	Carbon foot print simulator	awareness and knowledge
Re-structuring Library	Bike Rock	community change
	Walkable neighborhood	community change
	Walk to the library from…	community change
Collaborating with LIPA/etc Town/	Energy Usage	awareness and knowledge
	Waste Management	awareness and knowledge

Table 2. Application of Gray's Environmental Health Literacy Framework into Library System

Conclusion

According to the new report of UNDP (UNDP, 2022) "people's sense of safety and security is at a low in almost every country, including the richest countries, despite years of upwards development success." The report also underlines that, "those benefiting from some of the highest levels of good health, wealth, and education outcomes are reporting even greater anxiety than 10 years ago." The UNDP report calls for "greater solidarity across borders and a new approach to development; one that allows people to live free from want, fear, anxiety and indignity." The core message of this report clearly resonates with the framework we have presented. Mindfulness techniques should be included in the environmental health literacy programs and in the climate change mitigation and adaptation projects.

Library programs may offer opportunities for dynamic citizen engagement around climate change. One of the barriers to facilitate this engagement is the lack of strategies or know how to communicate climate change. Communication of climate change is so challenging (Moser and Dilling, 2011). Deeper understanding of the audience may help identifying the best options to frame an issue. Although raising awareness and discussing an issue does not directly result in behavior change but provides the ground for learning for communication on climate change. IPCC communication handbook (Corner et al. 2018) provides a variety of case specific examples to communicate climate science. Libraries can also foster public engagement with climate change knowledge since they have a deeper understanding of the audience.

Acknowledgments

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[i] https://www3.epa.gov/carbon-footprint-calculator/