Going Green!
A Case Study Approach Examining Green and Environmental Conservation Practices in School Nutrition Programs

National Food Service Management Institute
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National Food Service Management Institute
The University of Mississippi

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The purpose of the National Food Service Management Institute is to improve the operation of child nutrition programs through research, education and training, and information dissemination.

MISSION

The mission of the National Food Service Management Institute is to provide information and services that promote the continuous improvement of child nutrition programs.

VISION

The vision of the National Food Service Management Institute is to be the leader in providing education, research, and resources to promote excellence in child nutrition programs.

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GOING GREEN!
A CASE STUDY APPROACH EXAMINING GREEN AND ENVIRONMENTAL CONSERVATION PRACTICES IN SCHOOL NUTRITION PROGRAMS

EXECUTIVE SUMMARY

The purpose of this research project was to describe green/environmental conservation (GEC) approaches in school nutrition (SN) programs. Research objectives for this study were based on responses and comments provided by a virtual expert panel (correspondence by e-mail) and multiple-case study methods to identify practices, perceptions, and barriers to implementing environmental conservation approaches in SN programs. This project also explored the commonalities relating environmental conservation initiatives in various school settings.

To accomplish research objectives and goals, this research project used a multi-phase descriptive case study method to examine GEC approaches in SN programs. In Phase I, researchers utilized a virtual expert panel of SN professionals to collect information supporting the research objectives that would be used to develop the case study instruments for Phase II of the project. In Phase II, a holistic, multiple-case study design with a literal replication format was used during visits to four school districts in four states, representing four of the seven United States Department of Agriculture (USDA) regions. The first case study site visit served as the pilot to assess the case study process and instruments. Results from the pilot were used to refine the data collection process and instruments for the remaining three site visits. The three subsequent site visits were completed and the data from all four site visits and interviews were analyzed using constant comparison methods to review the interview transcripts, observation reports, and GEC documents and policies provided by stakeholders at each case study site.

The information gathered from Phase I and Phase II of the study unveiled more than 30 GEC practices in SN programs with recycling/waste management being the predominant GEC practice. SN directors and staff served various roles in the implementation and dissemination of GEC practices, including leadership, mentoring, education, and training roles throughout school district. School nutrition programs that had successful, sustainable GEC practices had support from their school's/school district's administrators and school staff and believed that the long-term benefits of their efforts were for the health and wellbeing of the students they served. Lack of funding and school district administration and school staff support were the primary barriers to sustaining SN programs GEC practices. Additional research is needed to examine this phenomena and sustainable GEC practices in SN programs on a national level.

INTRODUCTION

There are many factors driving the environmental conservation movement in school nutrition (SN) programs and school districts. Approximately 55 million children, school administrators, and staff spend their most of the day in K-12 schools. For students attending these schools, SN programs provide meals and snacks to more than 31 million children each day (United States Department of Agriculture [USDA], Food and Nutrition Service [FNS], 2012). The environmental impact of feeding and educating America's children is a major concern for environmentalists and children's advocates (EPA, 2007; EPA 2008; Shaughnessy, 2008; Commission for Environmental Cooperation of North America, 2002). Food is the largest component of discarded waste materials in the United States. More than 25% or 96 billion pounds of food prepared in this country are discarded as food waste, and the nation spends more than 1 billion dollars to dispose of it (EPA, n.d.). Food waste occurs in every sector of the food system, including food production, access and distribution, and consumption (Sobal, Khan, & Bisogni, 1998). Natural resources and human demands also have a profound effect on how the food system functions and how waste is produced. Foodservice operations consume large quantities of both natural gas and electricity, using on average 250,000 British thermal units per square foot and utilizing approximately 2.5 times more energy than other types of businesses (Consortium for Energy Efficiency, 2006). On average, the direct energy consumption of foodservice operations includes 30% for cooking, 19% for refrigeration, and 10% for sanitation. The health-and-environmental cause-effect framework of the foodservice system indicates that the relationship between health and the environment is driven by forces such as food production and consumption; this creates conditions in which health threats are developed or averted (Goldman, 1995). Research indicates that students are more susceptible to environmental

contaminants than adults and are more vulnerable to their effects (Goldman, 1995). Therefore, concerns about the local and global environment and the health and safety of students have motivated many schools to find alternatives to conventional operation methods. Additionally, with increasing rates of energy, food prices, and utilities, school and SN professionals are searching for environmental and economic techniques to reduce both operational costs and the ecological footprint schools and SN programs have on the environment.

"Going Green" has become a phenomenal conservation movement that is broadly defined as the modern day efforts to conserve the environment. Sustainable efforts such as conservation of raw materials, conservation of natural resources, and waste reduction are only a few ways food and nutrition professionals have contributed to creating and sustaining a healthy environment (ADA, 2007). From the restaurant perspective, increased cost of food, materials, or energy efficient equipment will result in an economic investment by attracting more customers by advertising "green" efforts or can be offset by increasing menu prices (National Restaurant Association, 2012). However, in the school setting, SN directors have fixed budgets and relatively finite customer bases, which do not allow them to recoup many major expenses (Hahn, 1997). Therefore, the purpose of this research study is to describe and examine green/environmental conservation (GEC) issues and initiatives in SN settings.

Research Objectives

Research objectives and goals focus on identifying roles, practices, perceptions, and barriers to implementing these approaches in SN programs. These research objectives aim to accomplish the following:

- Describe the extent to which SN professionals are involved in the planning, implementation, and sustainability of GEC practices in schools;

- Examine SN professionals' attitudes/beliefs about their perceived roles in and responsibility for supporting and contributing to GEC efforts in the school nutrition setting and the school district;
- Identify the types of practices, activities/strategies that are being utilized in efforts to adopt GEC into the school environment and identify the venues in which these efforts are occurring (i.e., kitchens, cafeterias/dining areas, classrooms, etc.);
- Identify any policy development, education, and training activities related to GEC that have been implemented for students, school nutrition staff, and other school personnel;
- Investigate allocation of resources (funding, rebates, and other resources) for GEC activities;
- Assess perceived barriers to supporting and contributing to school wellness initiatives and making positive personal lifestyle changes; and
- Identify the barriers to providing GEC practices.

METHODOLOGY

Research Design

To accomplish research objectives and goals, researchers used a multi-phase, descriptive case study method described by Yin (2003) to examine green/environmental conservation (GEC) approaches in school nutrition (SN) programs. Case study methodology is a qualitative approach that has been used to describe the scope and depth of a phenomena in various settings (multiple-phase approach) using specific characteristics (Yin 2003). In Phase I, researchers utilized a virtual expert panel of SN professionals to collect information supporting the research objectives that was then used to develop the case study instruments for Phase II of the project. In Phase II, a holistic, multiple-case study design using a literal replication format was used during visits to four school districts in four states, representing four United States Department of Agriculture (USDA) regions. The multiple-case design allows for the exploration of similarities and differences between and within each case using the case study instruments designed from information gathered in Phase I of this study (Baxter & Jack, 2008; Yin, 2003). The literal replication format was developed based on previous research and analysis of qualitative data to describe the GEC phenomenon in SN programs. The goals of the replication format were to:

- Identify similarities and differences between sustainable GEC practices for SN programs;
- Identify benefits and barriers/challenges of maintaining GEC practices in SN programs, and
- Identify roles of SN directors, SN staff, and school personnel involved in implementing and sustaining GEC practices.

The instruments were then tested during the first case study site visit which served as the pilot to test the case study process. Results from the pilot school site visit were used to refine the data collection process and instruments for the remaining three site visits.

Informed Consent

The researcher for this project followed consent procedures established by the Human Subjects Protection Review Committee at the University of Southern Mississippi. There were no identifying codes used to identify participants from either the expert panel or the site visits in Phase I or Phase II of this study. Expert panel members' and stakeholders' at each case study site agreed to participate in the research activities associated with this project which served as consent.

PHASE I

Virtual Expert Panel

State Agency SN directors representing the seven USDA regions were asked to provide names and contact information for two to three SN directors in their states who had initiated GEC approaches and initiatives in their SN program. From the names provided, SN directors were contacted via an e-mail invitation requesting their participation on a virtual expert panel. The virtual expert panel would participate in a modified Delphi process described by Linstone and Turoff (2002) to collect data relative to the objectives of the study and collect information that would be used to develop the case study data collection instruments for Phase II. The invitation described the purpose of the project, the role of the expert panel, and included the researcher's contact information should questions and concerns related to the study arise. The invitation also included an informed consent statement outlining the details of expert panel

members' participation in the study. A return e-mail from the expert panel candidates agreeing to participate on the virtual panel served as consent.

The modified Delphi process that guided the role of the virtual expert panel included communication between the researcher and expert panel occurred in three rounds. In Round One, a questionnaire containing broad, open-ended questions on GEC issues and approaches in the SN setting was e-mailed as an attachment to each expert panel member. The questionnaire was developed based on the objectives of the study, GEC research, and GEC literature. Panel members were e-mailed instructions to respond to the 16 questions that included two perception questions; two GEC practice questions; three questions related to the roles of SN director, SN/school personnel, and students; two questions on the benefits of GEC, two questions on the barriers/challenges of sustaining GEC practices in SNP, one question on evaluating GEC practices in the SN program) and four demographic questions. Panelists were asked to return the Round One questionnaire by e-mail as an attachment to the researcher within a two week period. A reminder e-mail with the questionnaire as an attachment was sent to panelists who had not responded one week after the questionnaire was sent. Completing the questionnaire took approximately 20 minutes to an hour to complete. All data collected was summarized by the researcher who then created a summary list and more complex questions for the virtual panel participants involved in Round Two of the Delphi process.

In Round Two, expert panel members were asked to review the information summarized from Round One and identify the gaps regarding various GEC practices and sustainability issues and approaches in the SN setting. The summary included 12 questions related to panelists' perceptions and how they defined GEC in SN programs; identified roles of SN directors, SN staff and school personnel; GEC practices in SN programs/schools; benefits and barriers for

implementing and sustaining GEC practices; and a summary of evaluation procedures for GEC practices. Round Two took an estimated 10 to 30 minutes to complete and return to the researcher. Researchers then reviewed the qualitative data collected and thematically coded the information to identify common and contrasting threads, identify potential hosts and case study sites, and used the findings to draft the case study instruments for Phase II.

PHASE II

Case Studies Instruments

The information collected from the virtual expert panel and a review of GEC literature were used to develop the case study instruments that were used for the replication process for each case study site visit in Phase II of the research study. Case study instruments included a structured interview questionnaire (that could be used with the SN director, SN staff, and key GEC stakeholders involved in the GEC practice in the SN program); an observation checklist; and a demographic survey to record pertinent information about the school, SN program, and school personnel/stakeholders actively involved in GEC initiatives at each case study site. The structured interview questions were predicted to take approximately 20 minutes to an hour to complete. The National Food Service Management Institute, Applied Research Division (NFSMI, ARD) researchers/staff and select members of the expert panel evaluated the instruments for the achievement of research objectives, usability, and brevity prior to the pilot site visit. Comments and suggestions provided by reviewers were used to guide the necessary revisions on the case study instruments.

Case Study Site Visits

The researchers used the names and contact information of SN directors who participated as an expert panel member to screen for potential case study candidates. The potential candidates

for the site visits completed a comprehensive telephone interview to determine their interest in participating in Phase II of the research project, discuss the case study parameters, and arrangements for the site visit. The final selection of four case study sites were based on the SN directors' willingness to participate as a host for a site visit, their level of involvement in GEC initiatives in their school(s)/school district, their school(s)/school district's willingness to share GEC policy and/or procedure documents, and their ability to schedule interviews with the SN staff and other involved school personnel. Prior to the initial site visit, the researcher mailed the SN director a follow-up letter describing the case study site visit process (interview observation process), informed consent document for the study, and a list of documents pertinent to the case study research. After hosts received school district approvals to conduct research at the each proposed case study site, the researcher worked with each SN director to outline the agenda for the case study visit.

Green/Environmental Conservation Stakeholders' Interviews and Pilot

Structured interviews, the observation process, and examination of documents and archival records were scheduled to take approximately one day to review at each site visit. The initial site visit served as the pilot to test the case study instruments and protocol (agenda). Results from the pilot site visit were used to refine the data collection instruments and process for the remaining three site visits.

Pilot Study

Approximately one-half day was dedicated to conducting structured interviews with the SN director, SN staff, and other school personnel involved in implementing and sustaining GEC initiatives. Each interview lasted approximately 20 minutes to an hour. The question protocol

included 13 open-ended questions that allowed the respondents to describe the following items:

- Green/environmental conservation practices in their SN program/school;
- Resources used to implement and sustain GEC activities;
- Roles and responsibilities of SN director/staff, school employees, and community stakeholders;
- Benefits and barriers of implementing and sustaining GEC practices; and
- Evaluation procedures and recommendations for sustaining GEC practices and activities in SN programs/schools.

All potential participants included in this study were working adults. An oral informed consent form for structured interviews was provided and read to participants prior to the interviews describing the research study, the voluntary nature of their participation, confidentiality, and contact information for the chair of the Institutional Review Board. Agreement to participate in interviews served as consent. The researcher took notes during each interview using the structured interview questionnaire instrument. Interview notes were typed and given an interview code based on the case study site and role of each interviewee in the school district. All handwritten and typed interview notes were securely stored at the NFSMI, ARD office.

Green/Environmental Conservation Practice Observations

The remaining half-day was dedicated to the observation process and examination of information requested prior to the on-site visit regarding documents and archival records. The researcher used the documentation and observation checklist to confirm characteristics of the school's/school district's GEC initiatives and capture additional roles and operational characteristics. The observation instrument consisted of 19 questions that the researcher could

ask GEC stakeholders about the GEC practice being observed in real time. The researcher only requested and reviewed information from GEC documents and archival records that the school district made publicly available and did not contain sensitive information. The demographic questions on the observation instrument included profile characteristics such as size of school district, geographic location, and free/reduce lunch verification.

Analysis

The researcher examined all raw data using several analytical strategies. School nutrition directors at each case study site were contacted via telephone or e-mail for short, focused, discussions to gather additional data or verify key observations. Data were categorized, tabulated, and cross-checked to address the initial purpose of the study. Thematic coding of key GEC characteristics and data specific to the research objectives were analyzed from the interview notes, observations, and GEC documents for pertinent data. Two NFSMI, ARD researchers conducted cross-comparative analytic techniques to confirm commonalities and differences of GEC initiatives in SN programs for all four case study sites and summarized their findings.

RESULTS

Phase I

Virtual Expert Panel

State agency school nutrition (SN) directors from six United States Department of Agriculture (USDA) regions provided names and contact information to 27 school nutrition directors who were implementing and/or sustaining GEC practices in SN programs for the virtual expert panel. Of the 27 invited to serve on the panel, 18 (66.7%) agreed to participate and completed two rounds of communication about their GEC perceptions and practices in SN program via e-mail. In Round One, panelists (n = 18) completed and returned the questionnaire. Fifteen of the virtual expert panel members were SN directors (83.2%), and the other three participants were a principal (5.6%), a state agency nutrition director (5.6%), and a dietary technician (5.6%). Seventeen (94.4%) of the panelists had more than six years of experience in school settings, with seven of those holding School Nutrition Association (SNA) certification (38.9%), six were registered dietitians (33.3%), and four had the School Nutrition Specialist (SNS) credential (22.2%). Seventeen of the expert panel members worked directly in school districts with twelve panelists serving more than 10,000 to 140,000 students (70.6%) and five (29.4%) served in school districts with less than 9,999 students.

A National Food Service Management Institute, Applied Research Division (NFSMI, ARD) researcher summarized the responses from Round One into primary themes under a category that met a research objective. For Round Two, panelists were asked to confirm their agreement to the categorized themes under each category and provide additional comments and suggestions if gaps were recognized or if panelists had additional insight about GEC practices in SNP. Of the 18 panelists responding in Round One, 13 participants confirmed all of the themes

identified in the Round One summary and provided comments and suggestions on the themes in Round Two and are presented in Table 1for both rounds. The information gathered from the virtual expert panel, was used to develop the structured interview protocol and observation tool for the case study site visits.

Table 1

Round One and Round Two Responses from Virtual Expert Panel Members[a]

Research Objectives/Goals	Primary Themes	Frequency of Responses	Response Summary
Describe or define Green/ Environmental Conservation in School Nutrition Programs	*Cost-Effective Practices*	7	Cost effective practices to reduce, use, and conserve resources (conserve energy, use energy efficient equipment, and conserve water, recycle bottles, plastics, paper, fuel, & metals)
	Conservation Practices	4	School nutrition programs make efforts to minimize the negative impact on the environment or initiate ways to improve the use of available resources
		3	Purchasing locally-grown foods or organic foods
		1	Using “natural” or “real” products
	Education & Training	3	Educating children about food sources; teaching gardening and farming
		2	Teaching children about the importance of protecting the environment
		2	Teaching students about and how to respect the earth/protect the environment
		1	Teaching/training composting

[a]Panelists provided more than one response for each research objective/goal

(Table 1 continues)

(Table 1 continued)

Round One and Round Two Responses from Virtual Expert Panel Members[a]

Research Objectives/Goals	Primary Themes	Frequency of Responses	Response Summary
	Education & Training	6	Educate and become role models to students, staff, and the community
Describe the Role of SN Professionals for Implementing and Sustaining GEC Practices	*Conservation Practices*	5	Being proactive in recycling efforts
		1	Purchase locally-grown products
		1	Purchasing in bulk and limiting the use of individually-wrapped items
		1	Composting
	Leadership	4	Encouraging conservation through purchases, meal preparation, and waste management techniques in the SN department
		3	Take a leadership role in conservation efforts
		3	Duty to preserve the earth/protect the environment
		1	Set policy and procedures
		1	Combine conservation efforts with regulatory requirements
	Cost-Effective Practices	2	Implement cost effective measures to support conservation efforts

[a]Panelists provided more than one response for each research objective/goal

(Table 1 continues)

(Table 1 continued)

Round One and Round Two Responses from Virtual Expert Panel Members[a]

Research Objectives/Goals	Primary Themes	Frequency of Responses	Response Summary
Describe Green/ Environmental Conservation in Schools	*Recycling/Waste Management Practices*	10	Recycle/Waste Reduction Practices (paper, plastic, glass, aluminum, steel cans, paper trays)
		7	Recycle items such as milk jugs/bottles, other plastics, cardboard, #10 cans, aluminum
		4	Collaborate with a company to recycle polystyrene
		3	Use scrap collectors instead of garbage disposals
		4	Implement a waste reduction program to reduce energy use, recycle, compost and/or vermicompost
		2	Use eco-friendly or recyclable serviceware such as cups, plastic, compressed paper trays instead of Styrofoam, and plates (clam shells)
		1	Use metal serviceware instead of plastic serviceware
		1	Use self-service style dining for students – allows students to choose their food items and reduce waste
		1	Leftovers are sent to a community feeding program
		1	Food to Pigs Program (leftovers program)

[a]Panelists provided more than one response for each research objective/goal

(Table 1 continues)

(Table 1 continued)

Round One and Round Two Responses from Virtual Expert Panel Members[a]

Research Objectives/Goals	Primary Themes	Frequency of Responses	Response Summary
Describe Green/ Environmental Conservation in Schools	*Energy Conservation*	7	Implement energy efficient practices (turning off lights, reduce paper use, using less fuel, and turning off equipment that is not in use)
		2	District employed a full-time staff member for energy conservation
		2	Use energy efficient equipment (Energy Star rated) dish machines and pulpers
		2	Use energy-efficient lighting/solar energy, pulpers, & other equipment
		1	Implemented an "Energy Basket" menu day to reduce the use of the dish machines for that day
		1	Developed an Energy Conservation Program/Policy/Resolution
	Education and Training	3	School/class gardens and nutrition education
		1	Increase conservation awareness in schools by use of newsletters, websites, posters, conservation handbook, etc.
		1	Include conservation education as a part of professional development activities

[a]Panelists provided more than one response for each research objective/goal

(Table 1 continues)

(Table 1 continued)

Round One and Round Two Responses from Virtual Expert Panel Members[a]

Research Objectives/Goals	Primary Themes	Frequency of Responses	Response Summary
Describe Green/ Environmental Conservation in Schools	*Purchase and Serve Locally Grown Foods*	2	Farm-to-School Salad Bar/School-grown vegetables for salad bars
		1	Purchase locally grown fruits and/or vegetables
		1	Purchase foods and products with less packaging
	Green Building & Renovations	3	Take part in obtaining LEED certification
		3	Use eco-friendly chemicals
		1	Implementing LEED building standards

[a]Panelists provided more than one response for each research objective/goal

Phase II

Case Study Sites

Pilot Case Study Site/ Case Site A

The pilot case site visit served as an evaluation of the use of the structured interview questions and observation instrument. The instruments served as useful tools to collect qualitative data according to the study's research objectives and goals and were not changed. The success of the pilot and the data collected served as the first case for the study.

General School District/School Nutrition Program Characteristics

The pilot site or Case Site A was a school district in the Southeast region of the United States. The school district was located in a metropolitan city with a population of more than 53,000 residents of which 73.5% are Caucasian/White Americans, 16.4% are African American/Black, and 10.1% of other races and ethnicity with an average income of $29,000 per year per household in 2008. The school district educated more than 6,000 students with an average daily attendance of 98% in 10 schools (seven elementary schools, two middle schools, and one high school) with a free (n = 1481) and reduced rate (n = 342) of 30%.

Green/Environmental Conservation Practices in the School Nutrition Program/School District

Case Site A had implemented and maintained GEC practices for more than five years at the time of the site visit. Initial GEC practices began with an idea from a SN manager to recycle cardboard from food packaging in one of the elementary schools. These efforts were coordinated with the city's recycling plan. The success of the cardboard recycling initiatives led to the exploration of pilot recycling plastic milk containers at the high school. Within one year, the plastic milk container program was expanded to all schools. The SN department obtained a grant from the regional dairy association to evaluate students' participation in the recycling of the milk containers. Over the next four years, the SN director, managers, and staff enlisted the assistance of other school staff and administrators (assistant superintendent, facilities director, and principals) to adopt new practices in school cafeterias. These changes included the purchase and use of combi-ovens, energy efficient lighting and ware washing equipment, composting (one elementary school), and preparing foods without the use of commercial fryers.

Over the next five years, the SN department and school district at Case Site A embarked on developing a recycling program (plastic milk containers and serviceware, paper, aluminum,

and light bulbs); incorporating GEC building and renovations and waste management practices; purchase GEC cleaning products, engaging in locally-grown/farm-to-school initiatives; prepared foods without the use of fryers, and improved IAQ initiatives and an Integrated Pest Management System (IPMS). The Integrated Pest Management System was a comprehensive, preventive maintenance program implemented to prevent and control pests in all school buildings. The process included routine assessments of all school buildings, caulking doors and windows, and maintaining door sweeps and openings. The SN and school staff shared the responsibility for limiting the consumption of food outside of the cafeteria, closing all windows and doors, cleaning the cafeteria and classrooms immediately after student activities, and minimizing clutter, and assessing food waste. Implementing and sharing these practices minimized the use of pesticides to only during school breaks. The school district implemented a Web-based work order system to report and respond immediately to pest-related issues as they arose.

The use of GEC cleaning products was implemented in all school buildings including all SN facilities. The SN department implemented a 'no bleach' policy and adopted the Environmental Protection Agency's (EPA's) School Chemical Cleanout Champaign (SC3), a comprehensive evaluation of chemicals in school buildings that allows the assessment of life cycles, disposal practices, the use of chemicals in school settings and the use of green trademarked items. School nutrition staff participated in in-service training on the proper use of GEC cleaning products in order to successfully adopt the use of GEC products. The school district also incorporated GEC building and renovation concepts in projects that included energy efficient equipment in the cafeterias and GEC construction materials and innovative architectural designs that would conserve energy.

Green/Environmental Conservation Roles and Responsibilities

The sustainability of GEC practices in the SN department and school district was primarily attributed to district-wide, team approach that included community support. The SN director was responsible for serving as the department's administrative liaison to the school district and served on a GEC Team that included the assistant superintendent, the school district's facilities director, and maintenance supervisor. The school district's GEC Team was instrumental in developing GEC policies and procedures that addressed the need to abide by state law to divert 25% of their school district's waste through recycling, sustain other GEC practices, and implement additional initiatives. The SN director was instrumental in training all SN managers and staff, assessing the sustainability of GEC practices at each SN operation, and reporting issues to the school district's facilities director and GEC Team. School nutrition managers worked closely with the SN director to carry out GEC practices at each school site. Managers also assisted with training SN and custodial staff; modeling GEC practices to the principals, other school staff and students; encouraging students to participate in the recycling of serviceware and plastic milk containers, and reporting issues to the maintenance department and SN director as they arose. The SN staff also encouraged students to take part in GEC practices and assisted the custodial staff with recycling practices.

Within the school district, the facilities director was responsible for supervising building supervisors/custodians and conducting routine GEC practice assessments and ensuring that GEC practices were within state and local environmental guidelines for safety in schools. In each school, teachers and principals also served as role models and stakeholders responsible for encouraging students to engage in GEC behaviors and assisting custodial and SN staff with placing recyclables in the correct bins, cutting off lights and equipment when not in use, and

closing doors and windows. Teachers were instrumental with assisting and leading student groups in GEC projects and reporting issues to the school district's GEC Team. Students came up with creative ways to engage the school community and parents to adopt GEC practices and behaviors. Student representatives of student-led groups made GEC posters placed throughout the school district to encourage GEC practices, assisted with the collection of recyclables, and reported issues to teachers and principals who shared the issues with the GEC Team.

Benefits of Green/Environmental Conservation Practices

Recycling of cardboard, #10 cans, and paper and plastics from food packaging, milk containers, and serviceware in the SN department reduced the amount of rubbish in garbage bins. The city picks up all recyclables from school facilities at no charge to the school districts. The change from the use of larger bins to smaller ones led to a cost reduction for garbage pickups and disposal for the school district. The smaller bins also utilized less space which was important for cafeterias and schools with limited space for storage of other items. The SN department's efforts to encourage the recycling of milk containers helped to increase the consumption of milk to 75%. The SN department reduced waste disposal from four dumpsters at three school sites to one dumpster per site. Food waste assessments led to changes in food procurement and cooking procedures to healthful items students accepted to reduce waste. Some produce byproducts were donated to a local farmer. The school district also reduced energy costs and redistributed some of their savings to implement more GEC practices. The GEC Team credits the school district's staff and students' efforts to implement district-wide GEC policies and procedures that followed their state's GEC guidelines for schools and received the Great Start Award for their GEC initiatives.

Barriers to Implementing and Sustaining Green/Environmental Conservation Practices

Adopting GEC practices was problematic for some staff and students. Energy, Indoor Air Quality (IAQ), and Integrated Pest Management System (IPMS) assessment results were used to justify additional behavior modification training to assist staff with changing their perceptions about adopting GEC practices such as eliminating the use of bleach, proper mixing of GEC cleaning products, working with students and school staff to maintain and sustain GEC practices, and gaining a better understanding of the importance of GEC practices. Common issues were students not paying attention to disposal of serviceware and milk containers in the proper bins, the disposal of paper products in the proper bins in classrooms, and cutting off or unplugging equipment when not in use. The GEC Team and school administrators provided consistent communication about the value of GEC practices and applied innovative ways to encourage participation in GEC practices to maintain sustainability of GEC initiatives.

There were barriers for sustaining some GEC practices. The SN department had to discontinue recycling #10 cans because they were unable to clean the cans as required by the city's guidelines for recycling tin items. The SN department's older dining facilities did not have enough storage space for holding recycling cardboard and other recyclables until the city's scheduled recycling pickup time. Another issue was the lack of funding for the implementation and evaluation of the milk container recycling project and the school garden project at an elementary school. Follow-ups of GEC activities in this school district revealed that savings from GEC practices were used to sustain district-wide practices that the GEC Team assessed as manageable to maintain. However, funding resources remained limited, and the school district was exploring ways in which to sustain other GEC practices.

Green/Environmental Conservation Evaluations

The GEC Team was responsible for evaluating the IAQ, the IPMS, energy conservation reports, and reports on issues from the school community that arose that may impede the sustainability of GEC practices. The success and challenges of GEC initiatives were reported to the school district board, school district administrator, the director of each department, and leaders of student and Parent and Teacher Association organizations to encourage adoption and behaviors to sustain GEC practices. Finding effective ways to quantify the successful implementation and sustainability of GEC initiatives remain problematic for the GEC Team. However, the team has found some successful assessment and sustainability strategies by communicating with other school districts and enlisting assistance from the local university to learn effective ways of implementing and sustaining success GEC practices, and shared their success with other school districts and the state officials.

Case Site B

General School District/SN Program Characteristics

Case Site B was a school district in the Mountain Plains region of the United States. The school district is one of four public school districts that serves students in two metropolitan cities (n = 101, 904); one of which is the seventh largest city in the state. The residents of these two cities are primarily Caucasian/White Americans (94.5%), and 5.5% are of other races and ethnicity with an average income of $63,000 per year per household in 2008. The school district has an enrollment of more than 17,887 students, and its SN program serves more than 14,000 meals at breakfast and lunch per day in 24 schools (15 elementary schools, four middle schools, and five high schools) with a free (n = 2,078) and reduced rate (n = 795) of 16% of the total enrollment.

Green/Environmental Conservation Practices in the SN Program/School District

The school district in Case Site B implemented three primary GEC practices: recycling, an IPMS, and the purchasing and use of green cleaning products according to their state's green cleaning guidelines and specifications for schools. For the SN department, recycling and use of green products to clean and sanitize food preparation and dining areas were the most exercised GEC practices. Recycling in SN operations has been sustainable for 10-15 years. School nutrition managers and staff recycled paper, cardboard, and print cartridges, and reduced the use of Styrofoam as the primary disposable for the department. Along with the school district, the SN department took part in the single-stream recycling efforts that were implemented a year prior to this study. Single-stream recycling allows a client to collect all recyclables without separating items. The items are then collected by a recycling company which is responsible for separating recyclable items before processing. Items collected in the school district include paper, approved plastics, cardboard, aluminum, and light bulbs. Because recycling efforts became a normal behavior for the entire school community, the school district paid for the single-stream recycling service. Another GEC practice implemented by the SN department was recycling disposable polystyrene trays. Through a grant from a polystyrene vendor, an SN manager and her staff at one school were able to recycle polystyrene if dining patrons and SN staff removed all food waste.

The SN department took part in the school district's IPMS and purchased green cleaning products. The school district followed the state's guidelines for green cleaning products in schools and used the guidelines to establish procurement, and used procedures for the district. Purchase and use of green cleaning products eliminated the use of bleach in the entire school district and localized mixing of products to central areas throughout the district to minimize

contamination. The school district's facilities director trained staff from each department on proper mixing procedures and use of green cleaning products in each department. Under the facilities and grounds department, the facilities director was responsible for working with the director within each department to set up IPMS assessment plans and select green cleaning products to meet their needs. For the SN department, a facilities and grounds staff member conducted monthly assessments of the SN department with a SN manager. This approach allowed the SN manager to discuss any issues and address any concerns that he/she may have to sustain pest preventive measures.

Green/Environmental Conservation Roles and Responsibilities

Seven stakeholders shared the responsibility of GEC practices at Case Site B: the assistant superintendent, SN director, facilities director, SN managers, principals, teachers and students. The assistant superintendent, SN director, facilities director, select teachers, secretaries, and principals were on the school district's recycling committee and served as role models throughout the school community. The assistant superintendent served as the coordinator of the school district's GEC efforts, which included recycling practices and building and renovation activities, and reported the district's efforts to the school board and school community. The SN director was responsible for supervising and training SN staff on recycling, IPMS, and the green cleaning practices for the SN department. She was also responsible for communicating issues to the recycling committee and facilities director and addressing the SN department's needs to sustain GEC practices. School nutrition managers and staff were responsible for the daily GEC recycling practices, including: working with students and other school staff to recycle aluminum, paper, and cardboard; reporting issues to the SN director and facilities director as they arose, and assisting the facilities and grounds staff with the IPMS building assessments. The facilities

director led all green cleaning practices; addressed building maintenance issues with each department's chair, custodial supervisors, and custodial staff; and worked with the recycling team to find innovative ways to recycle and make GEC practices more efficient and practical. Principals, teachers and other school staff were responsible for encouraging and supporting students' efforts to implement and sustain single-stream recycling and IPMS practices in all school building and classroom settings. Teachers, SN staff, and custodians were the real advocates for single-stream recycling efforts and served as role models and volunteers with student-led organizations to increase participation in the single stream recycling program. Students also served as role models and sent out notices and newsletters about their school's/school district's GEC efforts. In the elementary schools, an honor system was in place, and a class was chosen each week to collect the recycling bins from each class.

Benefits of Green/Environmental Conservation Practices

For the SN department, the recycling and polystyrene recycling project cut trash disposal within three months of implementation. The single-stream recycling system saved time and space, since time was not wasted in schools separating recyclables, and extra bins were not needed for separate items. This system also saved the school district money by using smaller classroom bins and reducing trash and disposal costs. Funds saved from GEC efforts were reverted into other sustaining GEC practices. The school board's and school district's support in reverting these funds has been key in sustaining the GEC practices for more than 10 years.

Barriers to Implementing and Sustaining Green/Environmental Conservation Practices

The stakeholders at Case Site B did not recognize many of their challenges as barriers but as potential opportunities for change. Funding for additional GEC practices was the only challenge mentioned. However, due to overwhelming support from school administrators and the

school district's ability to report assessment findings, money was not the issue that affected the sustainability of existing GEC practices in the school district. The recycling team indicated that finding innovative ways to maintain and increase morale for adopting and sustaining GEC practices was their primary concern but did not impede current initiatives.

Green/Environmental Conservation Evaluations

Integrated Pest Management System building assessments were conducted at least four times per year for most building s on campus. For SN facilities, the assessments were conducted more often by a SN manager and facilities and ground staff member because of the potential for pests to be found where food is stored, prepared, and served. Food and trash waste assessments were also conducted by this team, and issues and findings were reported to the SN director and facilities director. The facilities director and assistant superintendent were responsible for sharing assessment results with the school district and community and use the positive results to encourage, support, and improve GEC practices.

Case Site C

General School District/SN Program Characteristics

Case Site C was a school district in the Western USDA region of the United States. The school district was located in a metropolitan city (n = 107,514) with residents who were Caucasian/White Americans (76.3%), Hispanic/Latin American (19.0%), Asian American (3.1%), African American/Black (1.0%), and other races and ethnicity (0.6%) with an average income of $62,592 per year per household in 2008. The school district had an enrollment of more than 16,925 students, and its SN program served more than 13,000 meals at breakfast and lunch per day in 28 schools (17 elementary schools, five middle schools, and six high schools) with a free (n = 4,769) and reduced rate (n = 2,161) of 41% of the total enrollment.

Green/Environmental Conservation Practices in the SN Program/School District

The SN department and school district at Case Site C did not have a comprehensive GEC plan. Green/environmental conservation practices in the SN department included replacing polystyrene trays with biodegradable lunch trays and adopting other food purchasing, serving and storage practices that reduced time and costs. The SN director discontinued the use of sandwich wrappers for burgers and sandwiches, and changed how they displayed these items on the serving line. The school district received a federal grant and litigation funds to replace light fixtures and lighting ballasts throughout the district. New buildings and renovations optimized natural lighting in their construction. A district-wide Energy Management System (EMS) was installed in all facilities with digital thermostats, motion-sensor lighting, high efficiency windows and doors, and energy efficient chillers were installed in SN facilities to conserve energy and reduce energy costs. Integrated pest management systems had been in place in the school district since 1999 and was a part of the district's Healthy Schools Act. The school district also purchased green cleaning products, eliminated the use of bleach in the SN department, and recycled paper.

Various schools and school staff implemented and maintained their own GEC practices. Other GEC practices were implemented and maintained by student-led organizations and teachers in an effort to encourage students to adopt GEC behaviors. A 5th grade class used the recycling of aluminum cans and plastic bottles as a fundraiser for their outdoor education program. Fifth grade students encouraged others to bring their recyclables to school. Parents and teachers volunteered to separate and transport the recyclables once a week to the city's recycling center, which paid for the items. All schools in the district sent menus and letters to parents on recycled office paper.

Green/Environmental Conservation Roles and Responsibilities

The SN director's role in GEC practices were minimal, and she only served on the IPMS team to review quarterly reports, conduct SN trainings as needed for the selection and use of green products, and to conduct and review quarterly and annual energy conservation evaluations for each SN facility. Most GEC practices occurred at each individual school and may have involved SN managers and staff, and included serving as role models to students and assisting with recycling paper and plastic. Teachers and students worked with parents to collect and transport recyclables to the city's recycling center. The facilities director and custodial staff led the school district's efforts in implementing, sustaining, and assessing the IPMS and EMS. The facilities director was also instrumental in planning landscaping and weed barriers to decrease the use of herbicide and pesticide use in the district. The custodial staff was responsible for mixing and dispensing green cleaning products for all school district departments.

Benefits of Green/Environmental Conservation Practices

Students perceived that the unwrapped burgers/sandwiches were fresher, because they did not have the 'mystery' wrapper on them. Fruit added to the salad bar allowed students to serve themselves and reduced waste, saved labor time for prepping fruit cups for the cooler, and the SN department saved the money from the cost of purchasing disposable cups and wrappers. Green/Environmental conservation practices adopted at various schools served as a healthful idea for raising funds for student groups without using competitive foods as fundraisers. Teachers, students, SN staff, and parents felt a sense of accomplishment from their GEC fundraising efforts. The IPMS and EMS saved resources and reduced the use of bleach, harsh chemicals for cleaning, herbicides, and pesticides in the school district. The school district received an award for their IPMS.

Barriers to Implementing and Sustaining Green/Environmental Conservation Practices

Other than the IPMS and EMS, the SN department and school community did not implement and support other GEC practices across the school district. Assessments to adopt other practices had not been conducted or piloted beyond the schools that used recycling practices for student fundraising activities. Structured interviews with the SN director, SN managers, and IPMS team revealed that the perceptions within the school district were that they "are doing enough" to ensure that all local, state, and federal guidelines were being met and that time and funding are challenges for adopting additional district-wide GEC practices. There are no guidelines for GEC efforts in the district but the school district included the IPMS and EMS initiatives in their Healthy Schools Act.

Green/Environmental Conservation Evaluations

Only quarterly and annual IPMS and EMS assessments were conducted for each facility. Issues were immediately addressed by the IPMS team in accordance to local and state guidelines. Fifth graders recorded the number of pounds of recyclables collected and monies earned each week to fund their outdoor education projects.

Case Site D

General School District/SN Program Characteristics

The school district in the Case Site D was located in the Mid-Atlantic USDA region of the United States. The school district had schools throughout the county and district offices were located in the county's seat (n = 85,951). The county was made of residents of Caucasian/White Americans (89.2%), African American/Black (6.2%), Hispanic/Latin American (3.4%) and other races and ethnicity (1.2%) with an average income of $50,510 per year per household in 2008. The school district had an enrollment of more than 16,205 students in 30 schools (16 elementary

schools, six middle schools, and eight high schools). The free and reduced rate for the total enrollment is 31%.

Green/Environmental Conservation Practices in the SN Program/School District

The SN department was instrumental in planning and implementing the school district's GEC efforts. Green/environmental conservation practices in the SN department included the purchase and use of green cleaning products, a pulper to process waste, participation in the school district's single stream recycling system, IPMS, and the Leadership for Energy Awareness Program (LEAP). The SN staff was proactive at each SN facility in recycling cardboard, aluminum, #10 cans, light bulbs, plastic containers (#s 1-7), glass jars and bottles, paper products, cereal and frozen food boxes, and printer and copier paper. Energy conservation practices in the SN department included turning off lights, computers, and monitors when not in use, turning off hot water boosters during school breaks, and reporting water leaks and other issues as they occurred.

Across the school district, the school community participated in a single-stream recycling program and collected cardboard, aluminum, plastic containers, glass jars and bottles, newsprint, magazines and catalogs, cereal boxes, paper, mail, telephone books, and fluorescent light tubes. Energy conservation practices included the prohibition of microwaves, coffeepots, and refrigerators in classrooms for personal use, replacement of T9 light tubes for compact florescent bulbs and old ballasts. The LEAP promoted energy conservation best practices to adopt GEC behaviors, reduce energy consumption, costs, and greenhouse gases. The school district's Energy Management System (EMS) was centrally controlled for every building and maintained temperatures between 74 to 78 degrees Fahrenheit in the summer and 68 to 72 degrees Fahrenheit in buildings in the winter.

The IPMS and policy were developed and implemented in 1999 following the school district's board guidelines and that of the LEAP. The sustainability of IPMS and LEAP best practices had reduced the need for pesticide in all school facilities and limited the use of pesticides for bees in the school district's external grounds and bait stations. The IPMS and LEAP assessments and building evaluations were conducted monthly, and issues were addressed immediately. New building renovation projects followed local and state renovation guidelines for the purchase and use of energy efficient equipment and fixtures that met environmental standards.

Green/Environmental Conservation Roles and Responsibilities

District-wide GEC practices are administers through a GEC team that consist of the executive director for support services, the SN director and assistant director, the facilities director, and the maintenance/operations building chiefs. The executive director for support services supervised maintenance and operations for each department, and worked with the facilities planner, and served on the district's LEAP and GEC committees. The SN director and assistant director supervised SN staff and department's GEC practices, communicated with SN managers and staff about GEC issues, served on GEC committees, and assisted with training and educating SN staff and students about GEC efforts. The facilities director and planner coordinated the school district's renovation plans, supervised all IPMS and LEAP evaluations, and worked with teachers to develop the Energy Education Program for the school district. The maintenance/operations building chiefs supervised the daily recycling practices and evaluated the use of green cleaning products. Students and teachers organized GEC practices throughout the school district. Middle school students conducted energy audits as a part of their algebra

curriculum. Teachers integrated the school district's Energy Education Program into the vocational education curriculum to expose students to "green" careers.

Benefits of Green/Environmental Conservation Practices

The school district's ability to embrace the GEC practices of the IPMS and LEAP implemented throughout the school community enabled them to secure grants, state assistance for energy conservation projects, and community and city resources to sustain GEC initiatives. Benefits included savings of approximately $1 million over the ten year period. These savings were attributed to a decrease in energy costs by 12% and the removal of personal microwaves, coffee makers, mini-refrigerators, and turning off lights and unused equipment was estimated to be nearly $74,000 in 2007. The school district received credits from the federal government for reducing waste in landfills. Single-stream recycling for 2008 saved the school district $6,279 and reduced the amount of trash being thrown away by 2,754 cubic yards. Green/environmental conservation benefits were communicated to the school community and have received great response and assistance from parents and community leaders.

Barriers to Implementing and Sustaining Green/Environmental Conservation Practices

School administrators were able to adopt an environmental conservation policy in 1999 and implemented the LEAP, IPMS, and single-stream recycling initiatives. However, smaller pilot projects in several schools and student-led GEC projects did not receive the same support. The lack of support for the latter initiatives may prevent potentially successful GEC initiatives from becoming sustainable and students, teachers, and parents may lose interest in supporting sustained GEC practices.

Green/Environmental Conservation Evaluations

Evaluation guidelines for the LEAP, single-stream recycling, and IPMS provided the framework for assessments and reporting issues and successes of the school district's efforts. These efforts documented increased the school district's visibility in the community and state.

Commonality Factors of the Four Case Sites

Common and variable GEC factors were observed and documented that impact the implementation and sustainability of GEC initiatives between the four sites and are listed in Tables 2-5. There were five district-wide GEC initiatives documented as sustainable among the four sites and had measurable benefits: recycling, use of green products and services, GEC construction and renovations, resource conservation practices, and the use of automated or centralized GEC systems (Table 2).

Table 2

General Green/Environmental Conservation (GEC) Practices in the School Nutrition Program/School District

Recycling & Waste Management	**A**	**B**	**C**	**D**
Cardboard, paper, newsprint, plastic, aluminum	X	X	X	X
Glass			X	X
Light bulbs/tubes & ballasts		X		X
Single Stream Recycling		X		X
Copper, tires, oil, antifreeze (building materials)		X		
Polystyrene		X		
Print cartridges		X		
Purchase foods with less packaging/ Change serving procedures to eliminate the use of food wrappers and other disposables			X	
#10 cans				X
Use pulpers				X
Eliminate the use of Styrofoam		X		

(Table 2 continues)

(Table 2 continued)

General Green/Environmental Conservation (GEC) Practices in the School Nutrition Program/School District

Procurement/Use Green Products & Services	**A**	**B**	**C**	**D**
Green trademarked cleaning and sanitation products	X	X		X
Chemical Dilution System	X	X		X
Reduced the use of Bleach	X			X
Bleach-free		X	X	
Biodegradable products		X	X	
State-certified cleaning and sanitation products				X
Revised MSDS sheets/manual to include GEC products and services	X			
Use green ink for printing			X	
Automated or Centralized GEC Systems	**A**	**B**	**C**	**D**
Integrated Pest Management System (IPMS)	X	X	X	X
Energy Management System (EMS)		X	X	X
Automated/Web-based work order/evaluation system	X			
GEC Building and New Construction Projects	**A**	**B**	**C**	**D**
Energy efficient lighting	X	X	X	X
Building renovations	X		X	X
Purchase new equipment to meet efficiency standards and GEC regulations and policies	X	X		X
Replace chiller system			X	
Eliminate the use/removal of fryers	X			
High efficiency windows & doors			X	
Indoor Air Quality (IAQ)	X			
Motion-sensor lighting			X	
Construction of new SN facilities/new schools			X	
Green Certified School				X
Removal of Asbestos		X	X	

(Table 2 continues)

(Table 2 continued)

General Green/Environmental Conservation (GEC) Practices in the School Nutrition Program/School District

Resource Conservation Practices	**A**	**B**	**C**	**D**
Turn off lights and equipment when not in use	X	X	X	X
Locally-grown foods/Farm-to-School Program/School Garden	X		X	X
Eliminate the use of personal microwaves, coffee makers, and mini-refrigerators in classrooms and offices	X			X
Encourage fuel efficiency practices	X			
Add fruit to the salad bar			X	

In all four case study sites, the primary sustainable GEC practice was recycling. For two of the sites, recycling of cardboard, milk containers, or other products began in the SN department and eventually spread throughout schools or the entire school district. Recycling was more sustainable for the SN department and school district if recycling efforts were documented and there was a discount or free recycling service provided by the city's/community's waste management division or if grants were obtained to implement the practice. The adoption of conservation practices, such as turning off unused lighting and equipment, was the least expensive practice to implement and sustain, and only required an adoption of conservation behaviors for stakeholders.

Simple building renovations and modifications, such as building new facilities with green materials, switching to energy-efficient lighting/equipment, and ensuring that windows and doors had proper seals to prevent the entry of pests and prevent the loss of energy, were stated to be the top initiatives to implement within the districts. Purchasing and using green cleaning products and services reduced and/or eliminated the use of bleach in the SN department and school facilities. Automated or centralized systems, such as IPMS and EMS, were more sustainable

when a team of stakeholders worked together to conduct routine assessments and handle issues as they occurred. These systems also included evaluation and reporting guidelines to assist stakeholders with setting goals and information for establishing best practices.

Sustainability of GEC practices also depend on the roles and support from school district administrators and other members of the school community. School district administrators, such as assistant superintendents, executive director for support services (maintenance, buildings and grounds, custodial services), and SN directors had as much impact on the management, guidance, and evaluation for GEC practices as SN staff, school staff, and students had on implementing daily/routine GEC activities. School administrators were active in coordinating and leading the school district's GEC initiatives as well as serving as liaisons for the school district within the community. Many school district administrators also had roles assisting with the selection of green cleaning products and providing training on GEC practices, and evaluating and reporting GEC efforts.

Specific for the needs of the SN department, the SN director served in a variety of leadership roles that included the following responsibilities: serving on a GEC team; addressing GEC issues as they arose; conducting training and support; and ensuring that the SN department's GEC activities were in accordance to federal, state, and local regulations and guidelines. School nutrition managers also shared some leadership responsibilities as well as the same daily/routine GEC initiatives as other school staff and students. As leaders, SN managers shared training responsibilities with SN directors, assisted other school staff with IPMS and other automated systems evaluations and assessments, and served as role models who encouraged students and staff to participate in all GEC initiatives. School nutrition professionals and other school staff participated and encouraged students and staff to take part in GEC efforts and report

issues and ideas to improve GEC practices. Students participated in GEC practice activities as well as promoted GEC practices through student-guided organizations as peer role models, GEC training and education programs, and disseminated GEC information throughout the school and community. The roles and responsibilities of stakeholders that impact GEC practices in SN programs and school districts are presented in Table 3.

Table 3

Roles that Impact Green/Environmental Conservation (GEC) Practices in the School Nutrition Program /School District

School District Administrators (Assistant Superintendent, Director of Facilities Support Services, & Facilities Planner)	**A**	**B**	**C**	**D**
Coordinates and leads the school district's GEC efforts	X	X	X	X
Supervises GEC building and renovations		X		X
Serve on GEC committees		X	X	
Evaluate GEC practices		X		
Conducts trainings	X	X	X	X
School Nutrition Director	**A**	**B**	**C**	**D**
Serves on the GEC Team	X	X	X	X
Conducts training	X	X	X	X
Directs/supervises the SN department's GEC efforts	X	X		X
Communicates with SN managers/staff about GEC issues and address them		X		X
Reports issues to facilities director and GEC Team	X	X		
Conducts training as necessary	X			X
Work with school administrators to meet federal, state, and local guidelines			X	

(Table 3 continues)

(Table 3 continued)

Roles that Impact Green/Environmental Conservation (GEC) Practices in the School Nutrition Program/School District

School Nutrition Manager	**A**	**B**	**C**	**D**
Work with SN staff to carry out GEC practices	X	X	X	X
Assists with GEC trainings	X	X	X	
Encourage students to participate	X		X	
Report issues to maintenance department and to SN director	X	X		
Assist IPMS, EMS, and GEC Team with evaluations		X		
Collect recyclables		X	X	
Role model	X	X	X	X
School Nutrition Staff	**A**	**B**	**C**	**D**
Assist custodial staff with GEC practices	X		X	
Encourage the students to help	X		X	
Report issues to the managers	X		X	
Role model		X		
Facilities Director/Maintenance & Operations Assistant	**A**	**B**	**C**	**D**
Work with SN director, building supervisors, and other support staff to develop policy and procedures for GEC practices and follow state and local guidelines	X	X		
Serve as a liaison for the district to the community, city, and local university	X		X	
Research green chemicals for cleaning		X	X	
Leads/member the IPMS			X	
Supervise building supervisors/custodial staff and conduct routine observations	X			
Address maintenance issues with the custodial supervisors and custodians		X		X
Evaluate the purchasing, dispensing, and use of green chemical supplies				X

(Table 3 continues)

(Table 3 continued)

Roles that Impact Green/Environmental Conservation (GEC) Practices in the School Nutrition Program/School District

Custodians	**A**	**B**	**C**	**D**
Carry out GEC and waste management practices daily	X	X	X	X
Responsible for mixing and diluting green chemical products for cleaning	X	X	X	X
Assist with the evaluation of IPMS/waste management efforts		X	X	
Serve as role models to students and other school staff		X		
Teachers & School Staff	**A**	**B**	**C**	**D**
Involved in GEC practices	X	X	X	X
Mentor, encourage, and train students	X		X	
Educate and lead student groups	X	X		
Participate on a GEC Team	X			
Report Issues to a GEC Team	X			
Serve as a role model or advocate		X		
Students	**A**	**B**	**C**	**D**
Student-Guided Clubs	X	X	X	X
Peer Role Modeling of GEC Practices	X	X	X	X
Students actively participate in GEC practices	X	X	X	
Students disseminate GEC information	X	X		
Explore green careers				X
Parents	**A**	**B**	**C**	**D**
Participate in GEC practices (school garden/recycling)			X	
Serve on IPMS Team			X	

Other elements that were identified as variables which impact the sustainability of GEC practices in SN programs and schools are presented in Table 4. These elements included utilizing existing SN and school resources, developing partnerships with city/community agencies to carry

out GEC practices, and following federal, state, local, and school governance on GEC initiatives, grants and other incentives. Stakeholders who coordinated GEC teams also developed GEC policies and procedures to implement, maintain, and evaluate practices.

Table 4

Additional Elements that Effect the Sustainability of Green/Environmental Conservation (GEC) Practices in School Nutrition Programs and Schools

Funding and Other Resources	**A**	**B**	**C**	**D**
City/Community Resources	X	X	X	X
City/community picks up recyclables	X	X		
City/community recycles bags/aluminum		X	X	
City/community provides mulch			X	
City/community copper		X		
City/community shares recycling receptacles		X		
GEC efforts are on the district's websites		X		
Support from parents			X	
Energy Star and Portfolio Managers for recording data on utilities	X			X
Use existing SN and school resources	X	X		X
Tools for School (EPA Program)	X			X
Contract with environmental company for consultation	X			
EPA's School Chemical Cleanout Champion (SC3)	X			
The school district's wellness policy	X			
The school district's transportation department idling policy	X			
Emergency Response Policy	X			
Work with a local university on GEC projects	X			
HealthySeat Program (EPA)	X			
Additional space to store recyclables	X			
Energy Star and Portfolio Managers for recording data on utilities	X			X
LEAP Program				X
DOE guidelines				X
Grants	X			X
Savings Incentive Program				X

(Table 4 continues)

(Table 4 continued)

Additional Elements that Effect the Sustainability of Green/Environmental Conservation (GEC) Practices in School Nutrition Programs and Schools

GEC Policies and Procedures	**A**	**B**	**C**	**D**
Federal/state law, policy, guidelines	X	X	X	
School district's wellness policy/Healthy Schools Act	X	X	X	
School district's transportation department's Idling policy	X			
School district's best practices for energy & resource conservation handbook			X	
Lawsuit mandate			X	
School district's environmental conservation policy				X
GEC Training and Training Resources	**A**	**B**	**C**	**D**
Use in-service training for all school staff	X			X
In-classroom training for students	X			
Use consulting company for training		X		
Training and Monitoring (Evaluation) System		X		
GEC Evaluation	**A**	**B**	**C**	**D**
IPMS evaluations	X	X	X	X
Evaluation of all chemicals used in facilities	X	X		X
Energy audits	X		X	
Healthy School Management Team evaluation	X			
Visit other schools and observe GEC best practices	X			
IAQ evaluations	X			
Quality control inspections, surveys, and evaluations				X

Benefits and barriers were primary factors that affect the sustainability of GEC practices in schools and are presented in Table 5. Stakeholders at all four case sites identified recognition for their GEC practices as the greatest benefit for their school. Other benefits noted were reducing waste, saving labor hours, increasing milk consumption, and saving money. Barriers to sustainable GEC approaches for all four case sites were cost and time needed to implement and sustain GEC practices.

Table 5

Benefits and Barriers of General Green/Environmental Conservation (GEC) Practices in the School Nutrition Program/School District

Benefits of GEC Practices	**A**	**B**	**C**	**D**
Recognition of GEC practices	X	X	X	X
Cuts waste, garbage/trash disposal, and reduces the number/size of garbage receptacles	X	X		
Saves labor hours		X	X	
Saves money		X		X
Increase in milk consumption since switching to recyclable plastic bottles/jugs	X			
Use savings from GEC efforts for other projects		X		
Receive rebate for recyclables		X		
Increase student participation in school activities			X	
Increase Positive feelings/perceptions about the school environment			X	
Use recycling as fundraiser			X	
Barriers for Sustaining GEC Practices	**A**	**B**	**C**	**D**
Cost	X	X	X	X
Time	X	X	X	X
Need staff buy-in		X		X
Lack of interest/unable to change the culture of staff and students		X	X	
Unable to recycle Styrofoam	X			
Hard to recycle #10 cans	X			
Unable to recycle glass	X			
Pay for GEC services such as Single-Stream Recycling		X		
“Green” is not well-defined		X		
Cannot monitor GEC systems		X		
Each department monitors their own progress		X		
No space for recyclable storage			X	
No way to estimate longevity of equipment				X
No way to assess if GEC practices meet state’s EPA guidelines				X
Not enough resources and guides to follow				X

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to identify the practices, roles, perceptions, and barriers to implementing green/environmental conservation (GEC) approaches in school nutrition (SN) programs in two phases. Multiple commonalities that effect the implementation, evaluation, and sustainability of GEC initiatives in SN programs and schools were documented. The GEC practices identified in Phase I and Phase II of this study revealed more than 40 different GEC initiatives in SN programs. Recycling, the purchase and use of green cleaning products, and integrated programs such as energy management systems and integrated pest management systems were the common sustainable GEC practices in SN programs and school districts.

All stakeholders performed key roles and responsibilities for the promotion and sustainability of GEC practices in SN programs/schools. School nutrition managers and staff served as role models and proactive stakeholders for supporting GEC practices in schools. School nutrition directors served in leadership roles as educators, trainers, and members on GEC teams responsible for guiding innovative ways to implement, evaluate, and sustain GEC practices in schools. However, the sustainability of GEC practices relied on the support of all school district administrators who believed that GEC practices were important; stakeholders who conducted assessments and reported results; and students, teachers, SN and school staff who practiced GEC initiatives on a daily basis.

Limitations of the Current Study

The results of this study provide insight into GEC practices in SN programs and school districts across the United States. However, the data collected is limited to the perceptions and information shared by the expert panel and stakeholders at the four case study sites.

Implications for School Nutrition Programs and Schools Implementing and Sustaining Green/Environmental Conservation Practices

School nutrition and school professionals participating in this study provided the following recommendations for sustaining GEC practices:

- Secure the local school board's and district administrators' support of sustainable GEC practices;
- Justify, share, and promote reasons for implementing GEC practices with the school community;
- Find innovative ways to engage administrators, staff, and students in the planning, implementation, and sustainability of GEC practices;
- Communicate and observe other SN programs and schools with successful GEC best practices;
- Assess and evaluate that all GEC initiatives meet federal, state, and local governing regulations/guidelines;
- Establish GEC procedures/policies that identify the purpose/mission of GEC practices, objectives and goals, stakeholders' roles and responsibilities, and evaluation components;
- Evaluate current administrators', staff's, and students' perceptions of GEC practices and what the potential barriers would be to sustain GEC initiatives; and
- Employ consistent methods of engagement to garner and maintain staff and student buy-in for GEC practices.

Recommendations for Additional Research

The information from this multi-phase case study could be used as baseline information for future studies. More research could be conducted to:

- Examine if the qualitative results from this study confirm sustainable GEC practices and behaviors quantitatively on a national level; and
- Use information from this study and future research projects to develop best practices, training, and resources for SN professionals interested in planning, implementing, sustaining, and evaluating GEC practices in schools.

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