

Utah State University

DigitalCommons@USU

All Graduate Plan B and other Reports

Graduate Studies

5-1999

Conceptual Education Master Plan for the Utah Botanical Center: Part One: Natural Resources

Gregory J. Wright
Utah State University

Follow this and additional works at: <https://digitalcommons.usu.edu/gradreports>



Part of the [Landscape Architecture Commons](#)

Recommended Citation

Wright, Gregory J., "Conceptual Education Master Plan for the Utah Botanical Center: Part One: Natural Resources" (1999). *All Graduate Plan B and other Reports*. 1084.

<https://digitalcommons.usu.edu/gradreports/1084>

This Report is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Plan B and other Reports by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.



CONCEPTUAL EDUCATION MASTER PLAN
FOR THE UTAH BOTANICAL CENTER:
PART ONE: NATURAL RESOURCES

by

Gregory J. Wright

A report submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF LANDSCAPE ARCHITECTURE

Approved:

UTAH STATE UNIVERSITY
LOGAN, UTAH

1999

ABSTRACT

Conceptual Education Master Plan for the Utah Botanical Center:
Part One: Natural Resources

by

Gregory J. Wright, Master of Landscape Architecture

Utah State University, 1999

Major Professor: Vern J. Budge

Department: Landscape Architecture and Environmental Planning

The purpose of this study was to assess the needs of four potential target audiences that would be using the Utah Botanical Center (UBC) for educational purposes. The target audiences included school children, college students, nursery and landscape industry, and the general public. The UBC is relocating to a larger site that has wetlands and ponds. The UBC has taken this opportunity to define its mission and goals. Part of its mission is to broaden its educational programming from horticulture-based to programming including natural resource conservation topics. This study provides recommendations regarding what educational topics should be covered at the UBC for the different target audiences, and what facilities might be necessary to advance this educational programming. In addition, this study reviews natural resource topics being covered at other botanical institutions, nature centers, and water conservation groups.

The process for determining the needs of the target audiences began with the selection of representatives from the target audiences. Data was gathered through group meetings, personal interviews, and completion of questionnaires in which representatives from the target audiences were asked to fill out matrixes about specific topics and reply to open-ended questions. The matrixes asked for information about education topics and facilities, and the questions asked for information regarding the planning process. Data compiled from these matrixes was then analyzed to determine what topics these target audiences found to be important and what facilities they felt would be useful in the education process. Data was also gathered from horticulture and nature centers and water conservation organizations through phone interviews and requests for brochures from their educational programs. The questions asked through the phone interviews determined the facilities being used at these institutions and also solicited suggestions for planning educational programming. The requested brochures provided information about the education topics being covered at these institutions. This data was placed into matrixes that showed the topics and the audiences being targeted. The analyzed data from the target audiences, horticulture and nature centers, and water conservation organizations was then used to make recommendations for facilities and programming at the UBC.

Recommendations were provided for each target audience for both topics and facilities. The topics that were recommended to the UBC included water resource management, water conservation, storm water management, wetland ecology, native plants, urban wildlife habitat, fish and wildlife habitat, composting, integrated pest

management, residential landscape design, and landscape legacy. The facilities that were recommended included classrooms, an auditorium, hands-on demonstration areas, outdoor lecture facilities, and interpretive trails.

In summary, it was recommended that the UBC focus on school children first for educational programming. It is also advised that they start out with a small high-quality program that is expandable. Good quality programming is important to ensure that target audiences return to visit the UBC.

(111 pages)

DEDICATION

v

To my wife Janeen, whose patience has been enduring through my years of graduate study. She has always been confident in my ability to succeed even when I grew weary of the work.

CONTENTS

	Page
ABSTRACT	ii
DEDICATION	v
LIST OF TABLES	ix
LIST OF FIGURES	xi
CHAPTERS	
INTRODUCTION	1
Background of Utah Botanical Center	5
UBC Stated Objectives	9
1999 Status Report	11
Statement of Problem	12
Needs of Target Audiences	12
Similar Organizations	
Programs and Facilities	12
Outcome of Research	12
RESEARCH METHODOLOGY AND DESIGN	13
Target Audiences	13
School Children Grades K-12	13
Colleges and Universities	15
Nursery and Landscape Industry Professionals	16
General Public	16
Similar Educational Organizations	17
Botanical Institutions and Nature Centers	17
Water Conservation Organizations	19
Analysis of Research Data	20
Target Audiences	20
Similar Educational Organizations	20
Data Comparisons	20
Recommendations	21
DATA PRESENTATION AND ANALYSIS	22
Target Audiences	22

School Children Grades K-12	22
Topic Presentation	22
Topic Analysis	24
Facility Presentation	25
Facility Analysis	26
Open-ended Questions	28
Open-ended Questions Analysis	30
Additional Teachers' Group Comments	31
University Students	31
Topic Presentation	31
Topic Analysis	33
Facility Presentation	34
Facility Analysis	36
Open-ended Questions	36
Open-ended Questions Analysis	39
Nursery and Landscape Industry Professionals	40
Presentation	40
Analysis	45
General Public	46
Topic Presentation	46
Topic Analysis	47
Facility Presentation	48
Facility Analysis	49
Similar Education Organizations	50
Botanical and Nature Centers	50
Topic Presentation	50
Topic Analysis	53
Facility Presentation	56
Facilities Analysis	59
Open-ended Questions	60
Open-ended Questions Analysis	66
Water Conservation Organizations	67
Data Presentation	67
Data Analysis	68
Data Comparisons	69
Topics	69
Facilities	72
SUMMARY AND RECOMMENDATIONS	75
Summary	75

Recommendations	76
Topic Recommendations	76
Facility Recommendations	77
Other Recommendations and Observations	77
Recommendations for Further Research	79
REFERENCES CITED	80
APPENDICES	81
Appendix A: Davis School District Participants	82
Appendix B: Davis School District Questionnaire	84
Appendix C: UBC Technical Advisory Board Participants	91
Appendix D: UBC Technical Advisory Board Questionnaire	93
Appendix E: Nursery and Landscape Industry Questionnaire	100
Appendix F: Participating Institutions	104
Appendix G: Water Conservation Organizations	107
Appendix H: Summary: Utah State Science Core	109

LIST OF TABLES

TABLE		Page
1	Current Course Offerings	8
2	Davis School District Topic Importance	23
3	Davis School District Natural Resource and Other Topics	25
4	Davis School District Topic and Facilities	26
5	Davis School District Frequency of Facilities	27
6	UBC Advisory Board Topic Importance	32
7	UBC Advisory Board Natural and Other Topics	34
8	UBC Advisory Board Topic & Facilities	35
9	UBC Advisory Board Frequency of Facilities	36
10	Nursery and Landscape Industry Program Format	41
11	UBC General Public Survey (Topics)	47
12	UBC 1994 Public Survey of Activities (Facilities)	49
13	Topics and Target Audiences By Institution	52
14	Number of Institutions Presenting Topics	54
15	Frequency of Topics By Target Audience	55
16	Organizations and Facilities	58
17	Frequency of Facilities Used at Various Botanical and Nature Centers	59
18	Target Audience Topic Comparison	70

19	Important Topic Comparisons	72
20	Facility Comparisons	74

LIST OF FIGURES

Figure		Page
1	Utah Botanical Center (UBC) Site Map	2
2	Utah Botanical Center (UBC) Site -- Ponds	3

CHAPTER 1

INTRODUCTION

Utah State University (USU) as a land grant institution for the state of Utah has played and continues to play a key role in education and research for agriculture and other related fields. As part of its education and research program, USU established a botanical garden in Farmington Utah in 1925 on property which was used in conjunction as a field station for the Utah Agricultural Experiment Station. The name of this garden is the Utah Botanical Garden (UBG).

Due to the expansion of Highway 89 and the construction of an interchange at the Farmington site which will use over four acres of the seven-acre site, the UBG will have to relocate. The garden will be renamed The Utah Botanical Center (UBC) and will expand to 94 acres at a site in Kaysville to better accommodate the needs of the university and the public. USU is taking this opportunity of relocating the garden to expand its educational mission and capabilities at the new site in Kaysville. The new site, just South of the 200 North Kaysville exit off I-15, is four miles from the Farmington location, and adjacent to the existing Utah State University Agricultural Experiment Farm. The UBC will have high visibility as the property borders I-15 and includes the Kaysville Ponds. (See Figure 1, UBC Site Map and Figure 2, UBC Site - Ponds.) The UBC will be located within walking distance of three schools in the Davis School District. Davis County had a population of 216,000 in 1995 with projections of 355,041 for the year 2020. The state of Utah had a population of 1,959,000 in 1995

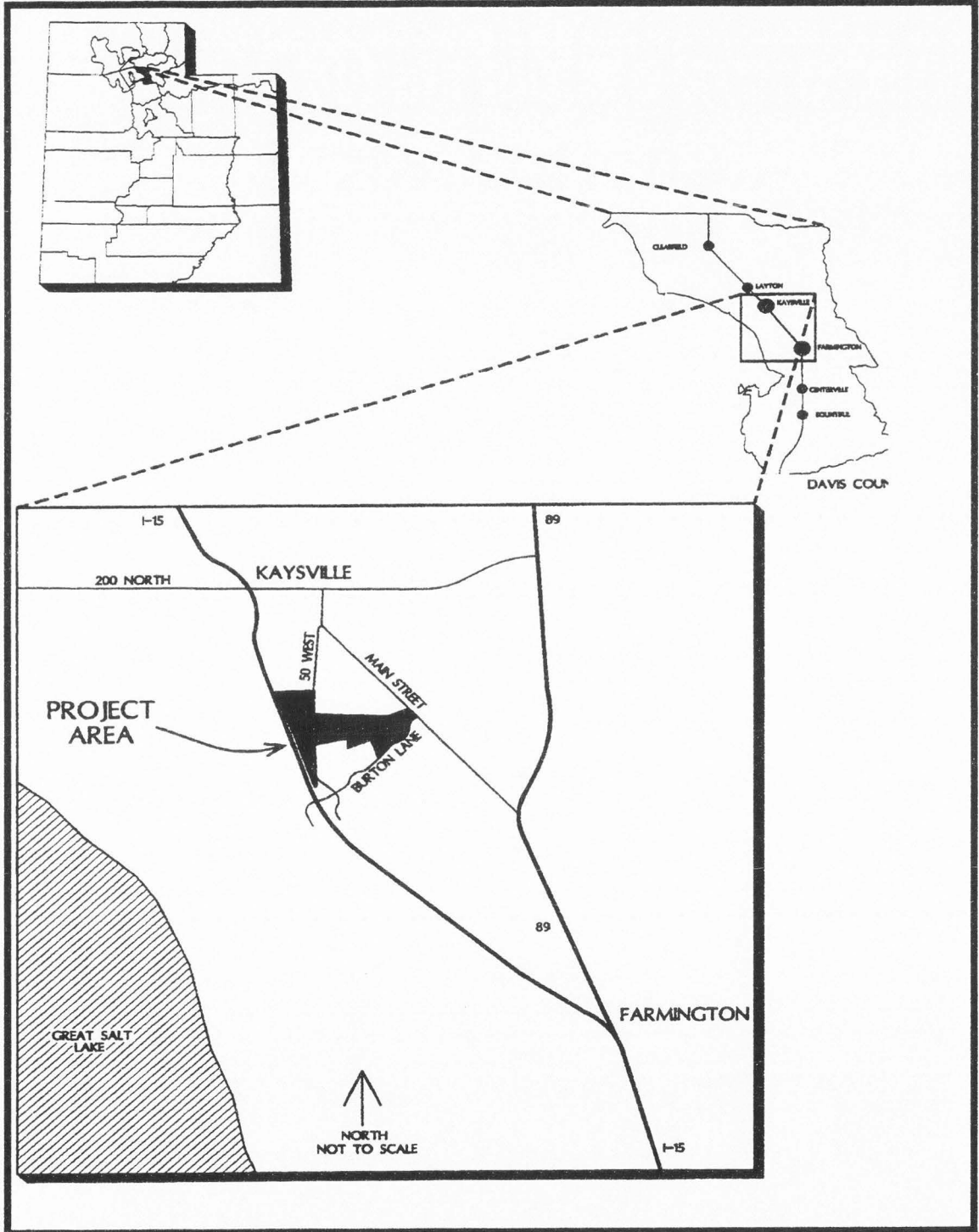


Figure 1 UBC site map

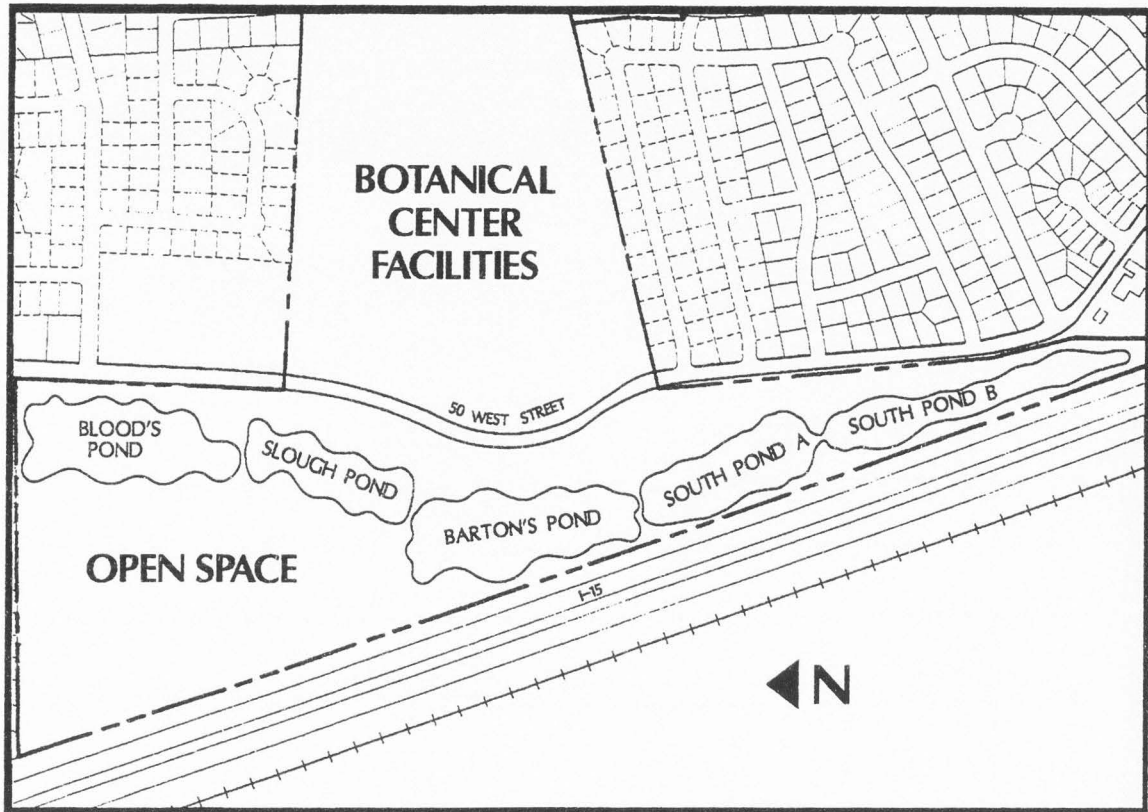


Figure 2 UBC site - ponds

and is projected to reach 3,311,276 in 2020 (Governor's Office, 1997). The UBC has the potential to serve millions of people across the Wasatch Front, the state of Utah, and the Intermountain West.

USU is committed to providing educational opportunities to the public through the UBC in a formal and non-formal setting. The National Science Teachers Association explains the value of non-formal learning experiences:

Informal science learning experiences spark curiosity and engage interest in the sciences during school years and throughout a lifetime. Informal science education institutions have a long history of providing staff development for teachers and enrichment experiences for students and the public. Informal science education accommodates different learning styles and effectively serves the complete spectrum of learners: gifted, challenged, non-traditional, and second language learners. (NSTA, 1998)

The UBC will provide an ideal site for students to combine formal and non-formal education and to discover the meaning and application of natural resource issues. Opportunities will exist for school children and their parents, the general public, and other professionals as well.

The Mission Statement of the UBC expresses the UBC's desire to address the issues presently confronting the university and the public, and to anticipate the issues of the future:

The Utah Botanical Center creates awareness among all generations of how they can enrich their quality of life by preserving Utah's precious natural resources. The Center provides educational, recreational, and interactive experiences as well as research and public outreach activities. (UBC, 1998, p. D1)

With the relocation to Kaysville and the renaming of the facility, the UBC has embarked upon an ambitious task of creating a larger and broader educational facility. The goals of the UBC include conservation and preservation, sustainability, education and extension, community and economic development, and research. These goals will be accomplished through course work and example. Historically, the only educational programming offered by the Extension Service at the UBG has been horticulture-based professional education programs rather than "episodic" program learning experiences. Horticulture-based programming will continue, although plans for the new property encompass a broader, program which will also emphasize natural resource issues as they relate to the public good for present and future generations.

Over the past two decades, many serious natural resource issues confronting the state have emerged. These include: increased urbanization, limited water supplies, a shrinking resource base for native plants, decreased wildlife habitat, and decreased open space for public use. The UBC will be an educational leader as it addresses these types of issues for the state.

It is valuable at this point to evaluate the educational needs of the community as they relate to the UBC and explore new and different educational programs that may occur there, so that these programs can be accommodated in planning the facilities. Interest has already been shown by the Davis School District, the Utah Nursery Industry, and USU for opportunities to enhance their educational programs through the UBC. Virginia Ord, Science Director of the Davis School District, stated that the district is looking for opportunities in which their students can participate in hands-on learning.

Background of Utah Botanical Center

As a land grant institution, USU has played and continues to play a key role in education and research for agriculture and other related fields. As a part of its educational and research program, USU purchased approximately seven acres in Farmington from the Potter family in 1925. In 1926, ornamental plant trials were initiated and the site became known as the Farmington Field Station of the Utah Agricultural Experiment Station. Flower variety trials were introduced in 1954 and the station took on the name of the Farmington Display Gardens. The late 1960's and early 70's brought further change as plant materials were reconfigured from row plots to

landscape beds and theme gardens. In 1980 the name was changed to the USU Horticulture Farm, when an Extension Gardening office opened on the site. The most recent name of USU/Utah Botanical Garden was formally established in 1984. The current director of the UBG, William Varga, began his professional work there in the mid 70's. Mr. Varga has been directly involved with the development of the UBG since that time.

Currently there are several educational opportunities being offered through the Continuing Education division of University Extension Service at the UBG. Individuals may receive a One-Year Certificate (40 credits), a Two-Year Certificate (80 credits), or an Associate of Applied Science Degree (96 credits). Courses taken through extension are also available to be taken as credit toward a four-year degree. There are eighteen core courses and six elective courses being offered off-campus (Table 1). The courses offered through Extension can be used in four professional certification programs. In addition to courses offered for credit, the Extension Service offers Saturday morning short courses for the homeowner. These short courses are sponsored by the Davis County Master Gardener Association's Speakers Bureau.

The Master Gardener program began in 1973 in Seattle, Washington and has expanded to more than 40 states. The objective of the program is to give garden enthusiasts further horticulture training. To receive certification, Master Gardeners must complete 40 hours of classroom training followed by a comprehensive exam. In addition, 40 hours of volunteer time must be donated to the community before obtaining certification. Volunteers assist the Extension horticulture program by answering phone

calls, manning information booths, and helping with plant diagnostics. Although this program is overseen by University Extension, the Master Gardeners have their own organization which also gets involved with other volunteer gardening activities. Certification has to be maintained yearly through further training workshops and volunteer hours. (Drost, 1997)

Due to the increased population growth and urbanization in our communities, the need for assistance in the field of horticulture has also increased. This places a greater demand on Extension Agents to assist the public with their concerns. The Master Gardeners provide valuable assistance to Extension and increases the amount of help available to the public.

TABLE 1.
Current Course Offerings

Course #	Course Title	Course #	Course Title
PLSC 100	Introduction to Agricultural Plant Science	PLSC 310	Greenhouse Crop Production
PLSC 110	Ornamental Horticulture Seminar	PLSC 316	Plant Propagation
PLSC 220	Weed and Pest Control	PLSC320	Garden Center Management
PLSC 225	Occupational Experience in Horticulture	PLSC 330	Residential Landscape Design
PLSC 237	Indoor Plants and Interiorscaping	PLSC 340	Managing for Sustainable Landscapes
PLSC 240	Home Horticulture	PLSC 360	Arboriculture
PLSC 260	Plant Materials I (Herbaceous)	PLSC 420	Turfgrass Science and Culture
PLSC 261	Plant Materials II (Woody)	PLSC 440	Vegetable Production
PLSC 265	Identification and Selection of Plants in Production Agriculture	PLSC 445	Small Fruit Culture
PLSC 290	Special Problems in Ornamental Horticulture	PLSC 450	Fruit Production
PLSC 301	Flower Arranging for the Home	SOIL 358	General Soils
PLSC 305	Greenhouse Design and Management		

(USU Extension Service, 1997)

UBC Stated Objectives

In order to achieve their mission statement, the UBC has outlined the following objectives in their 1998 Strategic Marketing Plan:

- **Conservation and Preservation** - The Utah Botanical Center will become the premiere facility in the Intermountain West that provides public information regarding the conservation and preservation of Utah's natural resources. The Center will advocate conservation by practicing and teaching sound water resource management, creating and enhancing wetlands, improving urban wildlife habitat, and preserving open space for public use.
- **Sustainability** - The Utah Botanical Center will effectively demonstrate the responsible use of precious natural resources. Visitors will be taught by example the concepts of ecologically sound landscape and architectural design and their importance to our environment.
- **Education and Extension** - The Utah Botanical Center will provide experiences for diverse audiences through USU Continuing Education degree programs, Master Gardener programs, workshops, conferences, seminars, a children's discovery program, collaborative elementary and secondary school programs, and community education projects. The Center will house USU Cooperative Extension offices which distribute information to communities statewide in order to enhance the economic, educational, and environmental quality of life for Utah residents.
- **Community and Economic Development** - The Utah Botanical Center will facilitate community and economic development by providing synergistic business opportunities. The Center will serve as a key attraction for state tourism as well as a public gathering place, sponsoring cultural and recreational opportunities.
- **Research** - The Utah Botanical Center will play a key role in developing a comprehensive program of applied research and demonstration projects. Research will be conducted in areas such as water conservation, home horticulture, water quality enhancement, wetland ecology, integrated pest management, urban forestry, agriculture, fish and wildlife, storm water management, and highway enhancement.

The current plans for the UBC include the following facilities: (UBC, 1998)

- **Visitor Center** - The Visitor Center will be a model for resource conservation and will house the Utah Botanical Center Staff, Davis County Extension offices and provide information to the public in areas such as plant materials, landscaping, plant diagnostics, and tourism. Facilities will include a gift shop, exhibit gallery, special events room, a restaurant and outdoor terrace.
- **Educational Facility** - The Educational Facility will provide classes, workshops, and seminars to emphasize environmental stewardship. Facilities will include classrooms, wet-labs, an auditorium, workshop space, a children's discovery room, library, and an herbarium.
- **Conservatory** - A traditional component of botanic gardens, the conservatory will offer year-round uses which will be popular in Utah's climate.
- **Theme Gardens** - These will be designed to foster awareness of living in a high desert climate. They will be used to show visitors by example how to create aesthetically pleasing and ecologically sensitive landscape designs.
- **The Working Garden** - This will provide visitors with many ideas for their own homes with an emphasis on sustainable landscapes. Sustainable principles such as integrated pest management, water conservation, and energy conservation will be incorporated. There will also be many sustainable landscape products showcased in these gardens. The Utah House 2000, a model home that incorporates sustainability, efficient use of resources, and affordable housing, will be located in this area.
- **Research Gardens** - These Gardens will focus on gaining a better understanding of plant life in Utah and the Intermountain West. Current and future issues will be addressed by research projects in areas such as water conservation, water quality enhancement, and sustainable landscapes.
- **Greenhouse Complex** - This will include several propagation, production, and research greenhouses. A native plant retail nursery may be included in the future. Plants will be grown for use in the garden and for research.
- **Public Open Space** - The gardens will provide a valuable 64-acre parcel of open space for Utah. This will include wetlands and the four Kaysville Ponds. There will be opportunities for recreation, interpretation, and trails which will comply with ADA standards.

- **Wetlands** - There are 23 acres of wetlands included in the Kaysville Ponds property. These will be restored and provide a valuable outdoor living classroom for wetland research, education and interpretation. In addition, these wetlands are important to Kaysville City's storm water treatment for they service more than one-third of the city's storm water drainage system.

1999 Status Report

Planning for the relocation of the gardens has been underway for several years. A conceptual master plan has been developed for the site and the UBC has recently employed the services of a landscape architect to assist with refinement of the facility layout. The UBC began relocating plant material from the Farmington site in the fall of 1998 after some site cleanup had been completed. The UBC is preparing to place infrastructure such as roads, utilities, and basic signage on the site. There have been meetings in 1997 and 1998 with the Governor and State Legislature to seek funding for the UBC. Partnerships are being formed with various State and Federal agencies such as the Bureau of Reclamation and Department of Natural Resources, and a marketing and capital campaign plan has been prepared. It is anticipated that the capital campaign will begin in 1999. Part of the planning process requires an understanding of the educational goals and programs which will occur at the center, since it will determine some of the facilities needed on the site. Since the UBC is currently in the planning stage of its facility development, the information gathered in this study can be incorporated into the facility's design.

Statement of Problem

A portion of the educational programs at the UBC will focus on natural resource topics, in addition to current horticulture programs. This research examines which natural resource subjects could be covered at the UBC.

The following questions are explored in this study: 1) needs of target audiences, and 2) programs and facilities at other institutions:

1. Needs of Target Audiences

- What natural resource topics should be covered at the K-12 level?
- For what topics would various colleges at Utah State University use the UBC as an educational resource?
- What natural resource education topics would the general public find interesting?
- In what ways can the UBC meet the educational needs of the Utah nursery and landscape industry?
- What facilities would be most useful in accommodating the above topics in an educational format?

2. Similar Organizations Programs and Facilities

- What natural resource topics are nature centers and other botanical institutions throughout the United States addressing in an educational format?
- What are water conservation organizations doing to educate the public in the state of Utah on water conservation needs?
- What facilities are being used to accommodate the educational programs at these institutions?

Outcomes of Research

This research will culminate in a prioritized list of recommended natural resource issues and program elements to be added to the design program for the UBC. These recommendations will include facilities needed to advance the educational programs at the UBC.

CHAPTER 2

RESEARCH METHODOLOGY AND DESIGN

My research was divided into two major areas of data collection which corresponded to the research questions posed above. The first part of the study examined the educational needs of various groups of clients, public school students, college students, the general public, and professionals in the nursery industry. The second part looked at programs offered by organizations currently involved in natural resource education. The information from these two areas was then used to determine the needs of potential clients of the UBC and to catalog natural resource programs offered by institutions in other parts of the country. Recommendations, for program planning, were then made to the UBC.

Target Audiences

Four main potential target audiences were selected for which the UBC could provide educational programming. A separate research approach was devised for each of the four target groups. Although there were many similarities and overlaps in the approaches, the nature of the audiences required separate data gathering methods.

School children grades K-12. In order to assess the needs of school children and the potential programs to be offered by the UBC, a decision was made to interview science teachers. Science teachers determined how the needs of the students would be met by educational resources provided by the UBC and thus were the best source of data concerning this client group. Initial contact was made with Virginia Ord, Director of Science Education at Davis School District. She selected a group of seven teachers

(Appendix A) to participate in the study. The UBC is located in the Davis School District. Students from the district would probably be the main users of the UBC in the K-12 client group, and were therefore considered to be a good representative sample. A meeting was held with a group of eight school teachers including Virginia Ord. The meeting was followed up by individual interviews with the eight participants.

The meeting introduced the participants to this research and provided background information about the UBC including information on the new site, its goals, and its mission. The background information was presented by David Anderson, Project Director for the UBC, and is found in Chapter One of this document. The meeting created an opportunity for the participants to discuss ideas about how the UBC could be used by teachers and students in the Davis School District. This discussion had a synergistic effect which resulted in many new and creative ideas. These ideas are included in the analysis of the data in the following chapter.

The interviews with individual participants included a questionnaire (Appendix B) in which participants were asked to assign a value of importance to educational topics to be addressed at the UBC. In addition, they were asked what types of facilities would be valuable in the presentation of these topics. Other information was requested such as the number of students that would typically participate in a field trip to the UBC and how often such visits would occur. These teachers were also asked how these educational topics would fit into their school curriculum. Further questions were asked regarding universal access and proximity of indoor facilities to outdoor activities. The group's

suggestions and observations for the planning process of the new facility were also taken into consideration.

Responses from these questionnaires were then reviewed and placed in matrixes for presentation and analysis. Some of the most valuable information came from the group meeting. Another useful source of information came from the open-ended questions on the questionnaire during the individual interviews. This information has been preserved in a written form and categorized by the type of information discussed. This data is presented in the Data Presentation and Analysis chapter.

Colleges and Universities. To determine how the UBC might be used by a university, members of the Technical Advisory Board (Appendix C) for the UBC were asked to answer a questionnaire (Appendix D). The Technical Advisory Board consists of representatives from the various colleges at USU. The board was asked the same questions regarding educational topics as the Davis School District, but the supplemental questions were adjusted to determine the particular needs of the college-level audience. The additional questions focused on what disciplines within the various colleges at USU would use the UBC and for what purpose. In addition, a question was asked regarding what educational programs should occur at the UBC in relation to continuing education and other satellite programs.

The approach to the Technical Advisory Board was somewhat different from the one used with the Davis School District because a focus group was not used. Because members of this board are familiar with the UBC, it was not necessary to provide the

participants with background data. Information regarding this research was provided to each member of the board and they were asked to complete the questionnaire.

The responses to the questionnaire were then placed in matrixes to rank the importance of individual topics and facilities. The responses to the open-ended questions were collected and maintained in written form as discussed above.

Nursery and Landscape Industry Professionals. The study also collected information from representatives of the nursery industry. Contact was made with Diane Jones, Executive Director for the Utah Nursery and Landscape Association. Ms. Jones facilitated contact with the association board which is composed of professionals representing various aspects of the nursery industry. The board provided a representative sample of professionals in the industry for this study. During a board meeting, on August 5, 1998, background information about the new facility at the UBC was provided. This research project was explained and the board members in attendance were asked to answer a questionnaire and return it to the UBC.

The questionnaire (Appendix E) was altered to reflect the concerns of this target audience. Professionals in the industry would need different kinds of educational programs than those used by the two student audiences or the general public. The format included mainly open-ended questions concerning types of educational programs the industry found beneficial at botanical institutions. Other questions focused on specific ways the UBC could assist the educational needs of the industry.

General Public. In October 1994, the UBC surveyed a sample of 500 Davis County residents. The survey covered a wide variety of topics important to the UBC.

Questions pertaining to these topics were asked regarding educational programming.

Although the survey did not include the specific educational topic questions which were asked of the school district and university, this research extrapolated from the data some topics which correspond with topics in this study. Because the data is extrapolated, the results are somewhat inconclusive. The findings of this study will be presented to the general public by the UBC at a future date at which time further input will be solicited.

Similar Educational Organizations

Three types of organizations similar to the UBC were identified for review of educational programming. The groups included other botanical institutions, nature centers, and water conservation organizations. These groups were chosen for this study because they offer natural resource education programming and have similar objectives as the UBC.

Botanical Institutions and Nature Centers. One purpose of this research is to determine what natural resource programming is currently being done at botanical institutions and nature centers around the country. Information was collected from a sample of institutions (Appendix F). Requests were made for any printed educational brochures that advertised classes, provided information on facilities used for education programs, addressed natural resource, and listed the typical enrollment in the programs.

A list of botanic gardens and arboreta was developed with the assistance of James E. Swasey, Director of the Longwood Graduate Program for Public Horticulture Administration at the University of Delaware. He was able to recommend many gardens

associated with universities with similar circumstances as the UBC. The inclusion of gardens with an association with a university was an important factor in this study. Fifty-three gardens and arboreta were selected. Corky McReynolds, Director of the Association of Nature Center Administrators developed a list of ten nature centers which in his opinion, have excellent educational programming.

From the list of fifty-three gardens and arboreta, thirty-eight institutions were eliminated because they were either not interested in the study and would not respond, or because they did not have educational programming in natural resources. These gardens combined with the eight nature centers participating in the study which resulted in a sample of twenty-three organizations.

The process for gathering information from these institutions began with an initial phone call that explained the nature of this research and requested information about the institution. If an institution was willing to participate, a questionnaire was faxed to them which asked for specific details regarding their educational programs, facilities, and number of participants. After the first few calls were made, it was decided that the initial step would be to contact the institutions and request their educational brochures. After examining the brochures, a decision was made as to whether or not the organization offered programs pertaining to natural resource topics. The organizations which had natural resource programs were included in the study sample.

Questionnaires were filled out with data from the brochures received from the participating organizations. Additional data was gathered from subsequent phone calls. It should be noted that some of the questions in the original questionnaire that were sent

to the initial organizations were not applicable to this research. Those questions related more to the administration of education programs and not to the planning of facilities. Information for those questions was not requested after the initial change in soliciting data. However, the information that was gathered has been made available to the UBC for their future use. The questions that were included in this study deal specifically with facilities and the number of participants in the programs. The latter question is important in determining the amount of space needed for classrooms and facilities. Because this study is exploratory in nature, trial and error have been part of its process.

Information gathered from the institutions was placed in matrixes to examine the frequency with which natural resource topics have been addressed, which institutions are presenting these topics, what audience is being targeted for the various topics, and what facilities are being used in the education process. This information was compared with the needs and desires of the target audiences and then applied to recommendations for the UBC.

Water Conservation Organizations. There were three individuals contacted in Utah who are involved in water resource education (Appendix G). They were: Suzanne Flory, of the Division of Water Resources Utah State Government, Georgia Barker, from the Utah Water Conservation Forum, and Geoff Smith, of the International Office of Water Education at the Utah Water Research Lab. Each of these organizations have education programs for various target audiences. Information about these programs was acquired and reviewed in order to help make informed recommendations for the UBC.

None of these organizations maintain their own facilities. They are outreach organizations, using facilities of other organizations in their education activities.

Analysis of Research Data

Target Audiences. As mentioned above, the data gathered from each target audience was placed in charts and matrixes showing responses to various questions and ranking natural resource topics. The responses to the open-ended questions were quoted and presented along with their corresponding questions. This type of data is valuable in understanding the needs of the target audiences. The data was then analyzed to review what topics and facilities were important to each target audience. Data gathered from the nursery and landscape industry was presented through their quoted responses. I analyzed these responses and outlined the needs of this audience.

Similar Educational Organizations. A similar process was used with the data gathered from the botanical institutions and nature centers. Matrixes show natural resource topics and facilities being utilized by these organizations. Each matrix is followed by descriptive examples of programs and facilities being used at various botanical institutions or nature centers.

Data Comparisons. Data was compared between the target audiences to gain a better understanding of their educational needs in relationship to each other. In addition, the data was also compared with programming at other institutions. Comparisons were also made between the desired facilities of the target audiences and the facilities at other institutions.

Recommendations

Recommendations were made for each target audience. They were also divided into natural resource topics and facilities. Information from the target audiences and the other institutions was included to help form these recommendations. These recommendations were based on the mission of the UBC, the importance of the topic as indicated by target audiences, and the facilities required to present such natural resource topics. The recommendations answer the questions posed by the research and create additional questions. Other recommendations were made regarding future areas of research for the UBC.

CHAPTER 3

DATA PRESENTATION AND ANALYSIS

The data was gathered in this study from two groups. The first group represented school children grades K-12, university students, nursery and landscape industry professionals, and the general public. The second group included organizations with similar functions to the UBC, such as horticulture and nature centers and water conservation organizations. Responses and data gathered from these two groups are presented individually by specific target audience.

Target Audiences

School Children Grades K-12.*Topic Presentation*

School teachers in the Davis School District placed greater importance on topics relating to activities and curriculum of the state science core (Table 2, *Davis School District Topic Importance*). These topics included:

- Water resource management
- Wetland enhancement
- Water conservation
- Water quality enhancement
- Wetland ecology
- Native plants
- Open space preservation

TABLE 2.
Davis School District Topic Importance

Topic	Important	Neutral	Unimportant
Water resource management	7	1	
Wetland enhancement	7	1	
Water conservation	6	2	
Water quality enhancement	7	1	
Wetland ecology	7	1	
Storm water management	3	4	1
Farmland ecology	1	6	1
Native plants	8		
Fish and wildlife habitat	4	3	1
Urban wildlife habitat	3	4	1
Open space preservation	5	3	
Highway enhancement	3	3	2
Water wise landscapes	4	3	1
Energy conservation	4	4	
Bioremediation	4	4	
Composting	3	5	
Recycling	3	5	
Urban planning	2	4	2
Community design	3	3	2
Urban growth	2	3	3
Ornamental horticulture	2	6	
Fruit crops	1	6	1
Vegetable crops	1	6	1
Integrated pest management	1	5	2
Greenhouse production	5	3	
Houseplants	1	4	3
Floral arranging		3	5
Hosting services		2	6
Culinary arts		1	7
Equipment maintenance & use	1	1	6
Photography	3	1	4
Visual arts painting & drawing	4	3	1

Note: The data represents eight respondents for each topic. For example, for the first topic, seven respondents considered water resource management as important while one considered it neutral. If one respondent listed two rankings for a topic, for example, important and neutral, the lower of the rankings was chosen.

Six or more of the eight respondents classified the following topics as neutral or unimportant to their teaching curriculum:

- Floral arranging
- Photography
- Hosting services
- Culinary arts
- Equipment maintenance and use

Although everyone of the respondents were all science teachers, they noted that some of these topics might be appropriate for other areas of education in the schools.

Additional topics suggested by the respondents included topics such as sound, heat, light, astronomy, naturally occurring chemical reactions, importance of agriculture in contemporary society, social and psychological attachment to the land, and winter ecology.

Topic Analysis

There may be a problem with using this data as quantifiable since the responses of the participants were a hierarchal ranking. However this report only uses the broad categories of data and does not try to make quantifiable comparisons. Future use of this data will simply indicate which topics were important and which topics were less important to the eight science teachers.

Table 3, *Davis School District Natural Resource Topics and Other Resource Topics*, shows that natural resource topics are important to the science curriculum in the public schools as reflected in the science teachers responses. Their responses also support the observations of other horticulture and nature centers reported later in this chapter. They emphasize the importance of providing programming that fits within the science core of the state schools. One anomaly should be noted. The topic of greenhouse production was rated as being important to the respondents. This topic might fit elsewhere in the state curriculum.

TABLE 3.
Davis School District Natural Resource Topics and Other Topics

Natural Resource Topics	Other Topics
Native plants	
Water resource management	
Wetland enhancement	
Water quality enhancement	
Wetland ecology	
Water conservation	
Open space preservation	
Fish and wildlife habitat	
	Greenhouse production

Note: This table shows topics considered to be important to the science curriculum as determined by participating science teachers in Davis School District

Facility Presentation

Responses to the question regarding what facilities are needed to assist in the educational programming of the various topics are presented in Table 4, *Davis School District Topics and Facilities*. The numbers represent the number of respondents who recommended a facility in conjunction with the particular topic.

TABLE 4.
Davis School District Topic and Facilities

Topic	Interpretation Self-guided trails	Indoor Lecture Facilities	Outdoor Lecture Facilities	Indoor Labs	Outdoor Labs	TV & Distance Video Learning	Distance Learning
Water resource management	5	4	4	4	5	2	1
Wetland enhancement	4	3	6	3	6	5	2
Water conservation	3	6	3	2	2	2	1
Water quality enhancement	3	3	5	6	6	3	1
Storm water management	4	3	2	2	1	1	2
Farmland ecology	4	3	3	1	4	2	2
Wetland ecology	6	3	5	3	4	5	1
Native plants	7	1	3	3	4	2	1
Fish and wildlife habitat	4	2	3	2	6	2	1
Urban wildlife habitat	6		2		4	1	1
Open space preservation	3	1	4	1	1	3	3
Highway enhancement	3	2	3			1	2
Water wise landscapes	5		3	1	3	2	1
Energy conservation	1	5	1	1	1	5	2
Bioremediation	4	2	4	2	3	3	1
Composting	3		4		4	1	1
Recycling	1	3	1		2	2	2
Urban planning	2	3	1		1	3	2
Community design	1	3	1			2	2
Urban growth	1	4	1			3	1
Ornamental horticulture	3	3	5	2	2	2	1
Fruit crops	4	1	6		3	1	1
Vegetable crops	4	1	6		3	1	1
Integrated pest management	2	1	4	1	2	2	2
Greenhouse production	2	3	4	3	1	1	1
Houseplants	2	2	2	1			1
Floral arranging	2	2	2	2		1	1
Hosting services	2	2	1	1	1	1	1
Culinary arts	2	2	1	2		1	1
Equipment maintenance & use	1	2				2	1
Photography	3	1	2		2	1	9
Visual arts painting & drawing	3	2	3	2	5	1	2

Note: The numbers in this table represent the number of teachers out of eight that would utilize the corresponding facilities for each topic.

Facility Analysis

The facilities for the school district were listed according to topics. The frequency that these facilities were recommended has been tallied to provide the total number of times a facility was recommended across all topics. This shows which facilities are the most useful for the most topics and thus show what facilities should be considered during

the initial program-planning stage. These results are found in Table 5, *Davis School*

District Frequency of Facilities.

TABLE 5.
Davis School District Frequency of Facilities

	Interpretation Self-guided trails	Indoor Lecture Facilities	Outdoor Lecture Facilities	Indoor Labs	Outdoor Labs	TV & Video	Distance Learning
Frequency Facilities Listed	100	73	95	45	76	64	52

Note: The numbers in this table represent the total number of times a facility was recommended by the science teachers for all topics found in Table 4, *Davis School District Topic and Facilities.*

From this Table we can see that interpretation and space for outdoor lectures are important to the teachers. Outdoor labs and indoor lecture facilities are also important. It should be noted that indoor labs have the fewest responses. This may be due to the fact that teachers bring students to places like the UBC to get out of the classroom and to interact with nature.

The teachers generated other ideas at the focus group meeting regarding ideal educational facilities at the UBC. One facility of major interest among the group was the idea of having windows that present both an above and below ground view of the wetlands in order to show students what is occurring under the soil or in the water. Another idea included an indoor aquarium where fish and other wildlife from the ponds could be viewed.

Another suggestion was a picnic area large enough to accommodate two tour bus loads of students. Other ideas for the UBC facilities included a site for multimedia and audio- presentations. The teachers suggested that the UBC provide some science equipment that all schools could use thus eliminate the often costly and prohibitive

duplication of such equipment at individual schools. This would also create a need for storage facilities for such items at the UBC.

Open-ended Questions

Three open-ended questions were asked of the eight teachers from the school district. The objective of these questions was to assist in the planning of programs and facilities at the UBC. The questions and the quoted responses to these questions follow. It should be noted that an effort was made not to duplicate similar responses.

1. What should be the proximity of indoor facilities to outdoor activities?

“Within walking distance, particular concern would be for six year old students. Not a problem for high school students, they will enjoy the walk through the grounds.”

“The location of any type of building or structure would be best located very near the wetland and upland area. The pond, water, plants, and animals would be right on site for study. The under water windows to the ponds might also be best located at this site.”

2. Suggestions for planning outdoor sites for universal or disabled access.

“Reasonable.”

“Have paths and boardwalks be a minimum of four feet wide, if possible use pavers. Provide some wider spaces to turn wheelchairs around. Include access ramps.”

“Provide small “pullouts” at key educational points with tiered bleacher type seating so that all can hear and see.”

“Provide docks over water. All paths and greenhouses should be accessible. If there are indoor labs, provide drop counters for wheelchairs include sinks, etc.”

“Provide special viewing areas inside and out. The line of sight from wheelchairs should be taken into consideration.”

3. Please give us any other suggestions or observations that would help in the planning process.

“Construct trail loops for different age groups or use different designations for each age group on the trail so that interpretive information is age appropriate.”

“Provide outdoor wireless mikes and speakers to allow groups to hear tour guide at various locations.”

“The UBC doesn’t need a classroom set of thirty microscopes in labs, perhaps just twelve. Laser Discs, DVD, CD Rom, and Video Microscope equipment would be nice.”

“Add seasonal changes to some curriculum areas if possible.”

“Provide sites for hands-on experimental situations. Ex: Aquatic dip-netting.”

“Provide walkways wider than traditional sidewalk widths.”

“Provide calculator based lab units with pH, light, temperature, etc.. Have probes available for use by classes.”

“Provide dip nets, aquatic insect gear, 30x microscopes, and insect I.D. materials.”

“Include dioramas showing plant and animal life of the area.”

“Include labels for plants on established trails.”

“Gazebo or equivalent for outdoor gathering area & outdoor discussions. Filter freeway noise.”

“Provide areas for student research - science projects, have staff available as a resource for high school students.”

“For elementary aged students provide:

- large insects that can be taken apart
- large flower that can be taken apart”

“Soil display area with large samples of soils, rocks, and minerals of Utah.”

“Kiosk at ponds area should be enclosed with interactive displays.”

“Several fixed telescopes looking at various geologic features of the Wasatch mountains.”

“Provide a way to view the various stages of a fishes' life.”

“Provide recycling bins at facility.”

“Work in partnerships with projects Wild, Wet, and Learning Tree.”

“Use upper level students as researchers.”

“Use students for “labor” & involve them in the planning process. Student driven ideas get great results.”

Open-ended Questions Analysis

Teachers in the Davis School District recommend that the relationship of facilities to outdoor activities should be within walking distance for an elementary school child. A further suggestion was made that an educational building be located near the wetlands and ponds that provides observation windows that look out onto these educational areas. These respondents also noted that universal access should include boardwalks, unobstructed line of sight for wheelchairs, turn-around spots, and drop counters and sinks in any type of lab space. Boardwalks and paths should be wide enough to allow for the passage of two wheelchairs.

Other suggestions and recommendations by the teachers include the provision of interpretation for various age groups, some science equipment and storage for such equipment, and educational displays. Other areas of concern was the need to filter freeway noise, to use student labor in the planning and implementation of the UBC, and to provide areas where students could participate in research projects. An ideal educational tool would be to have windows that provide a sectioned view of both the water and the land.

Additional Teachers' Group Comments

Teachers were concerned that K-6 or preschool-age children not be neglected for the following reasons:

- eagerness and willingness to learn
- natural curiosity
- their learning rate at this period of their lives

There was agreement among the teachers that opportunities for students to become the educator are valuable. Older students could become the experts on a topic and teach younger students.

The development of a School-to-Career program is desirable and could potentially provide funding for educational programs at the UBC. Partnerships with the *Utah Association of Conservation Districts* and the *Natural Resource Conservation Service* could provide useful educational opportunities and curriculum for students.

Transportation is an issue for schools using buses, and the cost of field trips may be prohibitive. The UBC should consider providing opportunities for multiple grade levels at the same time. Busses would then be full.

University Students

Topic Presentation

The Technical Advisory Board for the UBC prioritized the list of education topics according to what they felt to be important for their colleges (See Table 6, *UBC Advisory Board Topic Importance*). There were nine topics that four or more of the eight

participants considered to be important. These topics are:

- Water resource management
- Wetland enhancement
- Water conservation
- Wetland ecology
- Native plants
- Fish and wildlife habitat
- Water wise landscapes
- Ornamental horticulture
- Integrated pest management

TABLE 6.
UBC Advisory Board Topic Importance

Topic	Important	Neutral	Unimportant
Water resource management	4	3	
Wetland enhancement	4	3	
Water conservation	6	1	1
Water quality enhancement	3	4	
Storm water management	2	2	3
Farmland ecology	3	1	3
Wetland ecology	4	3	
Native plants	6		1
Fish and wildlife habitat	4	2	1
Urban wildlife habitat	3	3	1
Open space preservation	2	4	1
Highway enhancement	1	2	4
Water wise landscapes	5		2
Energy conservation	3	4	1
Bioremediation	3	2	2
Composting	2	2	3
Recycling	2	1	4
Urban planning		2	5
Community design	1	3	3
Urban growth	2	1	4
Ornamental horticulture	6		2
Fruit crops	2	3	2
Vegetable crops	2	3	2
Integrated pest management	4	2	1
Greenhouse production	1	2	4
Houseplants	1	3	3
Floral arranging		3	4
Retail business and entrepreneurship	2	2	4
Finance	1	3	4
Business plans	1	1	5
Marketing	1	2	4
Human resource management		2	5
Hosting services		2	5

Topic	Important	Neutral	Unimportant
Culinary arts	1	1	6
Equipment maintenance and use		3	4
Facility management		3	4
Photography		2	5
Visual arts painting and drawing		2	5
Administration of distance learning sites	1	1	4

Note: The data represents eight respondents for each topic. For example in topic one, four respondents considered water resource management as important while three considered it as neutral and one gave no response.

Interestingly, eighteen out of the original thirty-nine topics listed were considered unimportant by four or more members of the advisory board. Four additional topics were added to the list from various respondents.

- “sustainable agriculture”
- “no till farming”
- “residential landscape design”
- “urban forestry”

Topic Analysis

If we look at the data according to the classification of natural resource topics vs. other topics we can see again that natural resource topics have a higher prioritization over other topics. (See Table 7, *UBC Advisory Board Natural and Other Topics*.)

TABLE 7.
 UBC Advisory Board Natural and Other Topics

Natural Resource Topics	Other Topics
Water conservation	
Native plants	
Water resource management	
Wetland enhancement	
Wetland ecology	
Fish and wildlife habitat	
Water wise landscapes	
Integrated pest management	
	Ornamental horticulture

Note: The topics in this table represent those topics considered to be of importance by the advisory board as indicated from data in Table 6, *UBC Advisory Board Topic Importance*.

Facility Presentation

The advisory board also recommended facilities that would be useful in presenting the various education topics at the UBC. This information has been presented in Table 8, *UBC Advisory Board Topics and Facilities*. The numbers represent how many board members recommended the facility for that particular topic.

TABLE 8.
UBC Advisory Board Topic & Facilities

Topic	Interpretation Self-guided tours	Indoor Lecture	Outdoor Lecture	Indoor Labs	Outdoor Labs	TV & Video	Distance Learning
Water resource management	5	5	2	3	4	2	2
Wetland enhancement	5	5	2	3	4	2	2
Water conservation	5	4	2	2	3	2	2
Water quality enhancement	4	5	2	3	4	2	2
Storm water management	4	3	2	2	2	2	2
Farmland ecology	2	3	2	1	2	1	1
Wetland ecology	6	5	2	3	4	2	2
Native plants	5	4	2	2	3	2	2
Fish and wildlife habitat	4	4	2	2	3	2	2
Urban wildlife habitat	4	4	2	2	3	2	2
Open space preservation	3	5	1	2	3	2	2
Highway enhancement	1	2	2			2	2
Water wise landscapes	3	5	2	1	3	2	2
Energy conservation	3	5	1	2	3	2	2
Bioremediation	3	5	1	2	1	2	2
Composting	3	3	2	1	2	2	2
Recycling	2	3	1			3	3
Urban planning		3	1			3	3
Community design	1	4				3	3
Urban growth		2				2	2
Ornamental horticulture	1	4	3	3	4	1	1
Fruit crops	2	4	3	4	5	3	3
Vegetable crops	2	5	3	4	5	3	3
Integrated pest management	3	6	2	3	4	2	2
Greenhouse production	1	2	1	3	1	2	2
Houseplants	3	3	2	3	1	2	2
Floral arranging	2	3	2	3	1	2	2
Retail business and entrepreneurship		3				3	3
Finance		3				3	3
Business plans		3				3	3
Marketing		3				3	3
Human resource management		3				3	3
Hosting services		3				3	3
Culinary arts		3		1		3	3
Equipment maintenance and use		2	1	2	1	3	3
Facility management		3			1	3	3
Photography		3	1	2	1	2	2
Visual arts painting and drawing		2	1	2	1	2	2
Admin. of distance learning sites		2				3	3

Note: The numbers in this table represent the number of advisory board members out of eight that would utilize the corresponding facilities for each topic.

One advisory board member recommended guided tours. This would be a valuable educational tool that would apply to many groups. A guided tour would be considered more of a teaching style and therefore special facilities would not be needed.

Facility Analysis

The frequency that a facility has been recommended across all topics can be found in Table 9, *UBC Advisory Board Frequency of Facilities*.

TABLE 9.
UBC Advisory Board Frequency of Facilities

	Interpretation Self-guided tours	Indoor Lecture	Outdoor Lecture	Indoor Labs	Outdoor Labs	TV & Video	Distance Learning
Frequency of Suggested Facilities	77	139	50	61	69	91	91

Note: The numbers in this table represent the total number of times a facility was recommended by the UBC Advisory Board for all topics found in Table 8, *UBC Advisory Board Topic and Facilities*.

By far the most important facility to the UBC Advisory Board was an indoor lecture facility. The second most important was the interpretation and self-guided tours. In contrast to the K-12 school teachers, who tended to prefer outdoor experiences, the professors seemed to be more comfortable in an indoor lecture environment.

Open-ended Questions

Responses to the open-ended questions are helpful in determining how the UBC might be used by the various colleges at USU. Responses to the questions are listed below by college.

1. What disciplines in your college would use the Center?

College of Family life No response.

College of Science “Biology”

College of Engineering	“Environmental Engineering, Biological and Irrigation Engineering”
College of Education	“Science methods courses for teachers and possibly some programs in the Center for Persons with Disabilities (CPD).”
College of Business	“Economics, Business Administration, Business Information Systems, Management & Human Resources”
College of Natural Resources	“Forestry & possibly Fisheries, Wildlife, and Watershed”
College of Humanities, Arts, and Social Sciences	“Landscape Architecture & Env. Planning”
College of Agriculture	“Plant, Soils, and Biometerology Department”

2. How would those disciplines use the Center for teaching purposes?

College of Family life	No response.
College of Science	“Visit to view plants.”
College of Engineering	“Storm water management & treatment, wetland management and enhancement.”
College of Education	“Science methods instructors would use it to demonstrate its potential as a site for outdoor, environmental, and botanical science instruction. The CPD could use it as a site for programs.”
College of Business	“A Downlink from campus and Broadcasts to other sites.”
College of Natural Resources	“For field trips if special plant materials are readily available on site.”
College of Humanities, Arts, and Social Sciences	“Plant identification - plant composition, function relationships, and plant associations. Demonstration of landscape construction techniques, methods, and materials. Teaching research methods.”

College of Agriculture “Extension Class Division Courses
 Extension training (i.e. Master Gardner)
 Regular USU courses (field trips, etc.)”

3. Governor Leavitt has suggested that the USU’s Continuing Education Ogden Center be moved to the Kaysville site. In addition, there are plans to provide a com net downlink at the UBC. Keeping these things in mind, what education programs do you feel should occur at the Utah Botanical Center?

College of Family life “All of the areas mentioned in your list.
 Any programs offered through Continuing
 Education for credit could be offered. This
 opens the door for USU to have a presence
 in Davis County.”

College of Science No response.

College of Engineering “I can’t think of any beyond those listed in
 Table A. If the Ogden Center is moved to
 the Kaysville Site, UBC facilities may be
 useful in teaching some Environmental
 Engineering graduate courses currently
 taught through the Ogden Center.”

College of Education “The primary educational programs at the
 UBC should be related to the mission of the
 UBC. Other programs could use the
 facilities on a space available basis.”

College of Business “Those that have broad appeal (i.e. more
 students). Priority should probably be given
 to those departments and courses which can
 take advantage of the whole facility (i.e.
 indoor/outdoor labs, etc.) Much of what is in
 Business College wouldn’t take advantage
 of the full facility.”

College of Natural Resources “This place should be used for education
 programs that will make use of the
 opportunities that only a botanical center
 offers- plant materials, landscapes,
 demonstrations, etc. It should not be used

just as a place to put buildings and parking lots to serve unrelated users.

I would use this mainly as a place to conduct extension forestry workshops. I see little use for conducting university classes there where we bring down students from Logan. Could offer some college credit courses for people in the Wasatch Front, but again this shouldn't just be general classroom space."

College of Humanities, Arts,
and Humanities

No response.

College of Agriculture

"Courses should be limited to issues relevant to the UBC."

Open-ended Questions Analysis

It appears that most colleges at USU have at least one department that would use the UBC. The Colleges of Education, Humanities and Arts, and Agriculture would use the facilities the most. The College of Education might use it for science methods courses for teachers and for programs in the Center for Persons with Disabilities. The latter program might be along the lines of horticulture therapy. The department of Landscape Architecture and Environmental Planning, in the College of Humanities and Arts, would use the UBC for plant identification, composition, function, and associations. In addition, they would look at demonstrations of landscape construction techniques, methods, and materials. They might also review research methods at the UBC. The College of Agriculture would use the facilities for Extension Class Division Courses, Extension training (Master Gardener Program), and regular plant courses such as field trips.

In response to the question that pertained to what types of education programming should occur at the UBC, most of the respondents felt that only those relating to the mission of the UBC would be appropriate. One respondent suggested that there would be little need to bring students down to conduct a class at the UBC, although some college credit courses could be offered for people in the Wasatch Front. However, the respondent was quick to point out that the UBC should not solely provide general classroom space and that college credit courses could utilize the UBC on a space available basis. In addition, it was also mentioned that the UBC should not be used by the University as a place to put buildings and parking lots not essential to its basic mission.

Nursery and Landscape Industry Professionals

Presentation

Ten representatives from the nursery and landscape industry also responded to several open ended-questions. One question asked about what type of program format was the most useful to them. Data from this question is presented in Table 10, *Nursery and Landscape Industry Program Format*. It should be noted that some participants did not respond to all of the options on the question and therefore the totals do not add up to exactly ten.

TABLE 10.
Nursery and Landscape Industry
Program Format

Program Format	Number of Responses out of 10 participants
Short course 1-2 Weeks	3
Long course 3+ weeks	2
Saturday	2
Weekday	5
Daytime	4
Evening	7
Credit	4
Non-Credit	6
Certificate Preparation	3
Non-certificate	3
Demonstration/Self Taught	2
Courses with instructors	5
Lab experience/ Hands-on	3
Lecture style	4

Note: Indicates preference of educational format.

Several additional open-ended questions were asked of the nursery industry. Many of these focused on educational topics that might assist the nursery and landscape industry in their profession. An additional question asks for planning suggestions regarding the UBC. The questions and their quoted responses follow. Again, not every participant answered every question. An effort was made not to use duplicate responses.

Please list the environmental issues in which you need further training.

“Water, Weed control, plant nutrition, soils, pH.”

“Urban/Community/Arboriculture/Forestry, and plant health.”

“Landscape Design/water conserving landscape design.”

“Long term results of pesticide and chemical use, deer resistant plants and design, more use of native plants in home landscapes.”

“Water conservation (short& long term).”

“Green Industry impact on pollution, etc.”

“Sustainability.”

Please list any environmental restrictions or standards for which you need further training.

“Private pesticide application training; HazComm; WPS; IPM; Lightning safety and other safety issues related to farming.”

“Water and pesticides.”

“Line clearance for overhead power lines.”

“Pesticide handling.”

“Alternative pesticide chemicals or organic pest control.”

What environmental issues should the Utah Botanical Center address as an education and research facility?

“Pesticide applicator training; WPS & handler training; IPM; Turfgrass studies and testing (NTEP) and other research for Utah’s climate and soils.”

“Home composting; mulch technology; soils; xeriscaping; irrigation systems.”

“Drought hardy or low water plants; native plants; water.”

“Landscape plants, turf, etc.; pesticide testing.”

“Ground water safety/ water conservation; emphasis on air quality in SL Valley; organic pest control.”

“Environmental impact of pesticides, urban forestation, noise& air pollution, etc.”

“Non-toxic or Low-toxicity pest & weed control, and plant nutrition.”

“Basic pruning principles.”

“Creating microclimates in the landscape.”

From the broad list of topics you have listed in the above questions, what specific topics would be the most beneficial for you to study?

“Pesticide applicator training.”

“Horticulture; water issues.”

“Plant health care in urban landscapes.”

“Native plants.”

“All of them.”

“Water resources/conservation (as pertaining to possible future restrictions on supply).”

“Sustainability.”

What types of educational programming have you found to be most useful at institutions such as public gardens?

“Field days.”

“Horticulture.”

“Demonstration areas (finish the ‘Utah House’).”

“Plant labeling and Landscape uses; handouts.”

“Tours; seminars; professional association functions.”

“Classes on specific subjects: butterfly gardening, bird gardening, native plants.”

What types of programming have you found to be least useful?

“The ones [I] missed.”

“Flower arranging.”

“Long courses (most won’t commit).”

“Too simple (in a retail situation we need practical, tried and true methods/concepts taught in a sound manner).”

Please write any other comments or suggestions you have about the planning or function of the new Utah Botanical Center.

“I am interested in turfgrass studies there.”

“Plan to construct a small conference center available to user groups; have a committee of various interest groups to schedule education functions.”

“Provide a “800” info hotline with knowledgeable staff.”

“What I saw on the wetland plan looked great.”

As a representative member of your industry, how do you feel the Utah Botanical Center could assist your industry in their educational needs?

“Teach watering techniques and water auditing and water conservation in the landscape. Also energy conservation through landscaping to cool living/working areas vs. air conditioning. Also other professional horticulture practices that enhance quality of life and the environment.”

“All aspects of education.”

“Demo’s of new representative plants for the landscape; demos of proper tree management; produce free materials for distribution (education); regular lecture series; make facilities available to outside groups with similar goals.”

“Educate the public as well as the professional.”

“Provide facilities and help with certification programs.”

“Provide more outreach to the local nurseries in: pest control; native plants; water conservation; SL air quality concerns.”

“Provide disease/ insect alerts; list of fax/e-mail sites.”

“Host Master Gardener course, ASLA’s design course, etc.”

“Theme demonstration gardens: xeriscape; sun/shade; dry/wet; dwarf evergreens; native plants vs exotics; water gardens & wetlands....alpine.”

Analysis

Professionals in the Nursery and Landscape industry are interested in education. They were fairly evenly split (3-2) on the desired length for a course. Most of the respondents preferred weekday rather than weekend classes. Although some people were interested in daytime classes, there were almost twice as many supporters for evening classes. A combination of certificate and non-certificate courses, as well as credit and non-credit courses would be appreciated. The respondents preferred courses with instructors who offered a combination of lecture and hands-on experience.

Members of this industry are concerned with various issues. Many of these issues relate to water conservation, pesticide handling and use, water-conserving plants, the green industries' impact on pollution, integrated pest management, and safety issues related to farming and overhead power lines. The respondents indicated that they would like further training on these subjects. An important aspect of training would be the environmental restrictions and standards applicable to these subjects. Specifically, the industry members desire training in pesticide application, plant healthcare in urban landscape, native plants, water resources and conservation, and sustainability.

They have found that a variety of education formats including field days, demonstration areas, plant labeling, handouts, tours seminars, and classes on specific subjects are useful in the learning process. Some feel that long courses are not as effective and most members of the industry would not commit to such programs. In addition, the respondents stated that programming should be practical and teaching methods and concepts should be familiar.

Additional suggestions for the UBC included theme gardens and demonstration plots on turf grasses and other plants native to the state of Utah. An “info” hotline with knowledgeable staff would be helpful to the public and professionals by disseminating information on common questions, diseases, and insect alerts. The UBC could provide a list of fax, e-mail, and internet sites related to the issues being addressed in their educational programs. The UBC could also provide outreach to local nurseries. They could teach watering techniques, auditing, and conservation of the landscape, and also teach energy conservation through appropriate landscaping. The UBC could host Master Gardener courses and ASLA design courses and provide a conference center available to various professional groups for educational purposes.

General Public

Topic Presentation

Information was gathered from the public by the UBC in the form of a survey completed in October 1994. The survey did not directly ask about educational programming and facilities. It did, however, ask about the types of displays that the public would be interested in viewing at the UBC. Although these topics are not the same as those used in the formal study, there were similar topics. Extrapolation of the data into similar topics has been done whenever possible. Topics similar to ones used in the formal study are in parenthesis. This data can be found in Table 11, *UBC General Public Survey (Topics)*. It should be noted that because there were 465 respondents in the survey, the numerical results are listed in percentages.

TABLE 11.
UBC General Public Survey (Topics)

Please indicate if you would be interested in seeing any of the following landscaping or horticulture displays.

Survey Topics (Study Topics)	% Responded	
	Yes	No
Fruit trees (Fruit crops)	84	16
Vegetable gardens (Vegetable crops)	85	15
Herb gardens (Vegetable crops)	74	26
Roses (Ornamental horticulture)	88	12
Annuals and perennials (Ornamental horticulture)	95	5
Trees and shrubs (Ornamental horticulture, native plants)	97	3
Turf grass (Ornamental horticulture, water conservation)	54	46
Native and wildflower plantings (Native plants)	86	14
Backyard ponds/ fountains	73	27
Wetlands / riparian (Wetland ecology, wetland enhancement)	52	48
Greenhouse/ conservatory (Greenhouse production)	68	32
Landscaping for wildlife (Urban wildlife habitat)	67	33
Composting (Composting)	62	38
Paving surfaces	46	54
Garden structures	73	27
Outdoor lighting	69	31
Fencing	60	40
Retaining walls	56	44
Drought tolerant landscapes (Water conservation, native plants)	83	17
Plants for low maintenance (Native plants)	93	7
Turf / lawn alternatives (Water conservation)	69	31
Low water irrigation methods (Water conservation)	81	19
Reducing landscaping maintenance costs	90	10
Reducing landscaping maintenance time	90	10
Lawn alternatives i.e.bark, other grasses, ground covers, etc. (Water conservation)	83	17

Topic Analysis

The general public was interested in a variety of horticulture-related topics. If the data in Table 11, *UBC General Public Survey (Topics)*, is extrapolated to account for the topics related to this study, then the relative importance of some of the natural resource

topics can be determined. It appears that eighty percent or more of the respondents are interested in the following topics:

- Fruit crops
- Vegetable crops
- Ornamental horticulture
- Native plants
- Water conservation
- Reducing landscaping maintenance costs
- Reducing landscaping maintenance time

Facility Presentation

The 1994 UBC survey also has a question regarding the importance of providing various activities. For some of the activities listed, it is possible to assume that certain facilities might be needed. Although it might not be totally accurate, an effort was made to assign facilities to some of the activities in order to get a sense of what types of facilities might be favored by the general public. This data can be found in Table 12, *UBC 1994 Public Survey of Activities (Facilities)*. The respondents had four options for this question: “very important”, “important”, “not important”, and “don’t know”. Again, due to the number of respondents, the data is recorded as a percentage. Only data from activities related to education were used in this study.

TABLE 12
 UBC 1994 Public Survey of Activities (Facilities)

		How important is it for the UBC to provide the following activities?			
	Activity [Facilities]	% Responded			
		VERY IMP.	IMP.	NOT IMP.	DON'T KNOW
1. Interpretation (self-guided tours)	4. Indoor Labs				
2. Indoor lecture	5. Outdoor labs				
3. Outdoor lecture	6. TV&Video				
	7. Distance Learning sites				
Community education [1,2,3,4,6,]		49	45	1	5
USU credit classes [1,2,3,4,6,]		33	49	7	11
Extension classes (Master Gardener, etc) [1,2,3,4,6]		37	50	4	9
Plant information (literature, plant solving info) [1]		63	33	1	3
Horticulture library		37	52	4	7
Conference/Reception facilities [1,2,3,]		14	41	31	14
Workshops [2,3,4,6]		28	62	4	6
Demonstrations [1,2,3,4,5,6]		39	54	4	3
Displays [1]		38	54	4	4
Garden tours [1]		47	45	3	5
Identify plants [1,2,4]		54	42	1	3
Cultural events [2,3]		17	48	22	13
Concerts [2,3]		17	37	32	14
Festivals [2,3]		16	41	29	14
Exhibits [2,4]		28	55	9	8

Facility Analysis

Because the 1994 UBC Public Survey did not address facilities, an effort has been made to extrapolate what facilities might be useful according to the types of activities the public considered important. The facilities that had the most recommendations are listed in the order in which they might have the most use. Again, it is important to note that this listing is based on my best educated guess.

- Indoor lecture facilities
- Outdoor lecture facilities
- Interpretation (self-guided tours)
- Indoor labs/classrooms
- Tv and video equipment

It appears from the survey that the general public is more interested in traditional garden activities and consider cultural events, concerts, festivals, and conference and reception facilities to be less important.

Similar Education Organizations

Botanical and Nature Centers

Topic Presentation

The information gathered from the horticulture and nature centers was reviewed. Most of these organizations do a great deal of educational programming covering a wide variety of topics. These topics were broken down to fit into the list of natural resource topics that was prepared for this study. The data has been placed into a matrix according to topic, organization, and the target audience for these topics. Educational programming that relates to horticulture topics was not reviewed, and thus these topics were listed with a “n/a” in the matrix. This information is in Table 13, *Topics and Target Audiences by Institutions*. Two additional topics were added to the list upon review of the materials from these organizations. The first was “Landscape Legacy”, which looks at the historical context of the native landscape including its plant communities and uses. The second topic is residential landscape architecture.

Because so much information can be lost by reducing information to numbers or letters, examples of some programming have been preserved in written form. An effort was made to provide a description of some of the more interesting programs by including quotes.

Botanical History Comes Alive in Northeast Ohio -- “An interactive classroom program that engages students in an educational and entertaining study of the world

of plants. Characters will focus on the important aspects of their lives and work that deal with the world of plants. They will engage students in discussion and activity that will illustrate the connections between the discoveries of the past and our work in the plant sciences today.” -**Holden Arboretum**

Black Creek Canoe Trip-- “Canoe down south Mississippi’s only designated National Wild and Scenic River, Black Creek. Executive Director Larry G. Pardue will guide this afternoon safari. Along the way we will talk about the plants and plant communities that grow along the creek....” - **The Crosby Arboretum**

Prairies, Prairies, Prairies! -- “We’ll meet at Fontenelle Forest Nature Center for a brief overview of prairies and prairie life, then travel to two privately-owned native prairies.” – **Fontenelle Forest Nature Center**

Smaller American Lawns Today (SALT)-- “SALT is a new movement, originating at Connecticut College, aimed at reversing the lawn mania in America by restoring home and industrial grounds to more harmonious productive ecologically sound naturalistic landscapes....Now the natural landscape is fragmented into ever smaller unconnected pieces. Lawns contribute to this fragmentation, and are a major cause of the continuing loss of biodiversity locally, and also contribute to this problem globally.” – **Connecticut College Arboretum**

TABLE 13.
Topics and Target Audiences by Institution

Topic	Brooklyn Botanic Garden	Delaware Nature Society	Ferris State University	Frontier College	Kalamazoo College	Michigan State University	Ogden Nature Center
Water resource management		p		a	s		
Wetland enhancement	s						
Water conservation					y		
Water quality enhancement					s		
Storm water management					s		
Farmland ecology	s	sy			s		
Wetland ecology	s	syp	s	syp	s		s
Native plants	s	syp	s	syp	s		s
Fish and wildlife habitat	s	yps	s	syp	s		s
Urban wildlife habitat							
Open space preservation							
Highway enhancement							
Water wise landscapes							
Energy conservation					s		
Bioremediation							
Composting	spa	p		a			
Recycling		p					
Urban planning							
Community design							
Urban growth							
Ornamental Horticulture	n/a	m/a	n	m	n	n	n
Fruit Crops	n/a	m/a	n	m	n	n	n
Vegetable Crops	n/a	m/a	n	m	n	n	n
Integrated pest management							
Greenhouse production	n/a	m/a	n	n	n	n	n
Houseplants	n/a	m/a	n	n	n	n	n
Floral arranging	n/a	m/a	n	n	n	n	n
Retail business & entrepreneurship	y						
Finance	n/a	m/a	n	n	n	n	n
Business plans	n/a	m/a	n	n	n	n	n
Marketing	n/a	m/a	n	n	n	n	n
Human resource management	n/a	m/a	n	n	n	n	n
Hosting services	n/a	m/a	n	n	n	n	n
Culinary arts	n/a	m/a	n	n	n	n	n
Facility management	n/a	m/a	n	n	n	n	n
Admin. of distant learning sites	n/a	m/a	n	n	n	n	n
Equipment maintenance, use	n/a	m/a	n	n	n	n	n
Photography	n/a	m/a	n	n	n	n	n
Visual arts painting, drawing	n/a	m/a	n	n	n	n	n
Sustainable agriculture							
No till farming							
Residential landscape Design							fp
Urban forestry							
Landscape Legacy		a					

Note: Topics marked with an "N/A" represent topics not addressed in institutions. Blank, relate to natural resource issues but are not current.

Topic Analysis

These organizations provide a great number of programs as seen in Table 13, *Topics and Target Audiences by Institution*, yet, natural resource programming is limited to just a few topics. Most institutions cover wetland ecology, native plants, and fish and wildlife habitat in their educational programs.

Three topics from this research were not addressed by these organizations. These topics were highway enhancement, bioremediation, and administration of distant learning sites. Although distant learning sites were not addressed from a resource conservation standpoint, some facilities operate satellite classes so that participants do not have to travel far to gain access to the information that these organizations are providing

Table 14, *Number of Institutions Presenting Topics*, shows how many institutions are addressing a specific topic.

TABLE 14.
Number of Institutions Presenting Topics

Topic	Total Number of Institutions
Water resource management	11
Wetland enhancement	2
Water conservation	6
Water quality enhancement	2
Storm water management	4
Farmland ecology	8
Wetland ecology	17
Native plants	23
Fish and wildlife habitat	22
Urban wildlife habitat	7
Open space preservation	1
Highway enhancement	
Water wise landscapes	2
Energy conservation	3
Bioremediation	
Composting	7
Recycling	2
Urban planning	2
Community design	1
Urban growth	1
Ornamental Horticulture	1
Fruit Crops	
Vegetable Crops	
Integrated pest management	4
Greenhouse production	
Houseplants	
Floral arranging	3
Retail business & entrepreneurship	3
Finance	
Business plans	
Marketing	
Human resource management	
Hosting services	
Culinary arts	
Equipment maintenance & use	1
Facility management	
Photography	3
Visual arts painting and drawing	
Administration of distance learning sites	
Sustainable agriculture	
No till farming	
Residential Landscape design	10
Urban forestry	
Landscape Legacy	7

Another important aspect of these programs is the target audience that is being addressed. Table 15, *Frequency of Topics by Target Audiences*, shows how many institutions are targeting a specific audience for each topic. This is useful information in determining which target audiences are more successful with these topics.

TABLE 15.
Frequency of Topics By Target Audience

Topic	K-12	General Public Youth	General Public	Professionals	College Students
Water resource management	5	3	5	3	0
Wetland enhancement	1	1	0	0	0
Water conservation	3	2	4	1	0
Water quality enhancement	2	1	1	1	0
Storm water management	3	1	4	1	1
Farmland ecology	6	4	4	1	0
Wetland ecology	14	8	9	5	0
Native plants	17	8	15	7	2
Fish and wildlife habitat	18	11	12	8	1
Urban wildlife habitat	2	0	5	1	0
Open space preservation	0	0	1	1	0
Highway enhancement	0	0	0	0	0
Water wise landscapes	1	0	2	0	0
Energy conservation	1	1	2	1	0
Bioremediation	0	0	0	0	0
Composting	5	1	5	2	0
Recycling	0	0	1	1	0
Urban planning	0	0	2	0	0
Community design	0	0	1	0	0
Urban growth	0	0	1	0	0
Ornamental horticulture	0	0	0	0	0
Fruit crops	0	0	0	0	0
Vegetable crops	0	0	0	0	0
Integrated pest management	0	0	3	1	0
Greenhouse production	0	0	0	0	0
Houseplants	0	0	0	0	0
Floral arranging	0	0	1	0	0
Retail business & entrepreneurship	0	2	1	0	0
Finance	0	0	0	0	0
Business plans	0	0	0	0	0
Marketing	0	0	0	0	0
Human resource management	0	0	0	0	0
Hosting services	0	0	0	0	0
Culinary arts	0	0	0	0	0
Equipment Maintenance & Use	0	0	0	0	0
Facility management	0	0	0	0	0
Photography	0	0	1	0	0

Topic	K-12	General Public Youth	General Public	Professionals	College Students
Visual arts painting & drawing	0	0	0	0	0
Administration of distance learning sites	0	0	0	0	0
Sustainable agriculture	0	0	0	0	0
No till farming	0	0	0	0	0
Residential landscape design	0	0	8	1	0
Urban forestry	0	0	0	0	0
Landscape Legacy	4	1	6	0	0
Total Number of Times Programs are Offered for Target Audiences	82	44	94	35	4

Note: The numbers represent the number represents the number of institutions.

The numbers at the bottom of the table represent the total for each column. These figures show which audiences get the most attention and resources from institutions. School programming and the adult general public receive the most attention although it is clear that the majority of the programming is focused on children either through schools, or other public youth programs. The frequency was 126 for combined youth programs, and 94 for adult programs. This would indicate that, for these institutions, the most successful programs target youth audiences.

Facility Presentation

In an effort to gain a better idea of what facilities might be needed to accomplish the educational goals of the UBC, the organizations were asked what kinds of facilities they have. It was not possible to get complete information on what facilities were being used for the various topics as many participants did not have the time to review each program and list the facilities individually. Most facilities are being used for each topic. In conversation with the educators at these facilities, it seems that oftentimes classrooms and lecture rooms are multipurpose rooms. Instead of trying to develop a

matrix with topics and facilities compared, Table 16, *Organizations and Facilities*, has been developed to show facilities available at the organizations.

In addition, a description of some of the facilities at different locations has been provided to give a better understanding of the types of facilities being used. Some of these descriptions come from brochures while others are from conversations with the educators at these organizations.

Gilbert and Martha Hitchcock Wetlands Learning Center—“The 3,500 square-foot education building is nearly ready for ground breaking....It will include two classrooms, indoor and outdoor exhibits, an office, restrooms, a caretaker’s apartment, and special equipment for aquatic learning. The simple, farmhouse-style building is designed to be unobtrusive in the wooded setting. Outside the building will be an 1,800 foot, barrier-free boardwalk leading to a two-level wildlife observation blind on the edge of the Great Marsh.”—**Fontenelle Forest**

National Wildflower Research Center—“...[A] 34,000 square-foot building and numerous outbuildings and outdoor areas ... will allow for much-needed expansion of existing programs and enable the Center to enhance the quality of the experience it offers thousands of visitors each year. The facilities will include a 240 seat auditorium, education/reception gallery, multipurpose classrooms, children’s education activities center, library/reception hall/boardroom, and volunteer areas. There will be additional administration and research areas.”— **National Wildflower Research Center**

Fernwood Nature Preserve – “The facilities at Fernwood include a larger classroom with the capacity of ninety people and a smaller classroom seating forty. They also have an interactive children’s activity room, a lecture hall/art gallery that can seat 130-160 people, a library, and an outdoor teaching platform sixty feet by forty feet.” – **Fernwood Nature Preserve**

TABLE 16.
Organizations and Facilities

Facility	Brooklyn Botanic Gard.	Chicago Botanic Gard.	Connecticut College Arb	Crosby Arboretum	Davis Arboretum	Holden Arboretum	Lady Bird Johnson	Missouri Botanic Garden	Morris Arboretum	New York Botanic	Phipps Conservatory	Red Butte Gardens	State B.G. of Georgia	University of Guelph	Washington Park Arb.	Bernheim Arboretum	Chippewa Nature Cent.	Delaware Nature Society	Fernwood Nature Cent.	Fontenelle Forrest N.C.	Kalamazoo N. C.	Ogden Nat. Cent.	The Greenway Nat. Cen.
Interpretation (self-guided tours)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Indoor Lecture		x		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
Outdoor Lecture Facilities		x		x	x						x		x		x			x	x		x		x
Indoor Labs/classrooms	x				x	x	x	x	x	x	x	x	x	x			x	x	x	x		x	
Outdoor Labs					x						x		x	x			x						
TV/Video equipment						x	x						x	x			x	x		x		x	
Computer/Laser Disks								x				x	x								x		x
Projection Equipment						x	x					x		x			x	x		x	x		
Sound Equipment							x					x	x					x		x			
Institution Grounds	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bus or van																x		x					x
Classrooms	x	x	x			x	x		x	x		x						x	x	x	x	x	x
Multipurpose room		x	x			x	x			x								x		x			
Floral Design lab										x													
Landscape design room										x													
Exhibit Hall						x	x				x									x	x		x
Puppet Theater													x										

Facilities Analysis

Although facilities are an important part of the education process, the most important facilities are the grounds, for they are the basis of the educational programs.

Table 17, *Frequency of Facilities Used at Various Botanical and Nature Centers*, shows the frequency of occurrence of facilities across the various organizations.

TABLE 17.
Frequency of Facilities Used at Various Botanical and Nature Centers

Frequency of Suggested Facilities	Interpretation (self-guided tours)	Indoor Lecture Facilities	Outdoor Lecture Facilities	Indoor Labs/Classrooms	Outdoor Labs	TV/Video Equipment	Computer/Laser Disks	Projection Equipment	Sound Equipment	Institution Grounds	Bus or Van	Class Rooms	Multi-purpose rooms	Floral Design Lab	Landscape Design Room	Exhibit Hall	Puppet Theater
	23	18	11	14	5	6	5	6	4	23	3	14	7	1	1	5	1

Note: Numbers represent the frequency a facility was mentioned across all institutions.

As the table indicates, one organization has a puppet theater. This is an unusual facility, but it is apparently successful for children's programming. Other specialized facilities are a drafting room for landscape design courses, and a floral design lab with refrigerators and overhead mirrors for floral design classes. Although only one organization listed these two facilities, they would be important for these types of classes. The other primary facilities after the grounds and interpretation are indoor and outdoor lecture facilities, labs/classrooms, and dedicated classroom space.

Open-ended Questions

The botanical and nature centers were asked additional open-ended questions regarding unsuccessful programming and input into the planning process. Some of the respondents provided information that relate more to curriculum than topic and facility planning, but their responses were included as valuable information for future planning at the UBC. The organizations name and response are detailed below.

What programs have you found to be particularly unsuccessful and why?

Brooklyn Botanic Garden	“‘Big Name’ speakers – can’t recoup the cost. Anything too obscure – audiences are general gardeners and not of a scientific background.”
Chicago Botanic Garden	“The botanic garden is known for horticulture and landscape design – if they stray outside those subjects, then they are usually unsuccessful.”
Connecticut College Arboretum	“Mixing audiences – keep children and adult programming separate.”
Crosby Arboretum	“Organic gardening – not sure why. Some programs are great the first year and then the market is either easily saturated or else another organizations steals idea and audience.”
Davis Arboretum	“Success depends most on teacher and on publicity. Same course can be successful with one teacher and less so with another. We have had trouble meeting the needs of university classes due to our small staff, but a number of UCD courses are taught in the arboretum.”
Holden Arboretum	No response.
National Wildflower Center	No response.

Missouri Botanic Garden	“Providing packets of materials for parents to use with kids when they come to the garden – parents aren’t looking for a structured education program on a leisure visit.”
Morris Arboretum	“Classes on botany – not the practical thing that you can take home and see results. Haven’t had tremendous luck with children’s programs – competing for children’s time. Art classes - not a big audience.”
New York Botanic Garden	“Guided family tours – families don’t operate in that way, tours are too rigid.”
Phipps Conservatory	“Adult programs on tropical plants – no registrants, little interest in learning more about these plants. Adult programs on desert plants -- again no registrants. Adult programs on composting – no registrants, prejudice against compost. Adult cooking classes – inadequate facilities.”
Red Butte Gardens	“Regularly Scheduled tours – can’t accommodate everyone. Hike with a Naturalist – no fee for program, people don’t value it because they don’t have to pay money for it. Kids’ craft classes – timing was too varied. Some school programs – sometimes a problem because publicity wasn’t reaching the necessary or appropriate people. Training Garden Guides – they never volunteered but they had great gardens at home.”
State Bot. Garden of Georgia	“After school programs for children have never done well. – Perhaps the children who attend our programs are involved in other extra-curricular activities. Also, we are not withing walking distance to any elementary schools.”
The Arboretum, Univ. of Guelph	No response.
Washington Park Arboretum	“Behind-the-scenes offered midweek a.m. –attendance mostly volunteers - changed name, moved to weekends to attract broader audience.”

Bernheim Arb. & Research Forest	“Kids’ mini-scientific research area, species counts, sample size.”
Chippewa Nature Center	“Classes that have been mostly lecture/leader focused, classes with content that is not age appropriate. Also, we have a hard time tapping the middle and high school market due to the class schedules at the schools; it is harder for teachers to bring students for longer than the 50 minutes allotted for their class period.”
Delaware Nature Society	“Weather program – maybe needed to be more exciting. Air Alert - air pollution – Doesn’t really have anything to do with plants except for lichens, but fits school science core.”
Fernwood Nature Preserve	“Public walking tours every Sunday at the same time. Teachers want them to do a lot more than they have time for. Some programs are really quite rushed.”
Fontenelle Forest Assoc.	“The more specific the class, the less attendance in general. General public programming is difficult in general.”
Kalamazoo Nature Center	“Extended hours didn’t work with family programs – poor attendance. Early Sunday morning openings – maybe just have the grounds open instead of having all the facilities open would have been adequate.”
Ogden Nature Center	“School programs for families on Saturdays – maybe an advertising problem. Those who come enjoy it, just not a large group of participants.”
The Greenway Nature Center	“Weekend programs have had some problems – have had to move to a RSVP. If they aren’t bringing home a project, consumers not willing to pay. Don’t have a stable weekend teacher. School programs are limited due to transportation restraints in the school district.”

We welcome any advice on the planning of our educational programs.

Brooklyn Botanic Garden	“Don’t over extend yourself – every program needs to be a blockbuster to begin with to attract and keep your audience. Don’t be afraid to try something new. Quality of programs more important than quantity. Allow participants to evaluate programs.”
Chicago Botanic Garden	“Start out small and grow. Don’t start out with a full-blown program.”
Connecticut College Arboretum	“Target your audience – have high quality programs. We seem to get the same type of clientele in all programs. Public Relations and publicity really need to zero in on audience and advertise to the right audience.”
Crosby Arboretum	“We focus about 80 % on tried and true programs. The other 20% is experimental and aimed at new subjects or audiences. We know we will never be everything to everyone. Most of our courses are limited to twenty people. Some of the most successful programs have been landscape design, canoe trips, and notable guest lecturers.”
Davis Arboretum	No response.
Holden Arboretum	“Know your audience, look at how your circulation is going to work.”
National Wildflower Center	“Provide plenty of classrooms. Include a lot of storage for children’s programs”
Missouri Botanic Garden	“Put in lots of storage, special entrances for buses and school groups so that they don’t congregate at the ticket counter. Greenhouse for growing plants for classes, separate from other greenhouses. Special parking for school busses.”
Morris Arboretum	“Plenty of dedicated space just for children if that is where you want to focus. Entrance just for children. Areas that can get dirty and be cleaned up easily. Multi-purpose function rooms for food

	facilities. Plenty of storage space. Have discovery carts out in the garden.”
New York Botanic Garden	“Determine what the audience is interested in – our largest audience likes gardening. Let visitors create their own experience. Don’t offer workshops for families and kids. Maybe some trips would be good.”
Phipps Conservatory	“Talk to your community and find out what types of programs they are interested in, and what they expect your education department to provide in classes. Programs targeted to elementary school classes seem to be the most profitable.”
Red Butte Gardens	“If school programs are in line with state science core, they will help more teachers. Pre-visit activities and wrap-up activities in the schools are beneficial. Involve teachers in school programs, taking into account what they are doing in their classrooms. Have a hotline for common questions.”
State Botanic Garden of Georgia	“Communicate with the people in the area to find what programs are desired. Some of our most popular programs have been the practical, straight-forward classes. i.e. “Here’s how you plant a perennial border.” Many people are looking for well organized, educational activities to do with their children. Good publicity is a must!”
The Arboretum, Univ. of Guelph	No response.
Washington Park Arboretum	“Audience assessments and focus groups helpful.”
Bernheim Arb. & Research Forest	“Entertainment/Edutainment. Work with teachers.”
Chippewa Nature Center	“Keep the classes as student-guided as possible; i.e. not having a leader constantly lecturing or pointing out everything. Find ways to have the students doing the discovering themselves with gentle/subtle guidance from the leader. Decide on your organization’s overall educational goals. Then set the goals for each program and then start planning

the class content being sure it stays in line with the goals that are set.”

Delaware Nature Society

“Whatever programs that you do, make it a valuable service, something that students cannot do in class. We want our programs to be unique and not repeatable by a teacher, using a resource that schools don’t have access to. Have programs fit into the science core so that they have reason to participate. Teachers want live animals in outreach programs and hands-on, things that they can’t do on their own.”

Fernwood Nature Preserve

“Focus on children’s programming and family activities. Adult classes aren’t very well attended. The garden gets more adults because adults are more interested in gardening and not nature stuff. Birding is one of the fastest growing activities in America today. Eco-tours are also popular – they could be local, they don’t have to be extravagant. Be flexible, if doesn’t work, try again. Try to keep cost in a range that families can afford. Provide plenty of storage for displays. Provide a room for class and display preparation – don’t have it be a multi-use room so that you don’t have to clean up every day.”

Fontenelle Forest Assoc.

“Closely watch the school curriculum. High quality programs are very important. They use paid teachers to assure the quality of the programming. Their programs are more than a field trip. Make sure kids and adults have a great time. Provide opportunities for evaluation by school teachers.”

Kalamazoo Nature Center

“The difficulty for the nature center is the expense of getting students to the site. Maybe work out a contract with the schools so that you have a steady flow of children year to year. Tailor classes to the school science core. Helps teachers justify visit. Summer camp hours were extended to assist working parents. This was a big success.”

Ogden Nature Center	“Programs need to be appropriate for your target audience. Pricing needs to be kept low – most of ours is subsidized. If using volunteers, use them in areas that they really enjoy – they will do a better job.”
The Greenway and Nature Center	“Have adequate staff and facilities. Develop a publicity or media plan. Identify your audiences.”

Open-ended Questions Analysis

There were several themes throughout the responses to the open-ended questions. One theme was that programming for school children should correlate with the state science core. Another theme was to start out small in the education programming and provide quality programs rather than large quantities of programs. Further comments suggested that publicity and public relations are important for successful programs. In addition, it is important when doing publicity to do it in the proper formats and audiences. If the organization’s programs stray out of their mission the programming will be unsuccessful. It is also important to know the target audience and to know what they want. Providing experiences that cannot be duplicated in the classroom, this gives the teachers a reason to visit the site. Another program possibility is the currently popular “eco-tours.”

When planning for facilities, it was recommended that the UBC plan plenty of storage space, dedicated preparation rooms, and dedicated classroom space. One of the problems is that rooms that are considered multi-purpose constantly need to be set up and taken down for different functions, which is time consuming. It is important to look at

the number of groups using the facilities, because scheduling conflicts can occur if classroom space is at premium.

Water Conservation Organizations

Data Presentation

Another area of research was from water conservation organizations in the state of Utah. Three organizations were contacted to determine what kinds of public programming they provide. The names of these groups are the Utah Water Conservation Forum, Division of Water Resources, and the International Office of Water Education. A description of the types of educational programs that these organizations provide follows. It should be noted that none of these organizations have their own facilities because they are primarily outreach organizations. Thus they must travel and educate others at another site or in rented facilities.

Utah Water Conservation Forum – promotes water conservation through public and professional education. Their focus is on water-wise landscapes and irrigation. They also target cities promoting water auditing and water conservation pricing to provide incentives for homeowner to preserve this limited resource. They provide brochures, presentations, workshops, conferences, tours and tool kits. This organization often works in partnership with other groups and feels that there is a great opportunity for water conservation education at the UBC.

Division of Water Resources – Provides water educational programs mostly for formal and non-formal educators through Project Wet. They also host about twenty workshops a year with about twenty-five participants each. In addition to working with

teachers, they will do outreach programs in the schools. Their education for the general public is limited to talks at state parks. They promote and assist in the distribution of materials for educators. These include guides that assist in classroom curriculum and activities. One of particular interest is *The Wonders of Wetlands* produced through a partnership between Environmental Concern Inc. and The Watercourse. This is an extensive guide for educators that covers information from habitat to pollution.

International Office of Water Education – does not usually work with children directly, and mostly provides teacher in-service education. They do work with children through a poster contest. The overall winner of this contest receives a week-long vacation for their family at Lake Powell on a house boat with access to motor boat. They also provide education resource materials for teachers. One is the video *Water: A Never Ending Story* which has an accompanying curriculum. Another resource is *The Comprehensive Water Education Book*. This is another curriculum and activity book designed for grades K-6. The International Office of Water Education has a staff that focuses on curriculum development. They are available and willing to help with curriculum development at the UBC.

Data Analysis

The water conservation organizations in the state of Utah usually work in partnership with other organizations to assist them in their educational programs. They either provide in-service training for teachers or disseminate their information through workshops, conferences, and publications. They provide information on all aspects of

water. These groups would be valuable in the development of education programs at the UBC for all target audiences.

Data Comparisons

In order to make recommendations for programming at the UBC, the data must first be compared to look at similarities and differences in the responses of the target audiences. Comparisons need to be made for both topics and facilities. In addition, these results need to be compared with horticultural and nature centers. The purpose of comparison with other organizations is to determine whether a topic might be successful. It has been shown that some topics are not being covered at these organizations or there are very few educational programs covering these topics. These are important things to consider when planning educational programs.

Topics. To make comparisons between target audiences, a matrix has been developed that shows the ranking given to each topic according to the school district and the UBC Advisory Board (Table 18, *Target Audience Topic Comparisons*). Additional columns have been added to show which topics have been recommended by professionals and the general public where applicable and have been marked with an "x". Because the research tools for gathering data from the nursery industry and the general public were different, some of the topics were not suggested by these groups, although they may have been if they had been given the opportunity. Thus a "n/a" response was listed for a target audience that did not have the opportunity to respond to a particular topic. A similar approach was taken for the non-formal organizations. The difference with this group is that their brochures were not reviewed for horticulture programs unless

they had a natural resource orientation. Thus the horticulture topics are also marked with the “n/a” response.

Some additional topics suggested by the nursery and landscape industry professionals have been listed separately. These additional topics are pesticide application, safety with overhead power lines, and plant health care.

TABLE 18.
Target Audience Topic Comparisons

Topic	UBC				Number of Institutions Presenting Topics
	School District Ranking	Advisory Board Ranking	Nursery and Landscape Industry	General Public	
1. Unimportant					
2. Neutral					
3. Important					
Water resource management	3	3	x	n/a	10
Wetland enhancement	3	3	n/a	n/a	2
Water conservation	3	3	x	x	5
Water quality enhancement	3	2	x	n/a	2
Storm water management	2	1	n/a	n/a	3
Farmland ecology	2	2	n/a	n/a	8
Wetland ecology	3	3	n/a	n/a	17
Native plants	3	3	x	x	22
Fish and wildlife habitat	3	3	n/a	n/a	22
Urban wildlife habitat	2	3	n/a	n/a	7
Open space preservation	3	2	n/a	n/a	1
Highway enhancement	3	1	n/a	n/a	0
Water wise landscapes	3	3	x	x	1
Energy conservation	3	2	x	n/a	3
Bioremediation	3	3	n/a	n/a	0
Composting	2	1	x	n/a	7
Recycling	2	1	n/a	n/a	2
Urban planning	2	1	x	n/a	2
Community design	3	2	n/a	n/a	1
Urban growth	2	1	x	n/a	1
Ornamental horticulture	2	3	x	x	4
Fruit crops	2	2	n/a	x	n/a
Vegetable crops	2	2	n/a	x	n/a
Integrated pest management	2	3	x	n/a	4
Greenhouse production	3	1	n/a	n/a	n/a
Houseplants	2	2	n/a	n/a	n/a
Floral arranging	2	1	n/a	n/a	n/a
Retail business and entrepreneurship	n/a	1	n/a	n/a	3
Finance	n/a	1	n/a	n/a	0

Topic 1. Unimportant 2. Neutral 3. Important	UBC				Number of Institutions Presenting Topics
	School District Ranking	Advisory Board Ranking	Nursery and Landscape Industry	General Public	
Business plans	n/a	1	n/a	n/a	0
Marketing	n/a	1	n/a	n/a	0
Human resource management	n/a	1	n/a	n/a	0
Hosting services	1	1	n/a	n/a	0
Culinary arts	1	1	n/a	n/a	n/a
Equipment maintenance and use	1	1	x	n/a	0
Facility management	n/a	1	n/a	n/a	0
Photography	2	1	n/a	n/a	n/a
Visual arts painting and drawing	3	1	n/a	n/a	n/a
Administration of distance learning sites	n/a	1	n/a	n/a	0
Sustainable Agriculture	n/a	1	n/a	n/a	0
No till Farming	n/a	1	n/a	n/a	0
Residential Landscape Design	n/a	1	x	x	9
Urban Forestry	n/a	1	x	n/a	0
Landscape Legacy	n/a	n/a	n/a	n/a	7

Note: Where an “n/a” is indicated, the target audience did not have the option of responding to that specific topic.

Table 19, *Important Topic Comparisons*, shows topics which were considered to be important either to multiple user groups, or that are found in several educational programs at other similar organizations. The “Combined Target Audiences” column shows topics that were considered to be important by two or more target audiences. These are represented by the “★” symbol. Those with a “⊛” symbol represent topics that three or more target audiences found to be important and interesting. The last column “Combined Audiences and Institutions,” shows topics that are already addressed by seven or more non-formal organizations are providing programming and is indicated by the “*” symbol.

TABLE 19.
Important Topic Comparisons

Topic	Combined Target Audiences	Combined Audiences and Institutions
★= Two or more audiences		
⊛= Three or more audiences		
*= Seven or more organizations		
Water resource management	★	*
Wetland enhancement	★	
Water conservation	⊛	
Water quality enhancement	⊛	
Farmland ecology	★	*
Wetland ecology	★	*
Native plants	⊛	*
Fish and wildlife habitat	★	*
Urban wildlife habitat	★	*
Open space preservation	★	
Highway enhancement	★	
Water wise landscapes	⊛	
Energy conservation	⊛	
Bioremediation	★	
Community design	★	
Ornamental horticulture	⊛	
Fruit crops	★	
Vegetable crops	★	
Integrated pest management	⊛	
Houseplants	★	
Residential Landscape Design	★	*

Facilities

To make a comparison of facility requirements between the target audiences, data has been placed in a matrix (Table 20, *Facility Comparisons*). As a reminder, the numbers in the school district column and the UBC Advisory Board column represent the total number of times a facility was recommended for topic presentation by the respondents. Because there was not a classroom option on the questionnaires for the school district and the advisory board, respondents tended to mark either the indoor

lecture facility or the indoor lab option. A column showing how many other institutions have the listed facilities is included to provide comparison with the target audiences.

Another column, marked with the “★” symbol shows the interest of two or more target audiences in a particular facility. The last column, marked with the “*” symbol, shows facilities in which can be found at eleven or more of the horticulture and nature centers.

These are combined with the audiences.

TABLE 20.
Facility Comparisons

Facility ★= Two or more audiences *= eleven or more institutions	Davis School District	UBC Advisory Board	Nursery and Landscape Industry	General Public	Other Inst.	Target Audiences	Combined Audiences and Institutions
Interpretation (self-guided tours)	100	79	x	x	22	★	*
Indoor Lecture Facilities	73	143	x	x	17	★	*
Outdoor Lecture Facilities	95	50	n/a	x	11	★	*
Indoor Labs/Classrooms	45	63	n/a	x	13	★	*
Outdoor Labs	76	70	x	n/a	5	★	
TV/Video Equipment	64	92	n/a	x	5	★	
Computer/Laser Disk	n/a	n/a	n/a	n/a	5		
Projection Equipment	n/a	n/a	n/a	x	5		
Sound Equipment	n/a	n/a	n/a	x	3		
Institution Grounds	n/a	n/a	x	x	22	★	*
Bus or Van	n/a	n/a	n/a	n/a	3		
Classrooms	n/a	n/a	n/a	n/a	13		
Multi-purpose Rooms	n/a	n/a	n/a	n/a	6		
Floral Design Lab	n/a	n/a	n/a	n/a	1		
Landscape Design Room	n/a	n/a	n/a	n/a	1		
Exhibit Hall	n/a	n/a	n/a	n/a	4		
Puppet Theater	n/a	n/a	n/a	n/a	1		
Distant Learning Facilities	52	92	n/a	n/a	n/a	★	
Aquaria	1	n/a	n/a	n/a	n/a		
Guided Tours	n/a	n/a	n/a	n/a	n/a		
Underwater/Ground Windows	1	n/a	n/a	n/a	n/a		

Note: The list of facilities found in the above table was not provided to each target audience to review. Data from the nursery and landscape industry and the general public was gathered in a different format. The responses from these two audiences is indicated by an "x". Some respondents added items, and these have been included. The last item, "underwater/ground windows", was suggested by the school district and has been included because the idea came from the focus group meeting in which all participants were interested in having this type of facility.

CHAPTER 4

SUMMARY AND RECOMMENDATIONS

Summary

The goal of this research was to examine what natural resource topics should be part of the educational programming at the UBC. In an effort to examine the possibilities, two sets of questions were developed for which answers were sought giving consideration to potential target audiences and programs at other organizations similar to the UBC. The initial purpose of these questions was to explore the natural resource education needs of potential clients of the UBC. Representative groups were interviewed to discover these needs. In addition, inquiries were made concerning programs similar to the UBC. It was hoped that these two sources of information, potential users and other similar organizations, when taken together would provide suggestions regarding the types of programs to be offered in natural resources at the UBC.

Needs of Target Audiences

Four target audiences were selected and the following questions were investigated:

- What natural resource topics should be covered at the K-12 level?
- For what topics would various colleges at Utah State University use the Utah Botanical Center?
- What natural resource education topics would the general public find of interest?
- In what ways can the Utah Botanical Center meet the educational needs of the Utah Nursery Industry?

A fifth question was asked:

- What facilities would be most useful in accommodating the above topics in an educational format?

Similar Educational Organizations Programs and Facilities

In order to explore the types of programs being offered and the facilities being used by other similar organizations, the following three questions were submitted:

- What natural resource topics are nature centers and other botanical institutions throughout the United States addressing in an educational format?
- What are water conservation organizations doing to educate the public in the state of Utah on water conservation needs?
- What facilities are being used to accommodate the educational programs at these institutions?

Recommendations

Upon review of the data, recommendations can be made for both natural resource topics and facilities at the Utah Botanical Center. Recommendations for topics and facilities are referenced back to the main body of the research for documentation and are based upon the mission of the UBC. Recommendations have been listed according to preference of implementation. With higher preference given to those listed first.

Topic Recommendations. The following topics were chosen because of importance to the various target audience. The prioritization was based on the number of target audiences that considered a topic important and the number of institutions doing programming on that particular topic (See Tables 18 and 19, pages 70, 71 and 72). The recommendations are as follows:

- Native Plants
- Water Conservation

- Water Resource Management
- Integrated Pest Management
- Wetland Ecology
- Fish and Wildlife Habitat
- Urban Wildlife Habitat
- Landscape Legacy
- Residential Landscape Design
- Composting
- Farmland Ecology
- Storm Water Management
- Wetland Enhancement
- Energy Conservation
- Waterwise Landscapes

Facility Recommendations. All of the facilities recommended are important to the target audiences. But the prioritization is also based upon the author's judgement and planning background. The recommendations are also based upon facilities at other institutions (see Table 20, page 74) and are as follows:

- Indoor Lecture Facility (Auditorium seating a minimum of 200 people)
- Dedicated Classroom Spaces
- UBC Grounds
- Outdoor Hands-on Demonstration Areas
- Theme Gardens
- Outdoor Lecture Facility (Pavilion)

Other Recommendations and Observations. Through the process of the research, additional recommendations and observations were made by various audiences, institutions and the author. There is a semblance of prioritization to these observations which will be useful in the planning process.

- It is recommended that the UBC collaborate with other botanical institutions when possible to provide education programs to the people of Utah (author).

- It is recommended that the UBC start out with a small but high quality education program. Publicity is also an important consideration (pages 63-66).
- It is recommended that the UBC not provide classroom space for topics unrelated to the mission of the UBC (pages 4, 38-39).
- It is recommended that the UBC first focus on school children for natural resource. Other audiences could be targeted later on an experimental basis (pages 63-66).
- Programming for school children should be based upon the state science core (Appendix H).
- Provide a window into the wetlands for both above and below water viewing opportunities (page 27).
- It is recommended that no formal programming be provided for the university students. It should be noted that this group might utilize the site for field-trips to possibly review the various topics (pages 37-39).
- It is recommended that the UBC not base the development of facilities on the university student audience. However, facilities developed to accommodate other groups could be utilized by university students on a space available basis (pages 38-39).
- In an effort to accommodate the future growth of programming at the UBC, it is recommended that the UBC build a large shell with enough space for future needs and expansion. Space would be closed off to be completed as needed. This process will also assist in providing continuity in architecture (author).
- For maximum usage, classrooms could be large spaces with dividers that can create smaller multiple spaces. They should not be used for exhibit preparation or other activities that would require constant set-up and tear down (pages 63-66).
- It is recommended that when planning for universal access that consideration be given to line of sight at wheelchair height. In addition, drop counters and sinks, wider boardwalks, with space to turn around and for passage of two wheelchairs would be appropriate (page 28).
- Outdoor lecture facilities might include a larger pavilion. Additional smaller spaces could be provided at key interest points with terraced steps/seats. This

would allow the group to get off the path and facilitate better sight and auditory considerations (author and page 28).

- It is recommended that space be provided for tour bus parking. In addition, a separate entrance for tour groups would prevent congestion at the ticket or information counter. A picnic area for large school groups would also be helpful. One possibility might be to use “Pond Park” adjacent to the southernmost pond at the UBC (author and page 27).

Recommendations for Further Research

As with any study, the scope and time limits to the research prohibit a complete investigation into all desired areas. For this reason, further research is often desired, and recommended. These recommendations could further increase the understanding of educational needs and facilities for various audiences at the UBC.

Because this study has only reviewed broad topics at more of a master plan scale, it is advisable that possible curriculum under those topics be more thoroughly developed. This will further increase the understanding of how much storage and classroom space might be needed

Due to the time constraints placed on this project, adequate research for the general public was not completed. It is advisable that additional research be completed as data for this study was used from a 1994 survey which did not actually cover natural resource topics and facilities.

Research into horticulture topics would be useful and supplemental to the natural resource topics of this study. Information could be used from the data and brochures gathered in this study.

REFERENCES CITED

- Drost, Dan. 1997. "Unit Two" Utah Master Gardener Handbook, Dan Drost, ed. Logan, Utah: Department of Plant, Soils, and Biometeorology, Utah State University.
- Governor's Office of Planning and Budget. 1997. "Utah's Long term Economic and Demographic Projections." Utah Data Guide: Demographic and Economic Analysis. Salt Lake City, Utah: Utah State Planning and Budgeting Office, April 1997 Vol. 16, No. 2, pp. 5.
- National Science Teachers Association. 1998. "An NSTA Position Statement: Informal Science Education." Science Scope April: 34-35.
- Utah Botanical Center. 1998. Strategic Marketing Plan, Logan, Utah: Utah State University D1-D2.
- Utah Botanical Center. 1998. "Overview." Logan, Utah. Utah State University.
- USU Extension Service. 1997, "Applied Ornamental Horticulture Program: Course Descriptions." Farmington, Utah: Department of Plants, Soils, and Biometeorology, Utah State University.

APPENDICES

Appendix A.

Davis School District Participants

DAVIS SCHOOL DISTRICT PARTICIPANTS

Nancy Clark
Northridge High

Robin Clifton
Kaysville JR. High
Wk. 801-546-7930
rclifton@admin.kaysjr.davis.k12.ut.us

Dennis Erickson
Fairfield Jr. High

Virginia Ord
Davis Dist.
Wk. 801-451-1108,
Virginia@curric.dist.davis.k12.ut.us

Glen Orme
Woods Cross High
Wk. 801-299-2075

Steve Roundy
Kaysville Jr. High
Wk: 801-546-7930

Shawnda Stevens
Davis High School
Wk. 801-546-7940,
Shawnda@admin.dhs.davis.k12.ut.us

Betsy Thurgood
West Point Elementary
Wk: 801-774-7425

Appendix B.

Davis School District Questionnaire

Questionnaire for Davis School District

43. Name: _____
44. Phone number (May): _____
Phone number (June): _____
45. Are you a teacher _____ or a Teaching Curriculum Supervisor _____ ?
What is your curriculum area? _____
46. Name of School _____
47. Level of School Elementary School _____ Middle School _____ High School _____
48. How would students from your school travel to the Center? Walk _____ Bus _____ Personal Auto _____ Bicycle _____
Other (please specify) _____
49. Please read the following list of topics in Table A which could be taught at the Center. Please write in any and all additional topics you would suggest in the space provided at the bottom of Table A.
50. After completing item 8, please rank each topic in column 2 using the following ranking:

Unimportant
1

Neutral
2

Highly Important
3

51. In column 3, please list the teaching facility needed to best address each issue. (You may list more than one type of facility needed.)

Interpretation (self guided trails)	1	Distance learning facilities	7
Indoor lecture facilities	2	Other (please specify)	
Outdoor lecture facilities	3	_____	8
Indoor labs	4.	_____	9
Outdoor labs	5	_____	10
TV and video facilities	6		

52. In column 4, please give an estimate of the number of students using the facility for a given visit.

53. In column 5, please estimate the number of visits per year for a given topic

54. In column 6, please indicate the time of year when a visit or visits would likely be made. You may indicate more than one time period each year.

55. In column 7, please write which class or classes in your curriculum would use the facility to teach the topic.

The following is an example:

If wetland ecology was a highly important subject matter in your teaching, you would place a "3" under column 2.

If the topic were taught by interpretive field visits and class room lectures, you would place a "1 and a 2" in column 3.

If the number of student in your class was 30, you would write "30" in column 4.

If you were planning 3 visits to the Center to address this topic you would write "3" in column 5.

If you planned to visit the center in the Fall and the Spring to address this topic you would respond "Fall and Spring" in column 6.

If you would cover this topic in a ninth grade biology class you would write "Ninth grade biology" in column 7.

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
7. Wetland Ecology	3	1,2	30	3	f,s	Ninth Grade Biology

Table A

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
1. Water resource						
2. Wetland enhancement						
3. Water conservation						
4. Water quality enhancement						
5. Storm water management						
6. Farmland ecology						
7. Wetland ecology						
8. Native plants						
9. Fish and wildlife habitat						
10. Urban wildlife habitat						
11. Open space preservation						
12. Highway enhancement						

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
13. Water wise landscapes						
14. Energy conservation						
15. Bioremediation						
16. Composting						
17. Recycling						
18. Urban planning						
19. Community design						
20. Urban growth						
21. Ornamental horticulture						
22. Fruit crops						
23. Vegetable crops						
24. Integrated pest management						
25. Greenhouse production						
26. Houseplants						
27. Floral arranging						
28. Hosting services						
29. Culinary arts						
30. Equipment maintenance and use						

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
31. Photography						
32. Visual arts painting and drawing						
33. Other						
34. Other						
35. Other						
36. Other						
37. Other						

Part B

1. What should be the proximity of indoor facilities to outdoor activities?
2. Suggestions for planning of outdoor sites for universal or disabled access.
3. Please give us any other suggestions or observations which would help in the planning process.

Appendix C

UBC Technical Advisory Board Participants

UBC Technical Advisory Board Participants

Vern J. Budge
College of Humanities, Arts, and Social
Sciences
Associate Professor, Landscape
Architecture and Environmental
Planning Department
Phone: 435-797-0508
e-mail: vbudge@wpo.hass.usu.edu

Leona Kay Hawks
College of Family Life, Associate Dean
Extension Professor, Human
Environments Department
Phone: 435-797-1529
e-mail: leonah@ext.usu.edu

Michael Heikkinen
College of Education
Professor, Secondary Education
Department
Phone: 435-797-2223
e-mail: michaelh@fs1.ed.usu.edu

James A. MacMahon
College of Science, Dean
Professor, Biology Department
Phone: 435-797-2478
e-mail: scido@cc.usu.edu

Michael R. Kuhns
College of Natural Resources
Associate Professor, Forest Resources
Department
Extension Forester
Phone: 435-797-4056
e-mail: mikek@ext.usu.edu

Larry Rupp
University Extension
Department of Extensions, Ornamental
Horticulture
Phone: 435-797-2099
e-mail: Larryr@ext.usu.edu

Donald L. Snyder
College of Business
Associate Dean, College of Agriculture
Professor, Economics Department
Phone: 435-797-2383
e-mail: dsnyder@b202.usu.edu

Darwin L. Sorensen
College of Engineering
Research Associate Professor, Civil &
Environmental Engineering Department,
Water Research Laboratory
Phone: 435-797-3207
e-mail: dsore@pub.uwrl.usu.edu

Appendix D.

UBC Technical Advisory Board Questionnaire

Questionnaire for Advisory Committee

1. Name:
2. College:
3. Department:
4. Phone:
5. What disciplines in your college would use the Center?
6. How would those disciplines use the Center for teaching purposes?
7. How would students from your school travel to the Center? Bus___Personal Auto___Other (please specify)_____
8. Please read the following list of topics in Table A which could be taught at the Center. Please write in any and all additional topics you would suggest in the space provided at the bottom of Table A.
9. After completing item 7, please rank each topic in column 2 using the following ranking:

Unimportant
1

Neutral
2

Important
3

In column 3, please list the teaching facility needed to best address each issue. (You may list more than one type of facility needed.)

Interpretation (self guided trails)	1	TV and video facilities	6
Indoor lecture facilities	2	Distance learning facilities	7
Outdoor lecture facilities	3	Other (please specify)	
Indoor labs	4	_____	8
Outdoor labs	5	_____	9
		_____	10

10. In column 4, please give an estimate of the number of students using the facility for a given visit.
11. In column 5, please estimate the number of visits per year for a given topic
12. In column 6, please indicate the time of year when a visit or visits would likely be made. You may indicate more than one time period each year.
13. In column 7, please write which class or classes in your curriculum would use the facility to teach the topic.

The following is an example:

- If marketing was a highly important subject matter in your teaching, you would place a "3" under column 2.
- If the topic were taught by distance learning, you would place a "7" in column 3.
- If the number of students in your class was 30, you would write "30" in column 4.
- If you were planning 1 visit to the Center to address this topic you would write "1" in column 5.
- If you planned to visit the center in the Fall to address this topic you would respond "Fall" in column 6.
- If you would cover this topic in an undergraduate marketing class you would write "undergraduate marketing" in column 7.

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
Marketing	3	7	30	1	f	undergraduate marketing

Table A

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
1. Water resource						
2. Wetland enhancement						
3. Water conservation						
4. Water quality enhancement						
5. Storm water management						
6. Farmland ecology						
7. Wetland ecology						
8. Native plants						
9. Fish and wildlife habitat						
10. Urban wildlife habitat						
11. Open space preservation						
12. Highway enhancement						
13. Water wise landscapes						

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
14. Energy conservation						
15. Bioremediation						
16. Composting						
17. Recycling						
18. Urban planning						
19. Community design						
20. Urban growth						
21. Ornamental horticulture						
22. Fruit crops						
23. Vegetable crops						
24. Integrated pest						
25. Greenhouse production						
26. Houseplants						
27. Floral arranging						
28. Retail business and						
29. Finance						
30. Business plans						

Topic	Ranking	Teaching Facility	Number of Students per Visit	Visits per Year	Time of Year	Class
31. Marketing						
32. Human resource						
33. Hosting services						
34. Culinary arts						
35. Equipment maintenance and						
36. Facility management						
37. Photography						
38. Visual arts painting and						
39. Administration of distance						
40. Other						
41. Other						
42. Other						
43. Other						
44. Other						

Additional Question for Technical Advisory Board

Governor Levitt has suggested that the Ogden Center be moved to the Kaysville Site in addition to providing a downlink for com net. What type of education do you feel should occur at the Utah Botanical Center?

Appendix E.

Nursery and Landscape Industry Questionnaire

Questionnaire for the Utah Botanical Center

The Utah Botanical Center is being moved from Farmington to Kaysville. The Farmington site consisted of 7 acres. The Kaysville site is almost 100 acres in size. The move to the larger site permits a greater number and variety of facilities and programs. We are seeking your help in the development of a Conceptual Education Master Plan and the planning of the new facility. Please answer the following questions. Your answers will be valuable as the new Center is planned.

We would appreciate your name and a phone number where you can be reached so we can call with follow-up questions. As a professional in the field, your suggestions are essential to the planning process. If you agree to a follow-up phone call please fill in items 1 and 2. If you don't want to be called leave items 1 and 2 blank. Please respond to the other items. Please bring this survey with you to your board meeting on August 5th where we will have time for further discussion or mail to:

Utah Botanical Center, Attn: Greg Wright, 4055 University Blvd, Utah State University Logan, UT 84322-4055. Thank You.

1. Name _____
2. Phone number (day) _____ Phone number (night) _____
3. Name of Business _____
4. Where is your workplace located? City _____
County _____
Distance traveled to workplace _____
5. What is your profession?(Check all that apply)
Landscape Design ___ Landscape installation _____ Landscape maintenance _____
Pest/Weed control ___ Nursery worker _____ Grower _____ Supplier _____
Sales _____ Other(please specify) _____
6. For how many years have you been involved in the industry? _____ Years
7. Did you visit the Botanical Garden in Farmington during 1994-1997? Yes ___ No ___
If "yes", how many times? _____
8. What was the nature of your visit? Attending educational program _____
(Please check all that apply.) "Just Looking" _____
Plant or soil analysis _____
Other (please specify) _____

9. Have you visited other botanical centers or gardens in the State of Utah or the Inter-mountain West? Yes___No___
If "yes" please list the centers or gardens visited
10. What was the major purpose of your visits to the sites in question 9?
11. What things most impressed you about the facilities you visited?
12. Do you attend continuing education classes pertaining to your profession? Yes___
No___
13. Would continuing education classes at the Kaysville site be helpful to you? Yes___
No___
14. What program format is the most useful for you?
Short course- one or two weeks___ or longer course- three weeks or more_
Saturday___ weekday___
Daytime___ evening___
Non-credit___ credit___
Certificate preparation___ or no tie to certificate___
Demonstration plots, self taught___ Or formal courses with teacher___
Lab experience-hands on ___ or classroom - lecture___
15. Please list the environmental issues in which you need further training.
16. Please list any environmental restrictions or standards for which you need further training. (e.g. handling of pesticides)
17. What environmental issues should the Utah Botanical Center address as an education and research facility?

18. From the broad list of topics you have listed in questions 15, 16, and 17 what specific topics would be the most beneficial for you to study?

19. What types of educational programming have you found to be most useful at institutions such as public gardens?

20. What types of educational programming have you found to be least useful?

21. Would you be interested in teaching at the Center?

22. Please write any other comments or suggestions you have about the planning or functioning of the new Utah Botanical Center.

23. As a representative member of your industry, how do you feel the Utah Botanical Center could assist your industry in their educational needs?

Appendix F.
Participating Institutions

Brooklyn Botanic Garden

1000 Washington Avenue
 Brooklyn, NY 11225-1099
 Contact: Susannah Laskaris
 Patricia Lindermann
 Phone: 718-622-4433
 Governing Authority: Private Nonprofit

Chicago Botanic Garden

1000 Lake Cook Road
 Glencoe, IL 60022
 Contact: Holly Estal
 Phone: 847-835-5440
 Governing Authority: Private Nonprofit

Connecticut College Arboretum

5625 Connecticut College
 270 Mohegan Avenue
 New London, CT 06320
 Contact: Cathy Dame
 Phone: 860-439-5020
 Governing Authority: College/University

Crosby Arboretum

P.O. Box 190
 Picayune, MS 39446
 Contact: Larry Pardue
 Phone: 601-799-2311
 Governing Authority: Private Nonprofit

Davis Arboretum

University of California
 Davis, CA 95616
 Contact: Diane Cary
 Phone: 916-752-9498
 Governing Authority: College/University

The Holden Arboretum

9500 Sperry Road
 Kirtland, OH 44094-5172
 Contact: Paul Spector
 Phone: 440-256-1110
 Governing Authority: Private Nonprofit

Missouri Botanic Garden

P.O. Box 299
 St. Louis, MO 63166
 Contact: Larry DeBuhr
 Phone: 314-577-5100
 Governing Authority: Private Nonprofit

Morris Arboretum

9414 Meadowbrook Avenue
 Philadelphia, PA 19118
 Contact: Jan McFarlan
 Phone: 215-247-5777
 Governing Authority: College/University

**National Wildflower Research Center,
The**

Lady Bird Johnson Wildflower Center
 4801 LaCrosse Avenue
 Austin, TX 78739
 Contact: Julie
 Governing Authority: Private Nonprofit

New York Botanical Garden, The

Bronx, NY 10458-5126
 Contact: Catherine Eberbach
 Kim Riley
 Phone: 718-817-8700
 Governing Authority: Private Nonprofit

Phipps Conservatory

One Schenley Park
 Pittsburgh, PA 15213-3830
 Contact: Robert Alexander
 Phone: 412-622-6915
 Governing Authority: Private Nonprofit

Red Butte Garden and Arboreta

University of Utah
 18A deTrobriand Street
 Salt Lake City, UT 84113-5044
 Contact: Adrian
 Phone: 801-581-5322
 Governing Authority: College/University

State Botanic Garden of Georgia, The
 University of Georgia
 2450 S. Milledge Avenue
 Athens, GA 30605
 Contact: Paul McClendon
 Phone: 706-542-1244
 Governing Authority: College/University

The Arboretum
 University of Guelph
 Guelph, Ontario
 Canada N1G 2W1
 Contact: Lina Venerus
 Phone: 519-824-4120 Ext 4110
 Governing Authority: College/University

Washington Park Arboretum
 University of Washington
 Box 358010
 Seattle, WA 98195-8010
 Contact: Julie DeBarr

Nature Centers

Bernheim Arboretum and Research Forest
 Highway 245
 Clermont, KY 40110
 Contact: Kani Meyer
 Phone: 502-955-8512
 Governing Authority: Private Nonprofit

Chippewa Nature Center
 400 South Badour Road
 Midland, MI 48640
 Contact: Carol Good-Elliott
 Phone: 517-631-0830

Delaware Nature Society
 P.O. Box 700
 Hockessin, DE 19707
 Contact: Joe Sebastiani
 Phone: 302-239-2334

Fernwood Nature Center
 13988 Range Line Rd
 Niles, MI 49120-9042
 Contact: Wendy Jones
 Phone: 616-683-8653

Fontenelle Forrest Association
 1111 Bellevue Blvd. North
 Bellevue, NE 68005
 Contact: Craig Hensley
 Phone: 402-731-3140

Kalamazoo Nature Center
 7000 North Westnedge Avenue
 P.O. Box 127
 Kalamazoo, MI 49004-0127
 Contact: Sarah Hopkins
 Phone: 616-381-1574

Ogden Nature Center
 966 West 12th Street
 Ogden, UT 84404
 Contact: Barb Reis
 Phone: 801-621-7595

The Greenway & Nature Center
 Pueblo, CO
 Contact: Marge
 Phone: 719-549-2414
 Governing Authority: University/College

Appendix G.
Water Conservation Organizations

Division of Water Resources

Utah Department of Natural Resources

1636 West North Temple

Salt Lake City, UT 84116

Contact: Susanne Flory

Phone: 801-538-5401

International Office of water Education

Utah Water Research Lab.

Utah State University

Logan, UT 84322

Contact: Geoff Smith

Phone: 435-797-3232

Utah Water Conservation Forum

P.O. Box 1255

Salt Lake City, UT 84110

Contact: Georgia Barker

Phone: 801-782-3947

Appendix H.

Summary: Utah State Science Core

Level K

Science Topics

Five Senses
Animal Variation
Seasons
Magnets

Level 1

Science Topics

Air
Water
Plants
Weather

Level 2

Science Topics

Changes in Plants and Animals
Heat and Light
Matter
Rocks

Level 3

Science Topics

Ecosystems
Geological Features
Work and Machines
Electrical Safety

Level 4

Science Topics

Utah Plant and Animal Life
Water
Utah Rocks and Minerals
Utah Soils
Atmosphere and Weather

Level 5

Science Topics

Physical Features of Earth
Natural Resources
Matter
Electricity

Level 6

Science Topics

Heat, Light, Sound
Astronomy
Micro-Organisms

Level 7**Integrated Science**

Structure of Matter
 Structure of Organisms
 Structure of Classification

Level 8**Integrated Science**

Chemical Changes and Physical
 Changes
 Changes in Force, Motion, and Energy
 Earth Changes

Level 9**Earth Systems**

Earth's Biological Systems
 Earth's Atmospheric Systems
 Earth's Water System
 Earth's Geologic Systems
 Earth's Energy System
 Earth Within A System

Level 9-12**Biology**

Cells
 Heredity
 Diversity and Evolution
 Ecology

Level 9-12**Principles of Technology**

Matter
 Motion
 Energy

Level 9-12**Biology- Agricultural Science
and Technology**

Cells
 Heredity
 Diversity and Evolution
 Ecology

Level 9-12**Biology- Human Biology**

Cells
 Heredity
 Diversity and Evolution
 Ecology
 Human Organism

Level 9-12**Chemistry**

Structure
 Interaction
 Quantification and Analysis

Level 9-12**Physics**

Matter
 Motion
 Energy