APPENDICES
APPENDIX A

INTERVIEW MATERIALS USED IN THE STUDY
APPENDIX A-I

TELEPHONE SCREENER

NAME: __________________________ PHONE: __________________________

SPouse's NAME: __________________________

ADDRESS: __________________________

CITY: __________________________ STATE: _______ ZIP: _______

Hello, I'm calling in regard to a study that is being done at Michigan State University, E. Lansing, MI. We are talking to homeowners in Michigan and Georgia about their lawns. We want to find out why lawns are important to people, how individuals care for their lawns, and how they feel about lawn care services.

Q-1. Do you currently use a lawn care service to care for your lawn?

1. _____YES (Put in lawn service quota. N=5)
2. _____NO (Put in do-it-yourself quota. N=5)

INVITATION: We would like to talk with you and your spouse, personally, about your lawn and its care. You and your spouse would be interviewed during the same time period but separately. This interview will take approximately an hour. As part of the study we want to take pictures of respondent's front lawns. Would this be okay with you?

(Respondent does not have to agree to pictures to be part of study.)

____Agreed to pictures _____No to pictures

When can we schedule an appointment with you?

DAY__________ TIME__________

DIRECTIONS to interview location:

Thank you for your willingness to participate in the study. We will call you the day before your interview to make sure that the time is still alright.
APPENDIX A-II

Informed Consent

I, the undersigned (respondent), freely consent to participate in a study about my household's use of lawn care products and services. I do so with the understanding that our responses will contribute to the goals of the research project. The purposes of the study have been explained to me. The following understandings are held in common and agreed to by both parties:

1) The interview, which will take approximately two hours, will be audio taped by the interviewer.

2) The confidentiality of the interview is guaranteed and absolute. No transcription or analysis or representation of the information collected will ever contain the personal identification of the respondent, or the specific location of the residence where pictures were taken. Audio tapes will be destroyed after transcription is complete.

3) The respondent is assured that no follow-up contact will be made for the purpose of sales, solicitation or other commercial purpose. No record of name, address or other identifying data about the respondent will ever be given, sold or transferred to any other party.

4) I understand that I can terminate the interview at any time.

If there are any questions, the respondent is invited to call Dr. Ann Slocum, Michigan State University, 1-517-355-3779 or Lois Shern, 1-404-578-8334.

INFORMED CONSENT FOR THE INTERVIEW:
for Michigan State University: (Interviewer)  Respondent:

CONSENT FOR PICTURES:
I agree to allow two pictures of the exterior of my house and front lawn to be taken. I understand that the photographs may be used in educational and research presentations or publications. I understand that my name, street address or city will not be identified in any use of the photographs.
for Michigan State University: (Interviewer)  Respondent:
APPENDIX A-III

INTERVIEW GUIDE

INTRODUCTION

I'm __________________. I'll be talking with you for the next couple hours about your lawn. The purpose of the study is to find out why lawns are important to people, how individuals care for their lawns, and how they feel about lawn care services.

I'd like to tape the interview. I don't take shorthand and the tape will help me remember exactly what you said. Your responses will be grouped with those of others taking part in the study. Your name will never be associated with any statements. The tape will be destroyed after the study is over. Is the taping okay with you?

ASK THE FOLLOWING IF THEY AGREED TO TAKING PICTURES IN SCREENER:

During the initial phone call we asked if pictures could be taken of your front lawn. Is this still alright? You do not have to be home when we come. These pictures would be used for illustration purposes. The only identification would be "A lawn in (state name)". Your address and name would never be associated with the picture.

We have the consent form that needs to be signed. Please read it and see if you have any questions.

CHECKLIST:

_____ Informed Consent Signed

_____ OK to take picture of lawn
Q-1. WE'RE GOING TO BE TALKING ABOUT YOUR LAWN DURING THIS INTERVIEW. I REALIZE THAT YOU ALSO HAVE TREES, SHRUBS, AND FLOWERS IN YOUR YARD BUT I WOULD LIKE YOU TO TRY TO THINK PRIMARILY ABOUT YOUR LAWN. PLEASE DESCRIBE YOUR LAWN.

CHECKLIST FOR INTERVIEW:
- Size
- General Appearance
- Am’t Work

Q-2. WHAT KIND OF ACTIVITIES TAKE PLACE ON YOUR LAWN? WHAT DO YOU DO ON THE FRONT LAWN? BACKYARD LAWN?

CHECKLIST FOR INTERVIEWER:
- Play/Socialize Area
- Hang Out Clothes

Q-2a. HOW DO YOU FEEL ABOUT HAVING A LAWN? WHAT DOES YOUR LAWN MEAN TO YOU?

CHECKLIST FOR INTERVIEWER:
- Meaning
- Beauty
- Nature

Q-3. WHAT DO YOU, YOURSELF, DO TO TAKE CARE OF YOUR LAWN? (If respondent says, "NOTHING", ASK: WHO DOES THE LAWN WORK? WHAT DO THEY DO? DO (DID) YOUR CHILDREN HELP? ARE THERE SOME THINGS THAT NO ONE DOES?)

CHECKLIST FOR "SELF":
- Aerate lawn. Reseed.
- Clippings? Compost?
- Edging/special trimming.
- Equipment - what used?
  - Clippers Blower Edger Mower Spreader Sprinkler
- Flowers
- Grass/leaf raking.
- Leaf/pine needle blowing.
- Mow - how often? Time?
- Pest Control - what used? How often?
- Shrubs.
- Thatch.
- Trees.
- Water - how often?
- Weed Control - what used? How often?
Q-3a. If use a service, ASK: HOW MANY TIMES/YR IS SERVICE DONE?

HOW MUCH DOES THE SERVICE COST?

CHECKLIST FOR SERVICE:

- Aerate lawn. Reseed.
- Clippings? Compost?
- Edging/special trimming.
- Equipment - what used?
  - Clippers Blower Edger
  - Mower Spreader Sprinkler
- Flowers
- Grass/leaf raking.
- Leaf/pine needle blowing.
- Mow - how often? How much Time?
- Pest Control - what used? How often?
- Shrubs.
- Thatch.
- Trees.
- Water - how often?
- Weed Control - what used? How often?

Q-4. DOING THESE KINDS OF THINGS TAKES TIME AND MONEY.

WHY DO YOU DO ALL THIS?

DO YOU ENJOY DOING IT, OR IS IT A BURDEN?

ARE THERE NEIGHBORHOOD COVENANTS OR RULES SAY THAT YOU

HAVE TO DO THESE THINGS?

If YES, ASK: WHAT ARE THESE RULES?

CHECKLIST FOR INTERVIEWER:

- Neighbors’ Expectations
- Adds value to house.
- Have to! Why?
- Hire service so don’t
  - have to handle chemicals
- Exercise
- Like being out of doors

Q-5. WHAT DO YOU THINK WOULD HAPPEN IF YOU DIDN’T CARE FOR

YOUR LAWN LIKE YOU DO?

CHECKLIST FOR INTERVIEWER:

- Association rules
- Neighbors sue
- Association fine me
- Weeds would grow
Q-5a. WHEN YOU LOOK AROUND YOUR NEIGHBORHOOD, WHAT DO YOU
NOTICE ABOUT OTHER PEOPLE'S LAWNS?
CHECKLIST FOR INTERVIEWER:
   _____ Weeds

Q-5b. HOW WOULD YOU FEEL IF YOUR NEIGHBOR NEXT DOOR PLANTED
A FIELD OF WILDFLOWERS IN THEIR FRONT YARD?

Q-6. NOW I'D LIKE YOU TO TAKE A LITTLE TRIP DOWN MEMORY LANE.
WHAT DO YOU REMEMBER ABOUT LAWNS WHEN YOU WERE GROWING UP?
CHECKLIST FOR INTERVIEWER:
   _____ Did you have to mow?
   _____ 1st time mowed
   _____ Age 1st mowed
   _____ How much mowed?
   _____ Parents do same as you do now?
   _____ If no lawn, what about any trees, parks, etc.

Q-7. Clothing Pictures.

A. NOW I'D LIKE YOU TO LOOK AT THIS SET OF PICTURES. THESE ARE
PICTURE OF OUTFITS THAT A PERSON COULD WEAR WHEN APPLYING
PESTICIDES. WHAT I'D LIKE YOU TO DO IS SORT THEM INTO GROUPS.
YOU CAN SORT THEM IN ANY WAY THAT YOU WANT. THE FOOTWEAR
IN THE PICTURES ARE EITHER TENNIS SHOES OR BOOTS.

   Group Color: __________

   TELL ME ABOUT YOUR GROUP(S).
   WHY DID YOU SORT THEM IN THIS WAY?
   WHICH OUTFIT WOULD YOU PREFER TO SEE A LAWN CARE
   TECHNICIAN WEAR?

B. HERE'S ANOTHER SET OF PICTURES. HOW WOULD YOU GROUP THESE?

   Group Color: __________

   WHY DID YOU GROUP THEM LIKE THIS?
   WHICH OUTFIT WOULD YOU PREFER TO SEE A LAWN CARE
   TECHNICIAN WEAR?

C. HERE'S A THIRD SET OF PICTURES. HOW ABOUT THESE?

   Group Color: __________

   WHY DID YOU GROUP THEM LIKE THIS?
   WHICH OUTFIT WOULD YOU PREFER TO SEE A LAWN CARE
   TECHNICIAN WEAR?
D. OF THE OUTFITS THAT YOU CHOSE, WHICH ONE IS THE BEST?
WOULD YOU WEAR AN OUTFIT LIKE THIS?
WHAT WOULD YOU WEAR?

E. WOULD ANY OF THESE OUTFITS CAUSE YOU TO BE CONCERNED
ABOUT THE PRODUCT BEING APPLIED?

F. DO YOU THINK THAT WHAT A LAWN CARE EMPLOYEE WEARS WOULD
INFLUENCE YOUR DECISION TO HIRE THAT PARTICULAR COMPANY?
REHIRE THE COMPANY?

G. DO THINK THAT THE CHEMICALS A LAWN CARE COMPANY USES ARE
THE SAME KIND THAT A HOMEOWNER BUYS AND USES? WHY?

Q-8. Environmental Scale.
WE'RE GOING TO HAVE A CHANGE OF PACE NOW. I'D LIKE YOU TO
READ THE STATEMENTS ON THIS SHEET AND RATE EACH ONE BY
CIRCLING THE NUMBER WHICH CORRESPONDS WITH YOUR
AGREEMENT OR DISAGREEMENT FOR EACH STATEMENT.

WHAT'S YOUR REACTION TO A SERIES OF STATEMENTS LIKE THIS?
WERE THERE ANY STATEMENTS THAT WERE HARD TO UNDERSTAND?
ARE THERE ANY TERMS THAT YOU'RE UNFAMILIAR WITH?
WERE THERE ANY STATEMENTS THAT SEEMED TO MEAN THE SAME
TO YOU? (Be sure to ASK:)
WHAT DOES THE TERM "STEADY-STATE" MEAN TO YOU?

Q-9. I HAVE A SECOND SET OF STATEMENTS THAT I WOULD LIKE YOU TO
RATE. THIS IS A LITTLE DIFFERENT THAN THE LAST RATING. THIS
IS A 1 TO 7 SCALE. PLEASE CIRCLE THE NUMBER THAT BEST
DESCRIBES YOUR FEELINGS ABOUT EACH QUESTION.
(After completed ratings take back the completed sheet)
Ask the following Questions:

A. DO YOU THINK THAT USING LAWN CHEMICALS (FERTILIZERS,
PESTICIDES, HERBICIDES) POSES ANY KIND OF THREAT?
PERSONALLY FOR HEALTH? TO THE ENVIRONMENT IN GENERAL?

B. WHAT DIFFERENCE WOULD IT MAKE TO YOUR LOCAL, NEIGHBORHOOD
NATURAL ENVIRONMENT IF YOU STOPPED USING CHEMICALS ON YOUR
LAWN?

C. WHAT DIFFERENCE WOULD IT MAKE TO THE GLOBAL ENVIRONMENT IF
YOU STOPPED USING CHEMICALS ON YOUR LAWN?

D. WHAT'S YOUR REACTION TO THE STATEMENT: WHEN YOU COMPARE
ACRE TO ACRE, HOMEOWNERS USE TEN TIMES MORE CHEMICALS THAN
AGRICULTURE DOES?
ENVIROMENTAL SCALE

Please circle ONE answer for each of the following items:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Mildly Agree</th>
<th>Mildly Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>We are approaching the limit of the number of people the earth can support.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>The balance of nature is very delicate and easily upset.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Humans have the right to modify the natural environment to suit their needs.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Chemicals must be used in order to have a nice lawn.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Mankind was created to rule over the rest of mankind.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>When humans interfere with nature it often produces disastrous consequences.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>Plants and animals exist primarily to be used by humans.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8.</td>
<td>To maintain a healthy economy we will have to develop a &quot;steady-state&quot; economy where industrial growth is controlled.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Humans must live in harmony with nature in order to survive.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Lawn chemicals will not harm the environment if they are properly used.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11.</td>
<td>The earth is like a spaceship with only limited room and space.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12.</td>
<td>Humans need not adapt to the natural environment because they can remake it to suit their needs.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13.</td>
<td>There are limits to growth beyond which industrialized society cannot expand.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14.</td>
<td>Mankind is severely abusing the environment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15.</td>
<td>Lawn chemicals are dangerous and other things should be used in place of them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
HEALTH SCALE

Please circle ONE number for each statement.

1. How likely is it that getting pesticide on your skin will cause an immediate health risk?

<table>
<thead>
<tr>
<th>Very Likely</th>
<th>Very Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
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<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

2. How serious do you think that immediate health risk is apt to be?

<table>
<thead>
<tr>
<th>Very Serious</th>
<th>Very Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

3. How likely is it that getting pesticide on your skin will cause long-term harm?

<table>
<thead>
<tr>
<th>Very Likely</th>
<th>Very Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
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<tr>
<td>2</td>
<td>5</td>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

4. How serious do you think that long-term harm is apt to be?

<table>
<thead>
<tr>
<th>Very Serious</th>
<th>Very Mild</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
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<td>2</td>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>
Q-10. WE'VE COVERED A LOT OF TOPICS IN THE LAST HOUR OR SO - HOW YOU FEEL ABOUT YOUR LAWN, ACTIVITIES, MEMORIES, LOOKED AT THE CLOTHING PICTURES, TALKED ABOUT THE ENVIRONMENT - ARE THERE ANY OTHER COMMENTS YOU WOULD LIKE TO MAKE ABOUT YOUR LAWN, THE CLOTHING OUTFITS, OR ANYTHING ELSE?

Q-11. Background Information.
ALL WE HAVE LEFT ARE A FEW DEMOGRAPHIC QUESTIONS.

A. Do you have any children living at home?
   1. ____ NO
   2. ____ YES -> 2a. How many? ____________________________
      Ages? ____________________________

B. Do you have any pets?
   1. ____ NO
   2. ____ YES -> 2a. What? ____________________________

C. Are you presently employed outside the home?
   1. ____ NO
   2. ____ YES -> 2a. What do you do? ____________________________

D. What is your age? ___________
   (years)

E. Do you belong to any environmental organizations?
   1. ____ NO
   2. ____ YES -> 2a. Which ones? ____________________________

F. How many years of schooling have you completed? ________
   (Highest degree completed)

G. Which of the following categories best describes your total family income for 1993?
   (Hand income sheet to respondent. Let them fill it out themselves)
   (If Refuse to Answer code as 10)

H. (Observe RACE/ETHNICITY ____________________________)
Which of the following categories best describes your total family income for 1993?

1. _____ Less than $25,000
2. _____ $25,001 to $50,000
3. _____ $50,001 to $75,000
4. _____ $75,001 to $100,000
5. _____ $100,001 to $125,000
6. _____ $125,001 to $150,000
7. _____ $151,001 to $175,000
8. _____ $175,001 to $200,000
9. _____ Greater than $201,000
CLOTHING COMBINATIONS FOR PICTURES

Description of the garments and equipment:
- Short sleeved, white shirt of polyester/cotton knit with a placket and pocket.
- Long sleeved, white sweatshirt of 100% cotton.
- Navy colored shorts of polyester and cotton.
- Navy work pants of polyester and cotton.
- Navy coveralls of work weight, cotton and polyester.
- White and dark Tyvek® are disposable coveralls. Tyvek® is a spunbond olefin fabric manufactured by Du Pont. Different types are recommended for different kinds of pesticide applications.
- The jacket of polyester and cotton.
- The jeans of blue denim.
- Cotton, rubber soled tennis shoes.
- Gloves and boots of rubber.
- Sunglasses had the side and top shield.
- Respirator.
- ALL outfits were photographed with a baseball style cap.

OUTFIT A:
- A1. TENNIS SHOES, SHORTS, socks, SHORT sleeved shirt, NO gloves
ADD:
- A2. Gloves
- A3. Safety Glasses and Gloves
- A4. Respirator and Gloves - No Safety glasses
- A5. Respirator and Gloves - With Safety glasses

OUTFIT B:
- B1. BOOTS, SHORTS, socks, SHORT sleeved shirt, NO gloves
ADD:
- B2. Gloves
- B3. Safety glasses and Gloves
- B4. Respirator and Gloves - No Safety glasses
- B5. Respirator and Gloves - With Safety glasses
OUTFIT C:
   C1. TENNIS SHOES, SHORTS, socks, LONG sleeved shirt, NO gloves
ADD:
   C2. Gloves
   C3. Safety glasses and Gloves
   C4. Respirator and Gloves - No Safety glasses
   C5. Respirator and Gloves - With Safety glasses

OUTFIT D:
   D1. TENNIS SHOES, BLUE JEANS, socks, SHORT sleeved shirt, NO gloves
ADD:
   D2. Gloves
   D3. Safety glasses and Gloves
   D4. Respirator and Gloves - No Safety glasses
   D5. Respirator and Gloves - With Safety glasses

OUTFIT E:
   E1. BOOTS, BLUE JEANS, socks, SHORT sleeved shirt, NO gloves
ADD:
   E2. Gloves
   E3. Safety glasses and Gloves
   E4. Respirator and Gloves - No Safety glasses
   E5. Respirator and Gloves - With Safety glasses

OUTFIT F:
   F1. BOOTS, BLUE JEANS, socks, LONG sleeved shirt, NO gloves
ADD:
   F2. Gloves
   F3. Safety glasses and gloves - alone
   F4. Respirator and Gloves - No Safety glasses
   F5. Respirator and Gloves - With Safety glasses

OUTFIT G:
   G1. JACKET (Hood DOWN), GLOVES, BOOTS, socks, BLUE JEANS
ADD:
   G2. Safety Glasses
   G3. Respirator - No safety glasses
   G4. Respirator - With safety glasses

OUTFIT H:
   H1. JACKET (Hood UP), GLOVES, BOOTS, socks, BLUE JEANS
ADD:
   H2. Safety Glasses
   H3. Respirator - No safety glasses
   H4. Respirator - With safety glasses
OUTFIT I:
11. BOOTS, WORK PANTS, socks, SHORT sleeved shirt, NO gloves
ADD:
I2. Gloves
I3. Safety glasses and Gloves
I4. Respirator and Gloves - No Safety glasses
I5. Respirator and Gloves - With Safety glasses

OUTFIT J:
J1. BOOTS, WORK PANTS, socks, LONG sleeved shirt, NO gloves
ADD:
J2. Gloves
J3. Safety glasses and Gloves
J4. Respirator and Gloves - No Safety glasses
J5. Respirator and Gloves - With Safety glasses

OUTFIT K:
K1. BOOTS, WORK COVERALLS, NO gloves
ADD:
K2. Gloves
K3. Safety glasses and gloves
K4. Respirator and Gloves - No Safety glasses
K5. Respirator and Gloves - With Safety glasses

OUTFIT L:
L1. DARK TYVEK® BOOTS, WITH gloves
ADD:
L2. Safety glasses and Gloves
L3. Respirator and Gloves - No Safety glasses
L4. Respirator and Gloves - With Safety glasses

OUTFIT M:
M1. WHITE TYVEK® (Hood DOWN), BOOTS, WITH Gloves
ADD:
M2. Safety glasses and gloves
M3. Respirator and Gloves - No Safety glasses
M4. Respirator and Gloves - With Safety glasses

OUTFIT N:
N1. WHITE TYVEK® (Hood UP), BOOTS, GLOVES, RESPIRATOR, SAFETY GLASSES
APPENDIX B

REVIEW OF LITERATURE RELATED TO
HOMEOWNER'S PESTICIDE USE
APPENDIX B

Homeowner's Pesticide Use

A South Carolina study (Finklea, Keil, Sandifer, & Gadsden, 1969) was among the first to report on pesticide use in the home. They found that 89% of the 121 white families and 75 African American families surveyed used pesticides. Approximately one third of the users applied these chemicals during each week of the year. Most of the users ignored common sense safety precautions, e.g. 88% did not keep pesticides in a locked area, 66% stored them within reach of small children, and 54% placed them near food or medicine.

In a study of three urban areas - Philadelphia, PA; Dallas, TX; and Lansing, MI 92.5% of the 525 respondents reported using pesticides (von Rumker et al., 1974). Home and garden applications accounted for 12% of the total use of the 25 compounds that were considered. Only 8.5% of these respondents indicated that they were concerned with possible side effects from pesticide use.

Other studies have consistently shown that a high proportion of homeowners use pesticides. In 1974, 230 families in 18 Colorado communities were interviewed to determine their pesticide practices. Of these families, 72% used pesticides (Colorado ..., 1974). Lande (1975) in a study of 39 Pennsylvania families reported 85% used pesticides.

In 1976 a study of national scope was undertaken to determine the quantities of pesticides applied in the home environment (Savage, Keefe, & Wheeler, 1979). A total of 8,254 U.S. households in 25 SMSAs participated in the study. Nine out of every ten
households (90.7%) reported using some type of pesticide in their house, garden, or yard. This is consistent with findings from the previous small studies. It was estimated that three times as many householders used pesticides inside their houses as in their yards (83.7% use pesticides in the house, 21.4% in the garden, and 28.7% in the yard). Based upon comparisons among the geographic regions represented in the study, the southeastern region of the United States had the highest use of pesticides in the house (94%), while the California, Arizona, New Mexico region had the highest garden (27.7%) and yard usage (62.2% yard). Over 500 different pesticide formulations were found to be used. Fifteen pesticide formulations accounted for 65.5% of all observed pesticide containers. Many of the householders did not know what they used and less than 50% reported reading labels.

In 1990, a second national study was done for the EPA by Research Triangle Institute in Research Triangle Park, North Carolina (Whitmore et al., 1992). The study was based on a sample from 60 counties located throughout the continental United States. It was designed to provide defensible national inferences, not regional inferences. A response rate of 84.9% resulted in 2,078 households participating in the survey. Based on data from this study it is estimated that 90% of single-family residences have at least one pesticide product in storage, significantly greater than the estimated 70% for multifamily dwellings. About 85% of all households had at least one pesticide product in storage, 63% had one to five products in storage, and 22% had more than five products in storage. Products defined as pesticides included disinfectants, fungicides, insecticides, mollusccides, rodenticides, herbicides, and repellents. During the year prior to the study, approximately 65% of the households had used an insecticide and 59% had used herbicides.
Other important findings included:

1. Households with young children (47%) are less likely to have pesticide products stored within their reach than those without children (75%).

2. About one million households have products containing chlordane, 150,000 have products containing DDT, and 70,000 have heptachlor or silvex which they do not know how to dispose of.

3. The two most common household nuisance pests are ants and cockroaches, with mosquitoes and fleas the next most frequent.

4. Approximately 10 million households (15%) had pesticides applied by a professional lawn care company in the previous year.

Frankie and Levenson's (1978) study reported on attitudes, as well as practices, towards insects and insecticides. Data were collected in two Texas cities from 1974-1976. Interviews were conducted in Bryan-College Station over a period of three years and in the Dallas area over two years. A total of 551 white, middle-aged, married homeowners took part in the study. Findings from the Bryan-College Station sample showed that 55 - 76% of the participants had indoor/outdoor insect problems. Sixty three to 78% used chemicals indoors and 43 - 50% of the same people outdoors. In Dallas 68% had indoor insect problems and 75% outdoor problems. In 1976, a significant decline in indoor (50%) and outdoor (35%) problems was reported. Depending on the year, 47 to 68% and 33 to 58% of the Dallas people used chemicals indoors and outdoors, respectively.

In both cities, most respondents felt that chemicals did some good; relatively few could describe negative aspects. In both groups, the majority of calls to professional pest control services were for indoor problems. People did not know what chemicals the professionals used. Finally, the study reported that the attitude towards the use of chemicals changed in both cities. Respondents reported their attitude changing toward the use of chemicals due to personal experience with negative results, reading, TV, and
the ecology/environment movement. Most stated they used no chemicals or they used them cautiously.

This study was expanded to include Berkeley, CA (n=200), Dallas, TX (n=201) and New Brunswick, NJ (n=200); two socioeconomic groups (upper- and lower-middle class); specific pests (mostly insects), pesticides used, and a professional pest control operator (PCO) sample (Levenson and Frankie, 1983). The average respondent in the study was 44 years old, white, married, and a homeowner living in either an upper-middle class or lower-middle class neighborhood for 17 years. Of the 601 respondents, 539 said they had pest problems. Their most frequent source of pest information was from a PCO. Most people personally used chemicals indoors and out and many had used a PCO. Respondents rarely knew the type of chemical used by the PCOs. People expressed the belief that pesticides do good and rarely thought that they did any harm. Most respondents said that they had changed their attitudes toward being more cautious regarding pesticide use. Women indicated they disliked insects more than men and were more aware of potential harm from chemicals. Few differences were noted between house dwellers and apartment dwellers.

Kamble, Gold, & Vitzthum (1982) found that 73% of the homeowners in Nebraska with pest problems use pesticides. They estimated that 148,551 lbs of pesticides (AI) were used in 1980, with carbaryl, diazinon, and 2,4-D being used in greatest quantities. Methods of application, storage, and disposal were considered to be less than adequate in many cases.

Bennett et al. (1983) in a study of 958 households in North Central Indiana echoed these findings. The majority of the households surveyed (78%) used pesticides. Aerosol-spray formulations were used most often (58.1%). Pesticides were applied most frequently by adult females (55.4%). In this study only 5% of those using pesticides
stored them in a locked area. The kitchen was both the area of most frequent application (27%) and storage (38%).

Grieshop and Stiles (1989) found that 25% of the 415 California residents who responded to their questionnaire reported suffering illness from pesticide exposure. Almost 40% of pesticide users reported they did not always read and/or understand labels, 21% admitted applying stronger-than-recommended mixtures, 53% did not wear any protective clothing or equipment, and of those who did, 12% did not follow any clean-up procedures with exposed attire. Empty containers were most frequently thrown into trash can (88%) and 22% reported placing leftover chemicals in the trash (which is recommended on the label but illegal in California). The authors found an association between how safe or dangerous home users believed pesticides to be and the degree of risk-taking behavior; however there was considerable risk-taking among those who perceived great risk.

It appears that little has changed in homeowner attitudes or actions since researchers began looking at them. American homeowners use a great many pesticides both inside and outside their homes, generally do not follow commonsense safety precautions, and do not wear protective clothing.
APPENDIX C

REVIEW OF LITERATURE RELATED TO
PESTICIDES AND HEALTH
APPENDIX C

Pesticides and Health

The World Health Organization (WHO) considers acute pesticide poisoning a major global health problem (Lang, 1993). WHO estimates that between one and five million cases of acute pesticide poisoning occur, largely in underdeveloped nations. There is no national database in the United States that compiles complete statistics regarding incidence of death and injury from acute pesticide poisoning. The state of California requires that acute pesticide poisoning be reported to state health authorities. In 1987 about 17,000 exposure incidents were reported, of which 30 - 60% were symptomatic (Lang, 1993).

Researchers from the Minnesota Regional Poison Centers reported that, since 1986, pesticides have accounted for approximately 4.3% (2,209) of human exposure calls (Olson et al., 1991). The authors state that this is consistent with the percent of calls associated with pesticides poisonings nationally. Calls originating from a residence accounted for 85% of the calls. Eleven percent were from health care facilities and workplace calls accounted for 3%. Twenty two percent of the calls were related to organophosphate insecticide exposure. Herbicide type exposures are very different from other pesticide poison calls. They are typically associated with an adult male experiencing dermal exposure. When comparing the growing use of herbicides in both rural and urban settings with the number of calls, it was judged that potential exposure appeared low.
Redetzke and Applegate (1993) found organochlorine pesticide residues in adipose tissue samples taken from 25 persons in El Paso, TX during the fall of 1983 and spring of 1984. None of the persons involved were known to have experienced occupational exposure to pesticides or pesticide intoxication. These findings suggest that either there is continued use of banned organochlorine pesticides in the United States or there is increasing use in Mexico. A study in Australia found increased levels of organochlorine pesticides in human milk after home treatment for termites (Stacey & Tatum, 1985).

Savage et al. (1988) found a relationship between acute organophosphate poisonings occurring at one point in time and subsequent chronic neurological problems. Buesching and Wollstadt (1984), Burmeister, Everett, Van Lier, & Isacson (1983), Burmeister (1990), Cantor (1982), Hoar et al. (1986), and Weisenburger (1990) have all reported indications of long-term cause-and-effect relationships between agricultural pesticide use and cancer.

Fifty percent of all calls to the Minnesota Regional Poison Centers (Olson et al., 1991) reported pesticide exposure to children under the age of three years. This is an area of great concern because of the lack of knowledge about long term effects. Studies which have explored the long-term effects of such exposures on children include Gold, Gordis, Tonascia, & Szklo (1979), Moses (1989), Davis, Brownson, and Garcia (1992) and Davis et al. (1993). Gold and his colleagues reported that when comparing brain cancer cases to normal controls, an odds ratio (OR) of 2.3 ($p = 0.10$) was found for children exposed to household pest exterminations. A comparison to children with other cancers showed no such relationship. Moses reported that chronic exposure to fungicides poses the greatest risk of cancer as compared to other pesticide types. Davis and his group reported that childhood brain cancer odds ratios varied substantially by pesticide use situation and time period of use. When comparing childhood brain cancer cases
(n = 45) to friend controls (n = 85), significant positive associations were observed for
use of pesticides to control nuisance pests in the home, no-pest-strips in the home,
pesticides to control termites, Kwell shampoo, flea collars on pets, diazinon in the garden
or orchard, and herbicides to control weeds in the yard. In comparison to cancer
controls (n=108), significant positive associations were observed for use of pesticide
bombs in the home, pesticides to control termites, flea collars on pets, insecticides in the
garden or orchard, carbaryl in the garden or orchard, and herbicides to control weeds in
the yard. The authors cautioned that further research is needed to confirm these
findings.

Sinks (1985) found significant relationships between childhood brain cancer and
maternal use of aerosol pesticides during pregnancy (OR = 1.56, p = 0.04) and after
birth (OR = 1.66, p = 0.04). No significant risk was observed in this study for other
pesticide exposures.

Fenske et al. (1990) studied the potential for exposure and health risks of infants
following indoor residential pesticide applications. Despite the lack of information about
exposure/absorption and toxicological interpretations, the dose values measured in this
study raised concerns about the possibility of infant health problems resulting from
exposure to these pesticides.

Camann (1991) reported that carpet dust in the average American home contains
pesticide residues at about one part per million. Toddlers and infants, because of their
low body weight, frequent contact with the floor, and hand-to-mouth activities are
considered to be most susceptible to adverse effects from this source of pesticide
contamination.

The debate continues concerning the exact risks of pesticides for health. A 1990
poll indicated that 75% of the American public shares the perceptions that pesticides pose
a serious hazard to man and the environment (Trends...1992). It is generally agreed among scientists that the public perceives a greater risk from pesticides than the scientific community. However if research identifies dangers from these substances the public will have to weigh the very real benefits against human health costs.
APPENDIX D

REVIEW OF LITERATURE RELATED TO

ENVIRONMENTAL AESTHETICS
Appendix D

Environmental Aesthetics

Innate Preferences

Stephen Kaplan (1988a) defines preferences "as the outcome of a complex process that includes perceiving things and spaces and reacting to them in terms of their potential usefulness and supportiveness" (p. 46). Preferences may be an indicator of aesthetic judgment or involve decision making and choice (Kaplan, 1988b, p. 56). When viewed in an evolutionary perspective, preference guides behavior and learning and fosters the building and use of cognitive maps. Environmental preference is "the outcome of what must be an incredibly rapid set of cognitive processes that integrate such considerations as safety, access, and the opportunity to learn into a single affective judgment" (p. 63).

Kaplan (1979, 1987, 1988a, 1988b) suggests that aesthetic judgment is the product of two processes related to survival; one involves capturing the viewer's attention (involvement) and the other enhancing comprehension (making sense). Making sense is seen in terms of coherence (perceptual organization of patterns) and legibility (the ability to create a cognitive map and know an environment well enough to act in it). Involvement is related to complexity (the amount of information there is to perceive and to mystery (the promise of, or inducement to obtain new information by acting in the environment). In Kaplan's approach landscape preference is an expression of adaptational suitability and stresses the role of information gathering and organizing.
Appleton (1975, 1988) believes that the human experience of landscape is most closely connected to human's evolutionary heritage. His habitat theory suggests that both animals and premodern man appreciate landscape largely in terms of survival functions. He reasons that prospect (open views) and refuge (protection or opportunity for protection) have aesthetic value because such preferences would have enhanced human survival. His essential argument is that aesthetic reactions to landscape are in part inborn, and "if he is to experience landscape aesthetically, an observer must seek to recreate something of that primitive relationship which links a creature to its habitat" (1975, p. viii).

Balling and Falk (1982) reported that savanna and open forest scenes were highly preferred over thick forest, jungle or desert slides by people, regardless of age and nationality. Subjects for this study included 105 third-grade children, 77 sixth-grade children, 96 ninth-grade children, 100 college students from two Maryland colleges, 30 undergraduates from the University of Arizona, 14 retired senior citizens, 50 professional foresters, 34 people attending a meeting of biology teachers, and 42 adults from Maryland. Twenty slides, representing five different biomes - tropical rain forest, desert, savanna, temperate deciduous forest, and coniferous forest were viewed twice by the participants. Respondents were asked to rate each slide on where they would prefer to live permanently and where they would like to visit. The strongest preference for the savanna biome was found among the two youngest age groups in their study. By mid-adolescence and continuing throughout adulthood, the mean preferences for savanna, deciduous forest, and coniferous forest were statistically indistinguishable. These findings were interpreted to provide limited support for the hypothesis that people have some innate preference for savanna-like environments. Since humans evolved in the grassy, tree-sprinkled savannas of Africa, our modern preference for lawns and trees
may be an innate expression of our origins. But this underlying preference can be modified through experiences across the life span.

The Green Experience

Kaplan's description of "green experience" is based on a series of studies done with the same group of slides (Kaplan, 1975). The first study was done with a group of female college freshmen. A set of fifty-six slides were presented to the women. The ones that were categorized as "nature" were vastly preferred by the 88 participants. The subset of slides depicting urban settings were rated significantly lower. The various residential scenes were liked least of all.

Three years later 35 women from the original group were shown the same slides and asked to rate their preference for each. The results indicated that the mean-rated preference for nature scenes showed a significant increase; for the urban scenes, the ratings declined; for the residential setting, they remained low.

The same slides were used in a study in which respondents viewed scenes as one would glimpse them when driving in a car. The differences in rated preference between viewing durations of 10, 40, and 200 milliseconds were minor, but the relative preference for the nature pictures as compared to the urban scenes was even greater than in the other studies. Wohlwill (1976) replicated these studies and found similar preferences for nature over urban scenes.

Kaplan, Kaplan, and Wendt (1972) in a study using color slides to represent a continuum ranging from nature to a predominance of man-made aspects to urban scenes, found a clear preference for nature scenes over urban scenes. The participants were undergraduate students who were not familiar with the specific scenes that they were asked to rate on a five-point preference scale. Analysis of the ratings yielded two clear groupings: one of urban scenes and one of "nature" scenes. The nature cluster included
all the scenes selected to represent the nature end of the continuum including scenes in which nature predominated but where human influence was visible. The least preferred nature scenes consisted of a flat, open, relatively parched field with a forest in the very distant background and a scene dominated by coarse-textured, disordered foliage with a telephone pole surrounded by high weeds at one edge.

The urban grouping included all but two of the scenes selected to represent that end of the continuum. The scenes that reflected various residential settings did not form a unique grouping, suggesting that the participants did not perceive these as a distinct content domain. The nature grouping included a far broader range of nature content than had been expected. The presence of human influence did not detract from the perceptual categorization, and the preference for the nature scenes was not a function of the presence or absence of human influence.

The presence of vegetation emerged as the strongest predictor of preference in the 1982 study done by Herzog, Kaplan, and Kaplan. One hundred forty colored slides of a wide variety of urban setting were rated by students unfamiliar with the particular scenes. The overwhelming preference for any urban scene with vegetation suggests that nature in the city is highly valued.

Ulrich (1977) developed a model of visual landscape preference based upon an analysis of the informational qualities of various settings. Five variables thought to affect the informational properties of an environment were identified: complexity, focality, ground surface texture, depth, and mystery. This study showed that people prefer natural landscape scenes with a relatively high degree of complexity, a clear focal point, even ground texture, a good depth of field, and a sense that new predictable information will become available by moving through the landscape.
Specific landscape features have been identified that regularly increase the attractiveness of landscapes. There is a preference for smooth, even surface texture in the landscape. Several studies of forest landscapes have found positive relationships between aesthetic preference and comparatively even-length grass ground covers and negative preference effects of rough ground covers (Daniel & Boster, 1976; Rabinowitz and Coughlin, 1970; Ulrich, 1983).

A variety of other factors have been studied that can influence one’s preference for nature. Zube (1973b) suggested that landscape designers and managers in the environmental field valued natural landscapes more highly than did nonprofessionals in environmental fields and lay control groups. Lay groups and nonprofessionals tend to be less negatively disposed to man-made forms (towns) in relation to regional scenic beauty.

Gallagher’s (1977) dissertation on "visual preference for alternative natural landscapes" was concerned with identifying the processes that operate in preference for natural settings. Scenes for his photoquestionnaire included both natural areas (prairie/woodland sites characterized by low levels of management) and ornamental areas. Respondents rated each of the scenes. Two unexpected findings emerged from this study. First, "naturalness" when depicted as prairie grasses (rough, scruffy, unmanaged looking) was the least preferred. Second, the lack of trees had a bearing on judgments. The number and size of trees and their dominance in the scene accounted for 45% of the preference variance. Respondents preferred scenes that contained trees.

The importance of trees should come as no surprise. Gold (1977) had asserted that "the tree is the most dominant natural element in the urban landscape." Alexander, Ishikawa, and Silverstein (1977) declared that "trees have a very deep and crucial meaning to human beings" (p. 798). Zube (1973a) suggests that trees in the city reduce its perceptual scale. This may make the city seem smaller and more comprehensible to
people. Trees, especially deciduous forests, combined with open meadows, abundant grass cover, and minimal underbrush are generally preferred (Daniel & Bolster, 1976; Patey & Evans, 1979; Schroeder, 1991; Zube, 1976; Zube, Pitt, & Anderson, 1975).

Simply labeling a slide as a "wilderness area" elevated an area's scenic-quality rating, while labels such as "commercial timber stand" reduced it (Anderson, 1981).

Preference by Gender and Age

Sebba (1991) found that Israeli children’s environmental preferences were connected with the gender of the child. Boys showed a preference for outdoor sites and girls for indoor locations. Children’s preferences (both gender) were found to be connected with the type of settlement in which they grew up. "Indoors only" was preferred by more urban than rural children. This study also compared children’s actual experiences with adults' recollections. There was no connection between the children’s actual preferences and those remembered by adults. In total, 46% of the children preferred the outdoors as compared with 96.5% of the adults. The discrepancy between recall of adults and actual activities of the children may be due to the emotional qualities of memories from childhood or differences in the culture of yesterday and today. Adults of today did not have the technological games and activities that children now play with indoors. Similar findings were reported by Marcus (1978) who found that 86% of the environments recalled by American college students were outdoors.

Zube, Pitt, and Evans (1983) found that age influenced an individual’s response to the landscape. Young children rated landscapes differently from adults, and older adults differ slightly from young and middle-aged adults. Young children’s preferences were less affected by the presence of human influences in landscapes than were young and middle-aged adults, who greatly disliked them. Elderly adults were not as disturbed by human intrusions as younger adults were, but they disliked them more than children did.
Young and middle-aged adults were most sensitive to complexity in landscapes, while children exhibited a strong attraction to water in landscapes. Lyons (1983) also reported that preferences changed through the life cycle.

**Preference by Social Class**

Duncan (1973) and Hecht (1975) found that patterns of landscape taste correlated with social class. Duncan discovered that two distinct social groups in Bedford, New York lived in totally different natural environments. The landscape he classified as alpha was the oldest residential landscape in the area; homes were versions of traditional colonial residences, roads were crooked, overhung with trees and unpaved, gardens and landscaping reflected the preference for "natural" and studied "English seediness," and wealthy owners valued their privacy. Beta landscape included homes built within the previous 20 years, paved streets, gardens with open expanses of grass and symmetrically arranged shrubs and trees, few fences or trees obscured the views of the houses, children played in the streets, and owners were of a slightly lower socioeconomic class than alphas. Alphas and betas rarely mingled in church or social and civic organizations. Hecht reported streets with a high percentage of grass lawns were in middle- and lower-middle-income Mexican residential areas of Tucson, Arizona. Non-grass lawns were more numerous in upper- and middle-income Anglo subdivisions.

**Environmental Satisfaction**

A study of childless, relatively nonaffluent adults (n = 268) living in urban housing developments found that not only do people prefer to see the natural world, but having such views and facilities nearby strongly affects their satisfaction with their physical and social environment (Kaplan, 1981). People described their large, multiple-family housing to be friendlier, more supportive, and much more attractive when there were trees and
woods to be seen. Acres of large mowed areas did not contribute to this overall satisfaction.

Findings from this study also suggested that the natural environment is not a simple unidimensional construct. People differentiated their immediate residential environment in terms of various features of the natural setting. These seem to be based on a variety of factors, both visual and functional. Viewing parked cars and other apartments unscreened by trees was rated unfavorably.

Sheets and Manzer (1991) explored cognitive and affective reaction to vegetation in an urban setting that was familiar to the respondents. Using line drawings in one study and slides in a second study, they found that the addition of vegetation (trees and shrubs) generated positive affect and positive evaluations of the quality of life in the area. Subjects reported more positive feelings when viewing tree-lined streets; they felt friendlier, more cooperative, less sad, and less depressed. Scenes with vegetation were rated as better, safer, and cleaner places in which to live and as easier places in which to make a living.

Physical and Mental Restoration

The notion that experiences with the natural environment can be physically and psychologically healthful has been widely held since the 1800's. Since 1815, the Friends Hospital, Philadelphia, PA has used horticultural therapy to treat the mentally ill. Plant therapy, under professional supervision, is currently used in nearly 300 hospitals across the country, according to the American Horticultural Therapy Association in Gaithersburg, MD (Boal, 1994). In a recent survey, conducted by the Arthritis Foundation, 62% of the people with the disease enjoyed gardening more than any other activity (Boal, 1994).
Hartig, Mang, and Evans (1991) used a quasi-experimental field study and a true experiment to assess the restorative experiences of wilderness backpacking, nonwilderness vacations, and a control condition of daily routines. They reported that greater restorative effects arise from experiences in nature. A prolonged wilderness experience has restorative effects although immediate emotional response to returning to one's usual setting may be negative. Long-term follow-up suggested that some of the initially depressed reactions at the end of the trip not only dissipated but reversed over time. Participants who spent time in a park reported greater restoration than those who went for a walk through a lovely urban area or relaxed in a comfortably furnished room.

Ulrich (1979) addressed the idea that stressed or anxious individuals tend to feel better after exposure to natural rather than urban views. University students, experiencing anxiety because of a course examination, viewed color-slide presentations of either (a) everyday natural scenes dominated by green vegetation or (b) unblighted urban views lacking vegetation or water. Individuals' feelings were measured both immediately before and after the slide exposures using the Zuckerman Inventory of Personal Reactions. Results showed a clear pattern of restoration for natural scenes. Urban views actually tended to be detrimental to emotional well-being on some dimensions. The two categories of environment produced quite different changes in emotional states despite the fact that the complexity levels of the slide samples were equivalent. The results suggested that the importance of visual contacts with nature extends beyond aesthetic benefits, and include a range of benefits in terms of psychological well-being.

In a subsequent study Ulrich (1981) employed physiological measures of alpha wave amplitude and heart rate after exposure to different types of landscape scenes as well as paper and pencil ratings. Alpha is a valid indicator of cortical arousal and is associated with feelings of wakeful relaxation. This study tested whether visual exposure to nature
environments, i.e., nature with water and nature dominated by green vegetation, was more beneficial in a psychophysiological sense than exposure to environments lacking nature, i.e., urban without water and vegetation. Exposures to the two nature categories, especially water, had more beneficial influences on psychological states that the urban slides. The alpha amplitudes and heart rate findings were consistent with the self-ratings. The most positive influences on well-being were produced by the nature scenes. Gender differences were noted. Females exhibited stronger feelings of attentiveness and positive effect for vegetation scenes than the males.

The accord between the findings of these two studies is noteworthy because the investigations were performed in different countries, America (1979) and Sweden (1981). Based on findings from the two studies Ulrich proposed that people benefit most from visual contact with nature, as opposed to urban environments lacking nature (no vegetation), when they are in states of high arousal and anxiety. The benefits of visual exposure to nature, compared to urban content, may be less for unstressed people in normal arousal states. However, as the second study suggested, effects of nature exposures even on unstressed individuals can be significantly more positive than the influence of urban views. Further work continues to support the idea that natural environments facilitate recovery from stress (Ulrich, Simons, Losito, & Fiorito 1991).


A wide range of values concerning nature exist throughout the population. These values range from little interest in nature to great interest. Many people are only a generation or two removed from families who depended on their own gardens to provide
most of the food they ate. There appears to exist in most people a basic need for nature in some form. One of the reasons for the exodus to the suburbs is the desire to be close to nature in some form. At a time when there are great technological advances there is also a growing realization that humans are not apart from nature and there may be many benefits from nature that individuals are unaware of and only now beginning to understood.
APPENDIX E

REVIEW OF LITERATURE RELATED TO
ENVIRONMENTAL ATTITUDES AND BEHAVIOR
APPENDIX E

Environmental Attitudes and Behavior

The meta-analytic review of 187 studies looking at environmental behavior by Hines, Hungerford, & Tomera (1986/87) indicated a positive correlation between environmental attitudes and behavior. This meta-review included 51 studies of the environmental attitude-behavior relationship. Analysis of this relationship found a corrected correlation coefficient of .374, indicating that individuals expressing more proenvironmental attitudes were more likely to have reported engaging in responsible environmental behaviors, such as recycling, petitioning, and conserving energy. Higher attitude-behavior correlations were obtained in situations in which actual behaviors were assessed \( (r = .427) \) than where behaviors were determined by self-report \( (r = .334) \).

Consistent with the notion of attitude accessibility, studies that sample populations comprised of individuals with ties to environmental organizations resulted in a higher average correlation \( (r = .593) \) than did studies that sampled the general population.

This review suggests that the prediction of environmental behavior is based upon a multitude of actions, including locus of control, knowledge, ability, and such situational factors as economic constraints, social pressures, and opportunities.

Many studies have looked at sociodemographic variables in relation to environmental behavior. Findings from these studies are inconsistent. A number of studies suggest that individuals who express the most concern for the environment tend to be young and well educated (Althoff & Greig, 1977; Buttel, 1987; Buttel & Flinn,
and reside in urban areas (Althoff & Greg, 1977; Buttel, 1987; Buttel & Finn, 1978; Dunlap & Catton, 1979; Lowe & Pinhey, 1982; Mohai & Twilight, 1986; Samdahl & Robertson, 1989; Tremblay & Dunlap, 1978; Van Liere & Dunlap, 1980). Income, education, gender (being male), and environmental attitudes have been found to have positive associations with environmental knowledge (Arcury, 1990; Arcury & Christianson, 1993; Arcury & Johnson, 1987; Arcury, Johnson, & Scollay, 1986; Arcury, Scollay, & Johnson, 1987; Lovrich, Pierce, Tsurutani, & Abe, 1986; Maloney & Ward, 1973).

Other studies have reported conflicting findings. Honnold (1981) suggests that sociobiological cohorts may be more effective than age in predicting environmental concern. Neuman (1986) found that demographic attributes (gender, age, educational level, income, political stance) were unrelated to behavioral commitment to conservation practices.

Early studies on the effects of gender were inconclusive (Van Liere & Dunlap, 1980), but a recent review of studies on gender and environmental concern suggests that women express more concern than men in local environmental issues (Mohai, 1992). The difference is smaller for national issues, and women are less likely than men to take political action to protect the environment.

Van Liere and Dunlap (1980) reviewed a wide range of studies reporting the sociodemographic correlates of environmental concern and concluded that this line of research has had limited success in explaining environmental attitudes. The relationship between sociodemographic characteristics and environmental concern is still poorly understood.
Arcury and Christianson (1993) found no consistent differences by residence in regard to an individual's environmental world view, concern, knowledge, and action. They did find differences by education and income.

Samdahl and Robertson (1989) reexamined, through LISREL techniques, many of the sociodemographics and political ideologies that have been previously reported as determinants of environmental concern. The study tested the causal model that was developed using data from a general population survey in the state of Illinois (N = 2,131). Their analysis indicated that sociodemographic characteristics, residence, and political ideology were ineffective in explaining any of the three types of environmental concern (perceptions of problems, support for regulations and ecological behavior) identified. Pro-liberal ideology was a strong predictor of support for environmental regulation. The authors suggest that "further research might benefit most by exploring underlying belief structures rather than demographic characteristics of the population" (p. 57).

Baldassare & Katz (1992) found that personal environmental threat is a better predictor of overall environmental practices than are demographic variables and political factors. Perceived environmental threat was found to be highest among younger residents, women, liberals, and Democrats.

Current environmental literature suggests that there is a growing awareness of two major problems in research dealing with environmental attitudes. The first is the way in which attitudes are measured and conceptualized. Single-item scales, poor in validity and reliability, have frequently been used (McStay & Dunlap, 1983). A review of existing literature and results of a Washington State study (N = 806) by Van Liere and Dunlap (1981) found that there is little support for the assumption that all environmental concern measures are equivalent.
The second problem is the lack of theory. Environmental studies are often issue-oriented, which is important, but there is no underlying theoretical framework to tie all the findings together (Arcury & Christianson, 1993; Buttel, 1987; Stern, Dietz, & Kalof, 1993; Stern & Oskamp, 1987).

The New Environmental paradigm (NEP) developed by Catton and Dunlap (1978, 1980) and Dunlap (1980) is a major development in constructing a social theory of environmentalism. The basic proposition of the NEP is that every society has a dominant social paradigm based on experience, embedded in values, and related to actual behavior. Dunlap and Van Liere (1978) furthered the process of operationalizing the NEP by developing an NEP scale to measure the environmental world view. Studies using the NEP have looked at the emergence of a new worldview, or paradigm, associated with environmentalism. (See Appendix G for a review of NEP scale studies.)

Another approach to theory building has been to adapt Schwartz's (1977) norm-activation model of altruism to explain actions intended to ameliorate environmental problems. Schwartz's theory of altruism underlies the idea that proenvironmental behavior becomes more probable when an individual is aware of harmful consequences (AC) to others from a state of the environment and when that person ascribes responsibility (AR) to herself or himself for changing the offending environmental condition. Under conditions of AC and AR, individuals experience a sense of moral obligation to prevent or mitigate the harmful consequences. This so-called personal norm motivates action is being studied by a growing number of researchers (Black, Stern, & Elworth, 1985; Heberlein & Black, 1976; Hooper & Nielsen, 1991; Stern, Dietz, & Black, 1986; Stern, Dietz, & Kalop, 1993; Van Liere & Dunlap, 1978).

Stern and his colleagues (1993) expanded the Schwartz model by identifying three value orientations that may underlie environmental attitudes and behavior. These
include a social or altruistic orientation (concern for others), an egoistic value orientation (concern for me), and a biospheric value orientation (concern for Nature). There may be other value orientations that are culturally specific but the researcher's review of literature suggested that these three were the most frequently noted in Western environmental literature.

Findings from an initial study of college students (n = 349) suggest that because the three value orientation coexist in people and may all influence behavior, individual action may depend on the belief or value set that receives attention in a given context. This response has been identified as a "focus effect". Different sets of environmental attitude or preference questions draw attention to different value frames and result in differing degrees of measured environmental concern. It may be that the orientations represent points on a dimension of moral scope or breadth of moral concern or that the orientations compete within a person (p. 340).

This model also provides a vehicle for understanding gender differences that have been reported in other research. Findings from this study are consistent with feminist theory that argues that women tend to see a world of inherent interconnections, whereas men tend to see a world of clearly separate subjects and objects, with events abstracted from their contexts (p. 340). Women appear to be more accepting of messages that link environmental conditions to potential harm to themselves, others, and other species or the biosphere.

The mother/father effect, reported in previous research, may be explained by "differential awareness". Becoming a parent increases attention to information about things that may affect one's children's well-being; gender socialization may lead women to focus on children's health, and men on children's economic well-being, with opposite effects on environmental concern (p. 341).
The model also provides a basis for understanding age, period, and cohort differences reported in environmental research. The authors hypothesize that differences in beliefs about the consequences of environmental conditions may be largely based on media reports while differences in value orientations are more likely to reflect cohort effects. Beliefs about the effects of environmental impacting oneself, others and the biosphere, based on secondhand information, are more amendable to change while the values that can turn the beliefs into action are much less mutable.

This study did not address how individual concerns about the environment are shaped by social movements and political-economic forces. The authors suggest that these are processes which both influence environmental beliefs and focus attention on certain values would be amendable to study using this model.

The environmental attitudinal research field continues to produce studies like this one that are broadening the understandings of the relationship between attitudes and behavior.

The research related to environment and attitudes, values, and beliefs is ongoing. Improved measurement tools and study designs, and integration of findings into broader theory are needed.
APPENDIX F

REVIEW OF LITERATURE RELATED TO
ORIGIN OF THE AMERICAN LAWN
APPENDIX F

Origins of the Ideal American Lawn

Historians have written about the lawns which appeared in Persian, Greek and Roman gardens before the birth of Christ but the evidence for their existence is extremely scanty. The first detailed information about lawns was recorded between 1300 and 1500 (Hessayon, 1982).

The story of contemporary lawns probably began in medieval castles and monastery cloisters which provided safety for growing food, herbs, fruits and flowers. The small, enclosed, protected areas where fruit and flowers grew became known as pleasure gardens. The pleasure garden provided both food and a psychological sanctuary for human activity. People meditated, rested, danced, and courted in these orchardlike settings. The ground was covered with meadow grasses, which were kept short by beating and trampling them underfoot. Wild flowers crept in among the meadow grasses and gave rise to the name "flowery meads" (Harvey, 1981).

The modern lawn evolved from the pleasure gardens of the French and English. Pleasure gardens are not to be mistaken for the practical garden where one grew food and herbs. "Because it is the product of a leisure class and a mature culture, the pleasure garden...is never found among primitive peoples or upon the frontier" (Tatum, 1978, p. 65).

The formal Renaissance style pleasure garden dominated Europe for nearly three centuries. This landscape style continued the geometric lines of the building, especially its
central axis, into the surrounding site. The effect of these "architectural gardens" depended upon the viewer being able to experience the symmetry of the design. Elevated points, such as windows and terraces, provided spectators with a platform from which to view the garden to its' best advantage. These formal gardens reflected the belief that nature worked with clocklike precision and could be controlled by human hands and intelligence (Adams, 1979).

In the mid 1700s Englishmen returning from the Grand Tour sought to remake their own parks and gardens into something resembling the landscape pictures of Claude Lorrain (1600-1682) and Gaspar Poussin (1615-1675). This practice of designing gardens to resemble paintings explains such familiar terms as "landscape gardener" and "picturesque".

The English garden was a romanticized version of nature, full of copses and winding streams, wandering paths, thickets, and often a carefully manufactured ruin. Sweeping vistas of turf were an essential component of these creations (Crockett, 1971). These landscapes represented the philosophical belief that there was once a simpler, pastoral way of life where humans and nature lived in harmony (Watkin, 1982).

Landscape artists such as William Kent (1685-1748) contributed to the establishment of the lawn as an essential component of English landscape. Sir Francis Bacon wrote, "...nothing is more pleasing to the eye than green grass kept finely shorn..." It was the English landscape gardener, Lancelot "Capability" Brown (1715-1783), who truly brought the grass lawn into prominence. Brown destroyed existing gardens, cut down mature trees, and moved entire villages and people in his efforts to shape the ground into a concave or convex surface in order to focus an observer's view in a particular direction. Brown's landscapes, dominated by the lawn, became the icon of late eighteenth-century English society (Turner, 1985). It is very important to note that the British climate, mild winters, moderate temperatures, and high humidity played a major role in the success of Brown's use of grass. These high maintenance lawns appeared during the Victorian period in Europe
and only the wealthy could afford the gardeners and workmen needed to establish and maintain them.

British colonists brought their cattle, sheep, and seeds along with their cultural ideals to America. The forests of the New World were quickly cleared to create pasture for the cattle and sheep which played a central role in English agriculture. Seed brought from the Old World, such as bluegrass and white clover, were adapted to flourish in their new environment. The village commons, covered with a mixture of grasses, legumes, and other plants became a common landscape feature in the villages and towns of nineteenth century America (Cronon, 1983). For the average nineteenth century American grass growing near the house was usually sparse and scraggly. Growing grass was difficult and required special care and equipment. Lawns were generally kept to a minimum and cut by hand scythes or kept short by grazing animals until the mid-1800s. Many people did not allow grass to grow around their buildings. It was not unusual to see the "swept yard", bare soil, in the Southern United States. George Washington "mowed" his expanses of grass with deer.

Thomas Jefferson was one of the most influential of American travelers who brought the English landscape ideal back to the United States. He incorporated the pastoral image of a classical building set in a field of green into the design of his Monticello estate. Jefferson was also influential in crystallizing the philosophy of individual land ownership. He believed that an agrarian society made up of small landowners would furnish the most stable foundation for building the nation (Thistlewaite, 1955). Today there are millions of landowners of imperiled natural resources that do not believe "my yard is part of the problem" (Moncrief, 1970).

The ideal of rural nature had been articulated by Rousseau (1712-1778). His call to "return to nature" had earlier motivated Marie Antoinette's fondness for her make-believe
hamlet at Versailles. But this eighteenth century aristocratic pastime became the serious pursuit of middle class Americans in the nineteenth century. The Industrial Revolution created a new middle class striving to leave the dirty, crowded cities seeking beauty and cleanliness in the rural countryside.

Americans of the mid-nineteenth century were generally committed to the view that environment to a large extent determines human behavior and personality: to improve the character of a man, it was only necessary to improve his surroundings. This concept of the beneficial effects of environment was applicable to both the well and the ill.

Andrew Jackson Downing, considered the first American nurseryman and horticulture writer to significantly influence American life wrote that rural nature was the most beneficial and beautiful of environments, especially when it had been improved by a competent landscape gardener. Downing created acres of lawns for wealthy clients and suggested that those of more modest means could grow grass and trees on even a half an acre of ground. Downing's protege Frank Scott compared a lawn "where shrubs and flowers mingle in confusion with tall grass with the home of a slattern" (Lowen, 1991, p. 50).

Contact with nature was considered beneficial for everyone and working in one's garden was a socially valuable act if not actually a public duty and moral obligation (Griswold & Weller, 1991). To be able to live with nature, the refuge from the rigors of the city, was the purpose for working in the city in order to accumulate sufficient wealth to retire someday to the country (Huth, 1957; Nash, 1973; Tatum, 1978). Another powerful impetus for escaping the crowded city was epidemic disease. During the warm, summer months city residents fled outbreaks of smallpox, yellow fever, and cholera. Flight from the corruption associated with city-dwelling migrant populations provided additional motivation to escape to the country (Wright, 1981).
Since most people could not afford a home in the country and a home in town, a solution was sought in the "romantic suburb" (Jackson, 1985) which attempted to combine the nearness to an industrial city with the rural surroundings of the country. The first suburb is usually considered to be Llewellyn Park at West Orange, NJ, created during the mid 1850s for the drug importer Llewellyn S. Harkell (Jackson, 1985; Kastner, 1981). In the years following the Civil War, horse-drawn trolleys, electric street cars and the railroad allowed people to work in the city and live in the country. By the 1870s single family homes, landscaped with grass, shrubs, and flowers, had emerged as the housing of choice (Jackson, 1985). The invention of the lawn mower in 1830 by an Englishman, Edward Budding, and the creation of the American suburb made the lawn available to everyone (Jackson, 1985).

According to Meinig (1979) the modern American suburb became a dominant landscape form with the advent of the automobile. Southern California Suburbia spawned the low, wide-spreading, single-story houses standing on broad lots fronted by open, perfect green lawns; the most prominent feature of the house is the two-car garage opening onto a broad driveway, connecting the broad curving street (with no sidewalks, for pedestrians are unknown and unwanted) which leads to the great freeways on which these affluent nuclear families can be carried swiftly and effortlessly in air-conditioned comfort to surfing or skiing, golfing, boating, or country-clubbing, as well as to the great shopping plazas and to drive-in facilities catering to every need and whim (p. 169).

Frederick Law Olmsted's (1822-1903) influence upon the American residential landscape cannot be underestimated. He was a famous American landscape architect and designed public parks in Boston and New York. Olmsted laid out a genuine American suburban landscape in his 1868 plan for the community of Riverside, Illinois (Tatum, 1973). His design included a minimum 30 foot setback from the sidewalk and numerous trees along the street to create a parklike setting. He believed that the immediate house surroundings were to be designed to allow people "to carry on daily life in the outdoors."
He created "outdoor apartments" by means of terraces, lawns, hedged enclosures, and walled gardens (Griswold & Weller, 1991).

**Contemporary Developments**

The game of golf and the popularity of lawns appear to have spread together throughout American society. Golf began as a game of the wealthy but by the 1920s had spread to middle class America (Jenkins, 1994). The suburban golf course provided an example of landscape design to the middle-class that had been previously available only to the rich or to city residents with access to Olmstead’s urban parks (Fishman, 1987). Many service men, wounded in World War II, came to appreciate "good turf" as they played golf as part their rehabilitation at military hospitals (Jenkins, 1994).

The United States Department of Agriculture, agricultural experiment stations, and the United States Golf Association have worked closely over the years to meet the demands of golf courses and homeowners for better grasses to grow throughout the United States. In 1901 the U.S. Congress allotted $17,000 to study the "best native and foreign grass species...for turfing lawns and pleasure grounds" (Goldin, 1977, p. 143). In 1920, the Greens Section of the United States Golf Association received support from the U.S. Department of Agriculture for a program researching grass species suitable for greens and fairways. Today grass research centers are found throughout the United States and turf management is offered as a course of study in many universities. However, golf playing homeowners have found the manicured golf course green is often very difficult to emulate in their front yard.

Women have traditionally taken care of both the practical and pleasure gardens of the family. The necessity of the practical garden declined as the Industrial Revolution produced a growing middle-class and a new wealthy class. Production of food and goods
moved from the home to the factory, leaving the middle and upper class women with more leisure time.

The pleasure garden offered a socially acceptable pursuit for women. The first American women's garden club may have been the club founded in Athens, GA in 1890 (Ballard, 1978; Speller, 1931). While many clubs are still active today, the number of members has decreased. They helped spread the ideal of the American lawn through home and school programs.

As women have entered the paid workplace, they no longer have the leisure to work in the garden. A minimum amount of time is required to tend the lawn "if kept uncluttered with flower beds and shrubs and planted to a grass or a mixture that does not require special care..." (Rockwell & Grayson, 1956, p. 28). It is reasonable to assume that grass has replaced some or all of the previous garden areas.

"Mowing the lawn" has historically been a male responsibility. In the eighteenth century, a

good man could manage about a quarter of an acre before 10 a.m. when the grass got too dry for the scythe to bite. For a really good job you would also have to figure on two or three hours for a team of women to sweep up the cuttings (Elliott, 1993, p. 31).

The first lawn mowing machines were heavy and clumsy. Many were drawn by horses or mules. Brute strength was required to use a mower. Women, in their corsets and long skirts, would have had a difficult time handling these machines even if it would have been socially acceptable for them to work in their yard.

In 1902 the first gasoline powered mower was introduced. The riding lawn mower appeared in the 50s, the electric mower in the 1960s and a robotic, self directed, solar mower in the 1990s. Lowen (1991) states that from the beginning of the suburbs, lawn care has primarily been a male preserve, while gardening was a female pastime.
Contemporary studies in family roles and divisions of family labor often have a
general category of gardening, yard work, or exterior home maintenance. Typical of
these studies is a study reported by Shaw (1988). In this study, dealing with the
definitions and perception of household labor, respondents were asked to define specific
household tasks as work, mixed work and leisure, or leisure. For the task of gardening,
no females (n = 17) defined gardening as "work", 29.4% defined it as mixed
work/leisure and 70.6% defined it as leisure. Of the males (n = 56) responding, 32.1%
defined gardening as work, 19.6% defined it as mixed leisure/work and 48.2% defined it
as leisure. There was no information regarding what tasks were included in "gardening"
or whether the couples lived in houses or apartments.

No American studies were located that specifically reported who "mows the lawn"
and who applies the chemicals. Advertising about lawn care services is generally
directed at the male of the household. Jenkins (1994), in her comprehensive content
analysis of popular literature related to the lawn, clearly found that advertising related
to the lawn is always, either directly or indirectly, targeted to the man of the house.
Hessayon (1982) reported that in Great Britain one in every three lawns is cut by the
woman of the house. No comparable statistic was found for American households.

In the 1950s and 1960s more and more working class men were retiring in good
health and, thanks to Social Security, financial security. The trend continues today with
current census figures showing that 77.4% of Americans age 65 and over own their own
homes (Bureau of Census, 1994). Many of these retirees have the money, time, and
health to work on their lawns and in their gardens. Lawn care is a perfect hobby for
older men who are used to being physically active and now are faced with long periods of
free time.
After World War II the American dream of a house in the suburbs, a strong cultural ideal of lawn, the example of the golf course, the increasing cost of labor, and an emerging chemical industry contributed to the birth of a new service industry, professional lawn care. The increasing number of two-income families resulting from women entering the workforce and a new marketing tool, the telephone, heralded the advent of the modern lawn care industry.

In 1969 an Ohio-based company called ChemLawn began providing professional applications of fertilizers and pesticides for home lawns. The lawn care industry has grown at a steady rate of 25 to 30% per year from the mid 1960s to the mid 1980s (Schultz, 1989). In 1993 total lawn care industry sales were estimated at $2.5 billion, serving more than 10 million customers (Rocke, 1993). Of this total, chemical lawn care sales totaled about $1.7 billion and mowing and allied services (primarily mowing) $800 million. It was estimated that in 1992 lawn and landscape contractors maintained nearly 4.3 million acres of lawn of which 1.4 million acres were single-family properties (Code, 1993). Mowing services are currently the fastest growing portion of the lawn care industry (Roche, 1993).

The deep rooted ideal of the lawn and the strength of the economic, legal, and social systems supporting it make it unlikely that at this time in American history homeowners will accept another kind of groundcover to plant around their homes. Unless there is overwhelming evidence of serious environment and health risks associated with the chemicals needed to maintain the grass lawn in its present form, it is unlikely there will be a major reduction in the use of lawn chemicals.