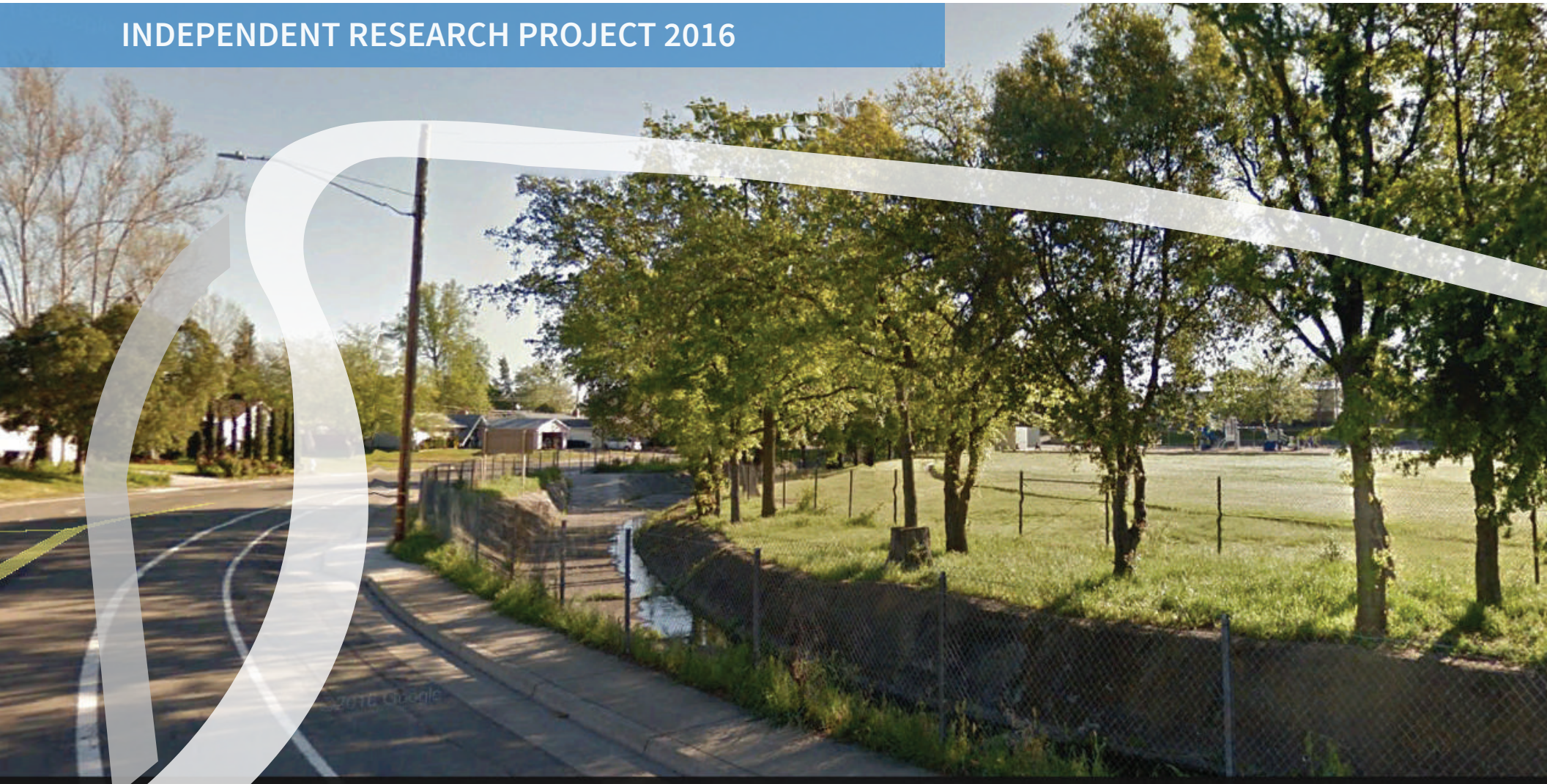
Local Nature

ESTABLISHING SENSE OF CONNECTION TO NATURE FOR GRAND OAKS ELEMENTARY NEIGHBORHOOD

INDEPENDENT RESEARCH PROJECT 2016



YALI ZHANG
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SPRING 2016

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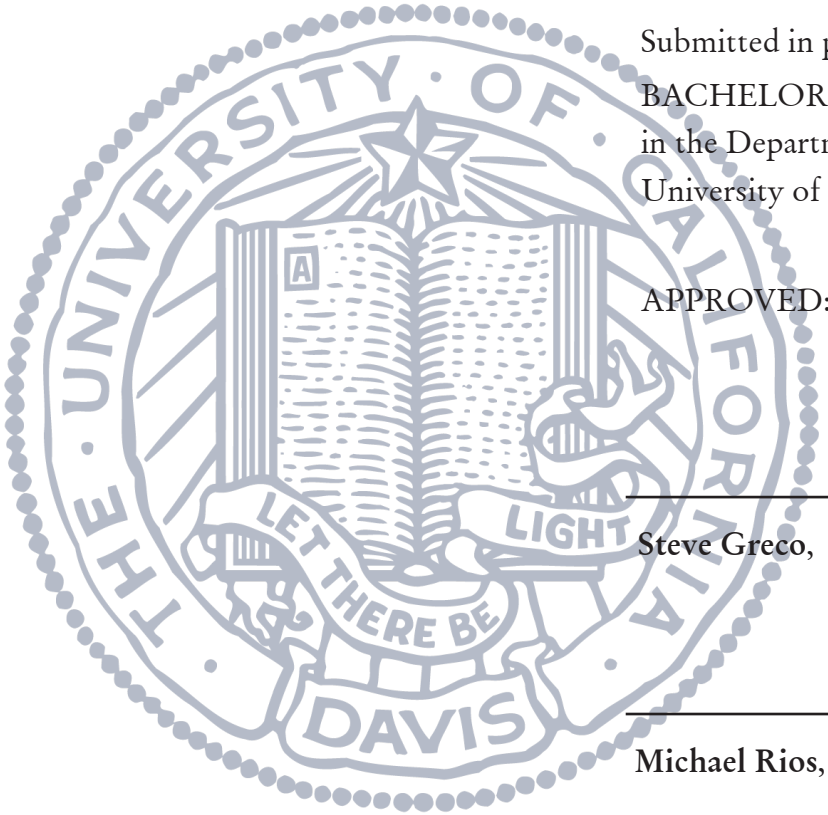

Submitted in partial satisfaction of the requirement for the degree of
BACHELOR OF SCIENCE IN LANDSCAPE ARCHTECTURE
in the Department of Human Ecology
University of California, Davis

APPROVED:

Steve Greco, Independent Project Chair

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ABSTRACT

Ecologist Leopold wrote “We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.” In the past decade there are a substantial body of literatures published studying connectedness to nature (CTN) and place attachment, however, there has been very few study done on the application of place attachment theory and CTN in environmental design. This paper proposes the idea of “local nature”, which is to restore urban residents’ CTN through restoring headwater streams at local scale, and providing urban residents’ an opportunity to interact with nature.

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I would like to express my deepest appreciation to the following individuals for their assistance and support for me to complete my final project:

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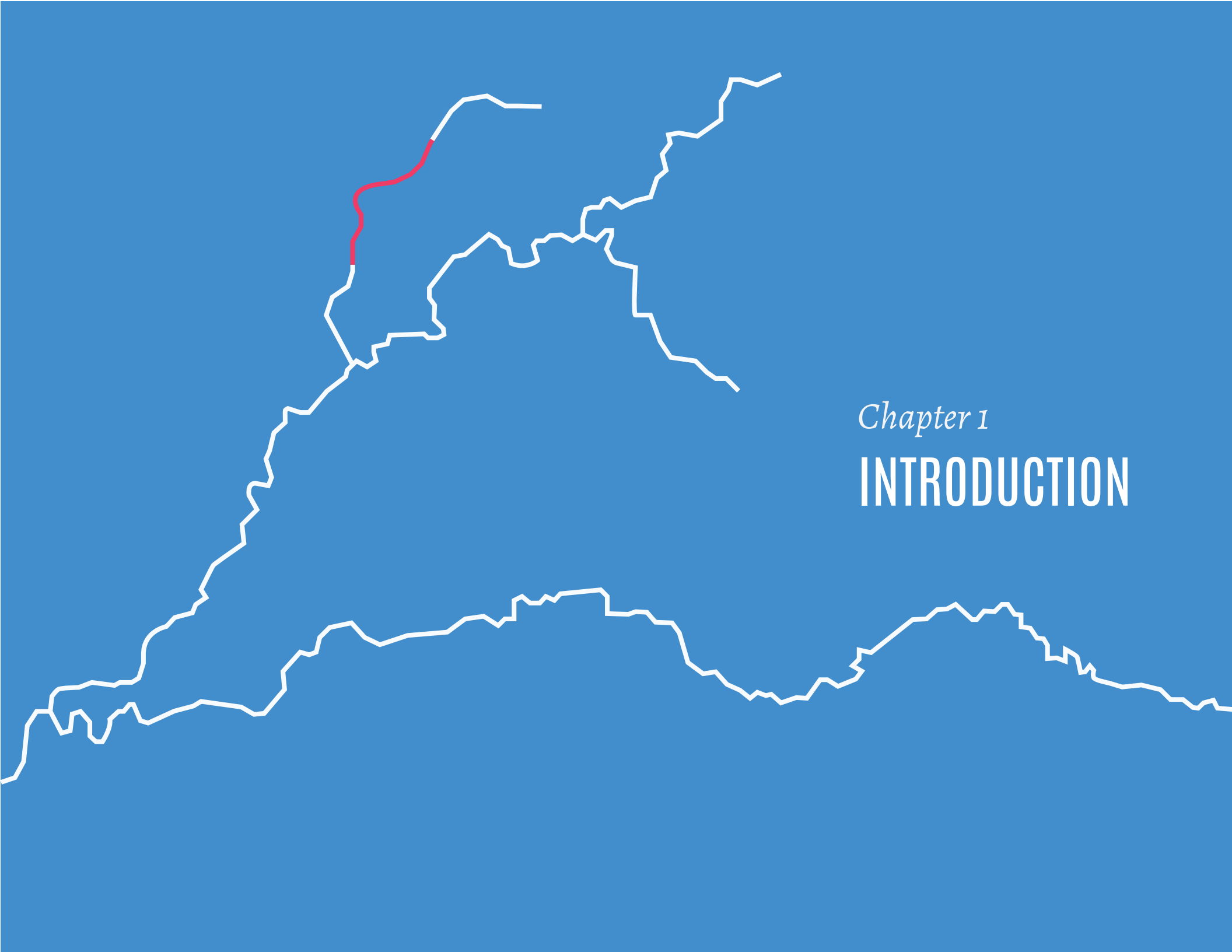


Chapter 1

INTRODUCTION

FIGURE 1.1

INTRODUCTION

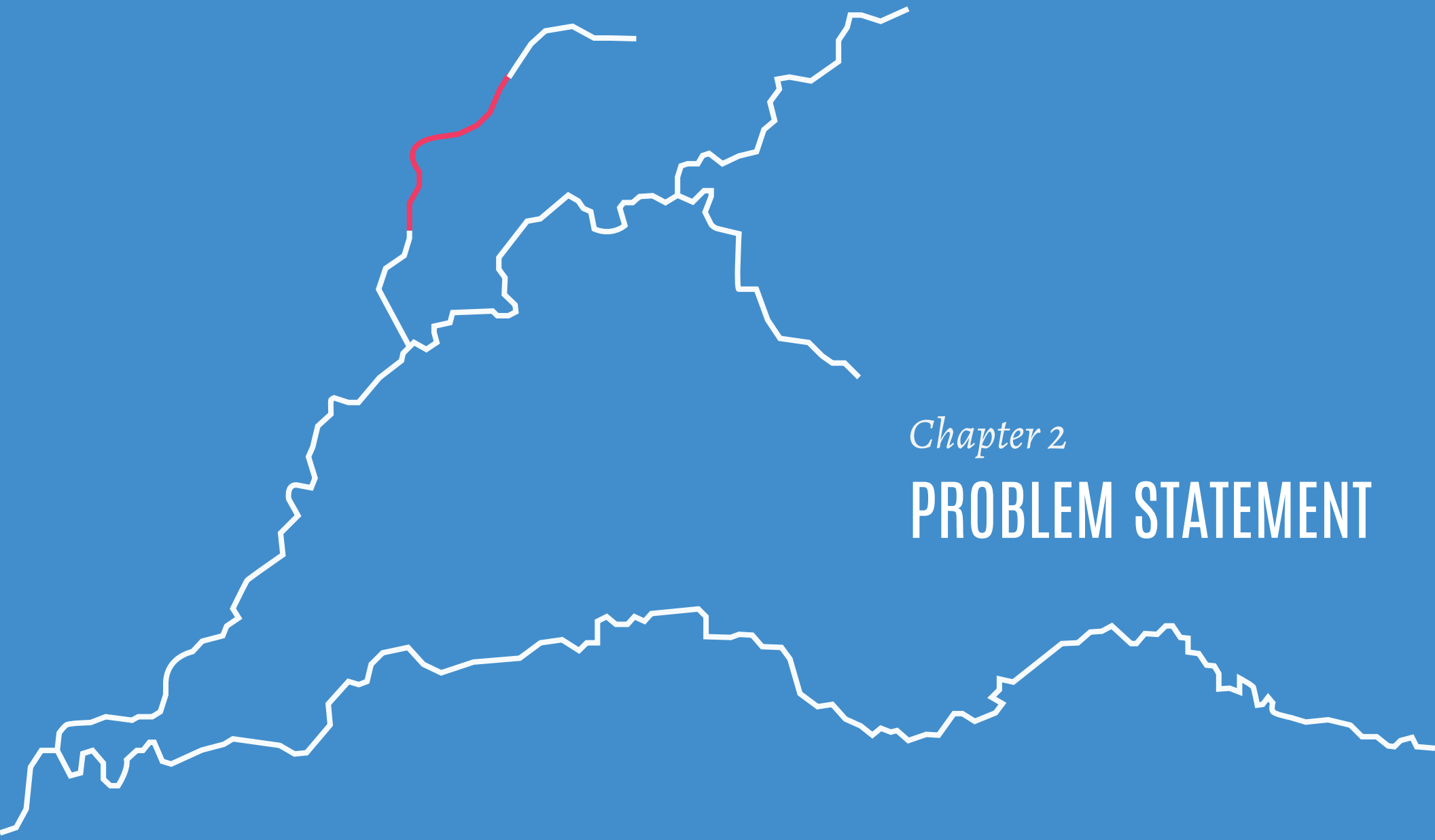
Since the hunter and gatherer era, human settlements have always chased after fresh water resources. People depended on water for food, agriculture and transportation – water is the one resource that humans cannot live without as well as all living things on Earth (Fiona, 2009). Many of the world's ancient societies developed alongside major rivers, and to date, most people in the world live within reach of a river (Bangs, 2006). The well-being of rivers and their associated wetlands and lakes directly affected the health of adjacent community. The direct dependency and constant interaction with natural water bodies allowed our distant ancestors to understand the value of water, and through the close physical connection people had with natural water, an intimate spiritual connection was also formed. Natural water bodies are seen as various kinds of deities in many cultures, as well as the practice of giving offerings to streams, lakes, and ocean as a mean to express people's appreciations, and to win the fond of water gods (Fiona 2012; Lin 2009).

However, the structure of modern cities in the U.S. manifest disrespect for water. Much of the aquatic habitats are destroyed to provide land for development, and riverine ecosystems are the most severely altered and deteriorated of all. Free flowing streams that traverse through cities are channelized, buried, or paved over altogether; the habitats that depend on the streams are eradicated in the process, along with our ecological conscience for the streams' health and concern for the ecosystem's well-being.

Since the degradation of riverine ecosystem is a result of human intervened alteration and lack of care to damaged streams afterward, a communal adoption of ecological behavior is necessary. Studies on connectedness to nature (CTN) and place attachment have shown CTN greatly influences an individual's ecological attitudes, and strong place attachment lead to place protective behavior. Although abundant research has been done on the two topics, there is a lack of unity of the two fields to identify key components that would positively influence urban residents' pro-environmental behavior and attitude.

Through reviewing past literatures on place attachment and CTN in relation with restoring urban streams, this paper develops the theory that connectedness to source water is essential for the development of connectedness to the broader natural world, and introduces the idea of local nature, which emphasizes on restoration of headwaters as the key component to increase CTN in urban residents.

Understanding the factors that affects people's attitude toward conservation has always been regarded as important in the field of environmental management, and thus numerous studies have beendone on how places and natural environment influence people's behaviors and attitude. However, there is not a study that exams the details of physical attributes of the natural environment and draws a conclusion that describes a critical component that affects people's ecological thinking. By presenting the idea of headwaters being the critical component, this research offers city designers, environmental psychologists and other researchers the insight of how to increas a community's ecological thinking through restoring urban streams.



Chapter 2

PROBLEM STATEMENT

FIGURE 2.1 A typical channelized stream stripped of vegetation and habitat

PROBLEM STATEMENT

In the past century urbanization has severely altered streams in U.S. Stream burial, the process where streams are directed into culverts, pipes, concrete-line ditches, or paved over, is the most extreme impact of urbanization on streams. Headwater streams, which is the scientific term that describes small streams such as seep, creek, spring, and brook, make up the majority of stream miles in U.S and offer numerous ecological value. However, due to their sizes (often around one mile) headwaters are often unnamed and unmapped, thus often neglected and are the victim of stream burial. Since the nation's industrialization period, most small streams that traverse through cities were buried during urban development (Elmore & Kaushal 2008).

The degradation of headwater streams and associated environmental problems are considered human driven, therefore participation of the public's fostering pro-environmental behavior is necessary (Oskamp 2000). The theory connectedness to nature (CTN) is developed through social-behavioral and environmental psychology scholars' interest in understanding people's psychological relationship with the natural world (Mayer & Frantz 2005). CTN suggests that a relationship with nature directly affect an individual's physical and mental wellbeing. Direct experience with natural setting lead to stronger sense of CTN, and therefore higher human interest in environmental protection (Perkins, 2010). In fact one of the most respected ecologists in U.S, Aldo Leopold (1949), states that this sense of connection to nature is a key component of fostering ecological behaviors, as he wrote "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

From here another question arises, what value does the land have to offer to people in order for people to see it as a community? Place attachment theory is introduced by environmental psychologists as an attempt to understand the elements that make a space meaningful to people. Ramkissoon, Weiler & Smith (2011) criticizes that literature on the concept of place attachment and pro-environmental behaviors are fragmented, scattered, and do not fully consider its multidimensional nature. By drawing together disorganized literature, their study develops a conceptual framework that integrates different place attachment sub-constructs compromising place dependence, place identity, place affect and place social bonding. This framework is used to assess the influence of place attachment in natural setting on pro-environmental behavior, and concludes that place influence positively influences an individual's pro-environmental behavioral intention.

The following content of my paper will be utilizing the framework mentioned above, as it is noted in Ramkisson, Welier & Smith's (2011) literature that "…this paper offers researchers a framework that is grounded in theory and past research…", to investigate the value of buried streams in terms of place attachment through reviewing past literature.

Place Dependence

Scannell & Gifford (2010 a) states an individual's functional dependence to a specific place greatly contributes to the individual's physical attachment to the place. The unique setting of certain places provide resources required for an individual's goal attainment, and the use of resources is frequent. For an example, a surfer may choose a specific beach to go to because of the ideal wind and wave condition. On the basis of functional dependence of a place, Bricker and Kerstetter (2003) interviewed 1,226 whitewater recreationists on the south fork of American River to study their level of attachment to the river. The finding reveals whitewater recreationists strongly agreed on the river means a lot to them, they are committed to the river, and they show more concerns with resource development and maintenance.

From Riley's (1998) study she identified the economical, recreational and safety values restored streams provided to the community through several case studies. 1) Economic value: San Antonio River restoration, located in Texas, turned formerly channelized River to a popular tourist attraction, featuring a continuous promenade on both sides of the river and waterfront shops facing the river. A survey done in 1973 to San Antonio citizens obtained a strong positive response to the project, and over 80 percent of the population agreed that restored San Antonio river has brought economic value to the city.

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2) Recreational value: 60-mile of riparian trees were revegetated on the bank of Platte River in Colorado, where now thousands of people bike, walk and jog on the riparian trail.

3) Safety: channelization and burial of streams have been proven ineffective in flood control and increase the potential of flooding during high rainfall. Restoring streams has been a popular practice by hydrologists and engineers to alleviate flood issue.

FIGURE 2.2 San Antonio Riverwalk helps to revitalize local businesses for city of Texas

Place Affect

Place affect is conceptualized as the emotional bond that individuals share with a place. The term is first used by Tuan (1977) who defined this bond as "topophilia" or "love of place". Place affect gains particular meaning in natural environment as abundant literatures in environmental health discipline show that affective connection with nature generates a sense of psychological wellbeing (Herzog, Black, Fountaine, & Kntts, 1997; Kaplan & Talbot, 1983; Korpela, Ylem, Tyrvainen, & Silvennoinen, 2009). People live in greener places also exhibit better physical health than people who live in less green places (Vries, Verhei, Groenwegen, & Spreeuwenberg, 2003; Maller, et al 2005). Patients in hospital with access to therapeutic gardens also display faster recovery rate (Maller, et al, 2005). Evidence suggests that natural settings tend to increase positive emotions of an individual about the place (Hartig, Book, Garvill, Olsson, & Garling, 1996; Ulrich, 1979), therefore may foster pro-environmental behaviors.

Buried streams are stripped of their habitats, ecological value and aesthetical value, present in the form opposite of natural environment that positively influences people's psychological and physical wellbeing. Therefore, following hypothesis is developed:

Hypothesis 2: Buried streams may adversely influence an individual's affection and emotional bond to the streams, consequently leading to the lack of voluntary desire to protect the streams.

Place Identity

Place identity is a concept in the environmental psychology field which proposes that personal identities form in relation to environment (Proshansky 1978). It is an abstract concept however, the most common form of place identity is exemplified through nationality. People from a specific country is identified relating that country, such as a person from France will identify himself/herself as French. Place identity is formed through knowledge and feelings developed through everyday experience with a physical space (Raymond, et al 2003), for an example, a second or third generation French descendent who was born and grew up in U.S will identify himself/herself primarily as American instead of French.

Riley's (1998) urban stream restoration case studies reveals that local residents' engagement and interaction with restored streams increased significantly than before restoration. Moshaver, Negintaji, & Zeraatisheh's (2015) research also indicate that natural factors has a significant impact on local resident' place identities. Since the natural factor and people-place interaction are absent in buried streams, based on place identity theory, hypothesis 3 is developed:

Hypothesis 3: Buried streams provide insignificant value to an individual's development of place identity.

FIGURE 2.3 South Platte River after restoration and became a popular place for tubing in the summer.

Place Social Bonding

Place social bonding can be described as a sense of belongingness and is evolved when individuals develop communal bonds with other people through the people-place interaction. Hidalgo and Hernandez (2001) in their measurement of physical and social place attachment in houses, neighborhoods and cities concluded that the social attachments were stronger than attachment to physical attributes of the place alone. Raymond et al. (2010) found that natural settings set the context for social experiences and the bonds that are consequently formed.

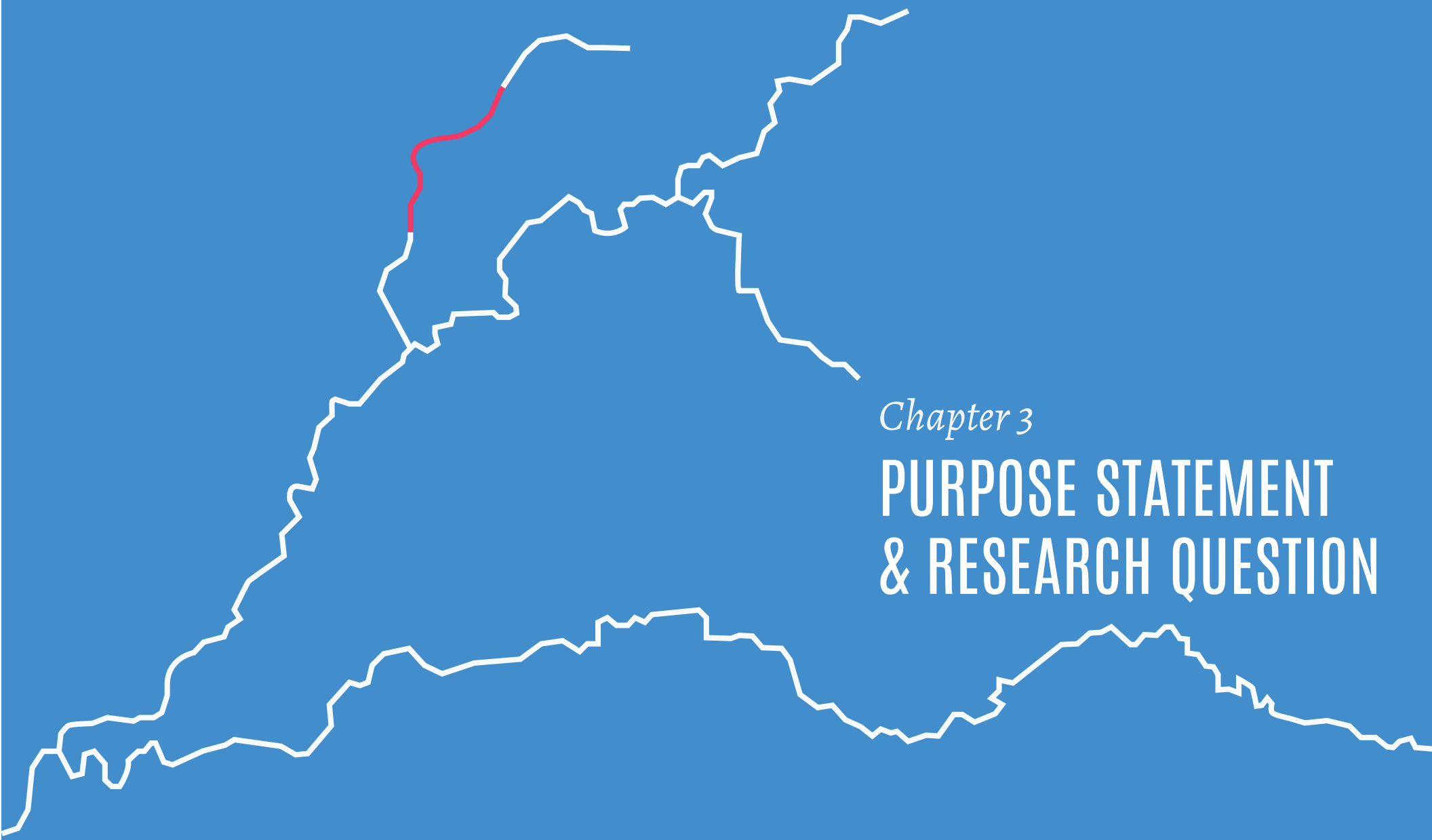
Urban stream restoration projects have always showed significant contributions to providing the setting that allows social bonding. Restoration of Strawberry Creek located in Berkeley was completed by a collaboration of city representatives, graduate students of UC Berkeley, students from Berkeley High School, and local volunteers. After the completion of the restoration project, EH&S (Environmental Health & Safety) staff and Berkeley High School teachers agreed on long term collaboration to involve high school students in future restoration projects. Berkeley local news featured student planting day to gather community effort in maintaining the creek. Furthermore, students who were involved in the restoration project indicate that they have gained an appreciation and awareness of the creek's value (Purcell, Corbin, & Hans, 2007).

Hypothesis 4: Buried streams do not offer appropriate setting that allows place-social bonding, therefore insignificant in contributing an individual's sense of belongingness to a place.

Conclusion from Literature Review

From the four hypotheses developed above through investigating the various sub-constructs that affect place attachment, the conclusion this paper draws is that buried and channelized streams do not provide an environment that allows the formation of place attachment by local residents. Therefore, it is unlikely that local residents will foster concerns and ecological behaviors to protect the streams, which will lead to further degradation of buried and channelized streams. It should be noted that although case studies used to exemplify successful people-place attachment through restoring urban streams are large rivers, the general concept can still be transferred to headwater streams.

Study of CTN and place attachment has always provided significant values to environmental management. A substantial body of empirical and non-empirical literatures on related topics have been published by scholars in the past decade to study the elements that cause people to obtain an emotional respond to a place. It has been proven repeatedly that people's emotions are positively influenced by contacts and interaction with the natural world and strong place attachment leads to place-protective behaviors. Some researches, though few in numbers, investigated the importance of natural factors affecting place identity in urban setting. However, overall there is a lack of research on identifying a key component that bridges urban residents' senses of attachment to the natural world. As in 2007 one-half of the world's population lives in cities, therefore identifying this key component is critical in alleviating environmental problems.



Chapter 3

PURPOSE STATEMENT & RESEARCH QUESTION

PURPOSE STATEMENT

As previously introduced, humans have a long history settling near water bodies and sharing an emotional bond with them. Natural water bodies are often personified as deities or symbolized to carry spiritual meaning across cultures; ceremonial practices of many cultures were also performed near water (Lin, 2009). Archibald (1995) states that place and story are inseparable. By giving places a name and story we call them into existence. He continues to say that "We create ourselves from stories that conjoin us to places; bind us to each other; blend individual and communal identities; and provide definition, context and continuity, perspective, and personality. These stories of ourselves are works in progress until death." Water is an important element in creating a sense of place and formation of identity of the community that establish nearby; it is also the essential resource needed to sustain the life of every living creature on Earth. Natural water bodies are the communal space that bring together wildlife, plants and people—a pivotal concept that the theory of this essay expands on: *restoring the emotional bond between people and source fresh water is critical to the development the individual's sense as a member of the broader natural community, and consequently the ability to empathize with other species and thus fostering ecological behaviors.*

Although fresh water bodies appear in various forms such as lakes and ponds, many metropolises in U.S are established near large rivers for transportation and hydropower value provided by rivers.

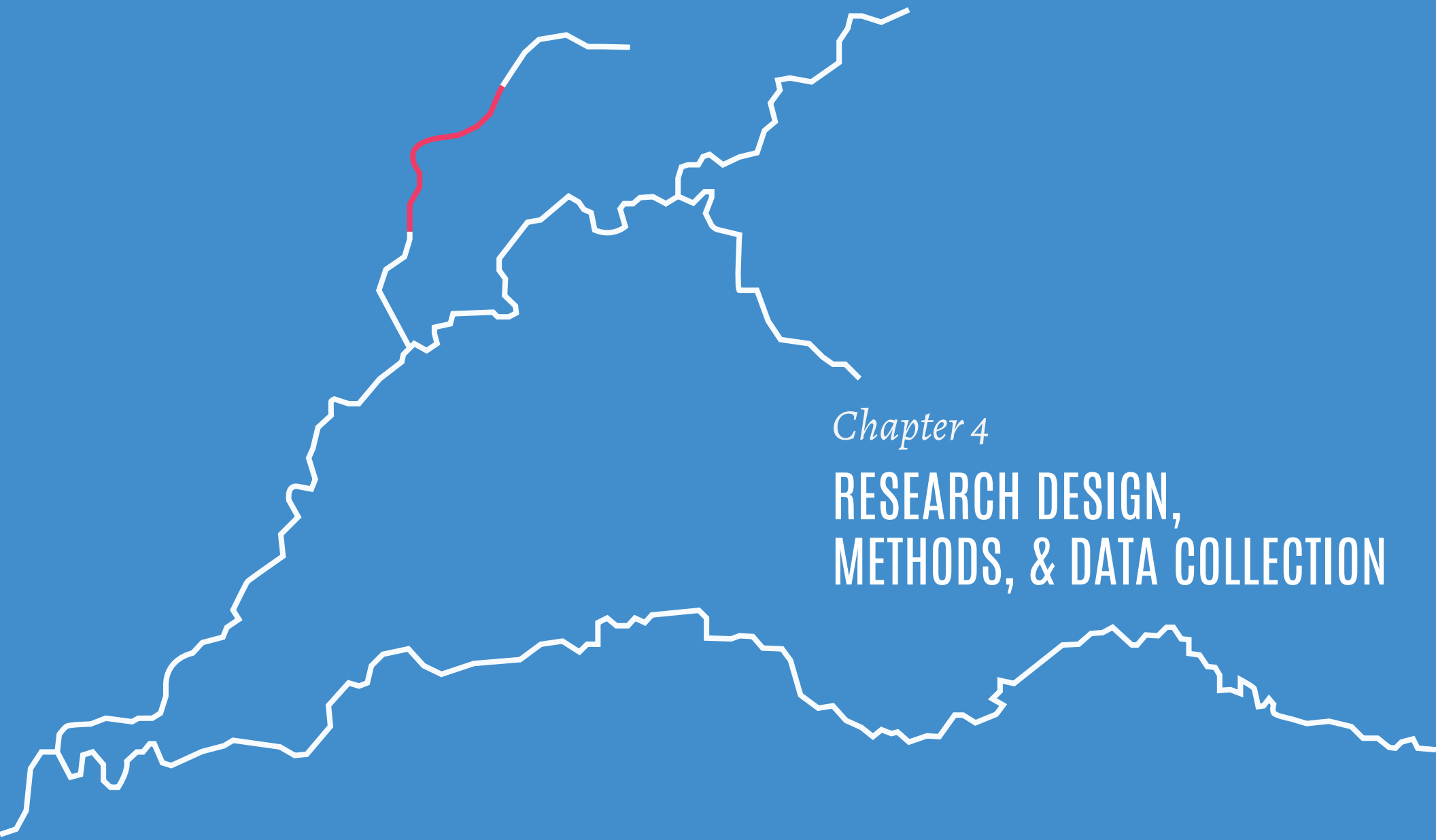
After WWII and invention of automobiles, After WWII and invention of automobiles, people moved away from big cities to suburbs in search of larger land properties and houses. To date, suburban population has far exceeded major cities' population. Suburban cities are characterized with low-density development, which led to rapid expansion of urban sprawl and consequently, many suburban cities have moved out of reach of the region's main river. While many suburban cities are far from the major rivers, abundant headwaters still traverse through them.

The purpose of this research is to study how small ecological urban streams with diverse habitat affect its local community's ecological attitude through investigating: 1) how local residents use the space in terms of activities and interaction taken place by the stream; 2) how local residents value the stream and its biodiversity.

RESEARCH QUESTION

By understanding how people develop emotional attachment with nature, this research seeks for solution to the question:

how can we design stream restoration projects to increase urban residents' sense of connectedness to nature?



Chapter 4

RESEARCH DESIGN, METHODS, & DATA COLLECTION

RESEARCH DESIGN

Two sites are selected to conduct the research: Grand Oak Elementary School neighborhood in Citrus Heights, CA and Thousand Oaks Elementary School in Berkeley, CA. Grand Oak Elementary School is located amongst a residential neighborhood. A segment of the creek is burried under the houses, but is day-lighted at the school in the form of channelized ditch runs along the backyard of some residential houses and through the school yard. This site is selected as the subject of the study in terms of proposing a design intervention that restores the creek to encourage local residents to interact with nature. Thousand Oaks Elementary neighborhood is selected as the comparison group for Grand Oak Elementary School. The school is also located within a residential neighborhood and a segment of Blackberry Creek runs through the back of the school yard. The creek has been restored to its natural state, and the school yard also serves as the community park for the local residents.

Survey, onsite observation, and interviewing local residents are the methods used for this research. The research methods are conducted at both sites to measure local residents' view of themselves as egalitarian members of the broader natural community; observe how local residents use the restored creek as a resource, and their attitude or bonding with the creek. Data collected from Grand Oak Elementary School (Citrus Heights) will be used to test the hypothesis developed earlier; data collected from Thousand Oaks Elementary School (Berkeley) will be used for case study and serves as a model project for design intervention. Results from both sites will also be compared side by side to identify major gaps and key issues that are present in Grand Oak Elementary school, which will be use to drive the design.

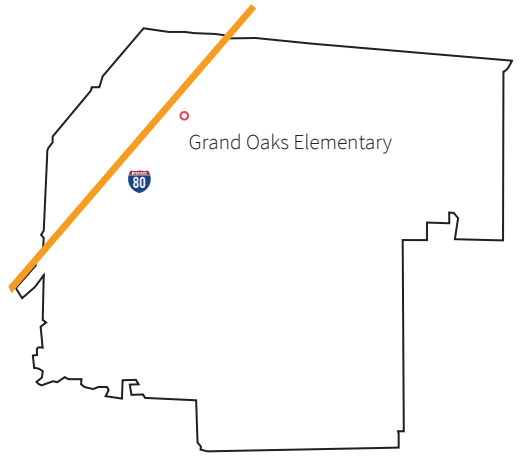


FIGURE 4.1 Vicinity map of study area, Grand Oaks Elementary in Citrus Heights.

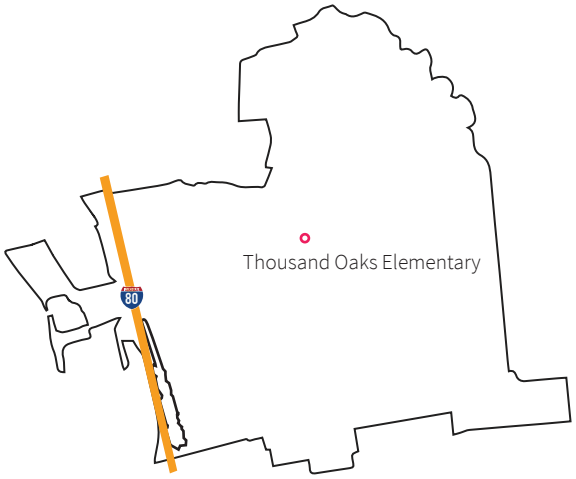


FIGURE 4.2 Vicinity map of study area, Thousand Oaks Elementary in Berkeley.

Survey instrument: Connectedness to Nature Scale

Connectedness to nature scale (CNS) (Mayer & Frantz 2004) is used to survey local residents from Grand Oak Elementary School neighborhood and Thousand Oaks Elementary School. The scale is generated by students and the instructor in an environmental psychology course. The scale consisted of 14 items designed to measure the extent to which participants generally feel a part of the natural world. Participants will respond on a 5-point scale, from 1 being strongly disagree to 5 being strongly agree.

Please answer each of these questions in terms of *the way you generally feel*. There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly and candidly as you can what you are presently experiencing.

1	2	3	4	5
Strongly disagree		Neutral		Strongly agree

_____1. I often feel a sense of oneness with the natural world around me.

_____2. I think of the natural world as a community to which I belong.

_____3. I recognize and appreciate the intelligence of other living organisms.

_____4. I often feel disconnected from nature.

_____5. When I think of my life, I imagine myself to be part of a larger cyclical process of living.

_____6. I often feel a kinship with animals and plants.

_____7. I feel as though I belong to the Earth as equally as it belongs to me.

_____8. I have a deep understanding of how my actions affect the natural world.

_____9. I often feel part of the web of life.

_____10. I feel that all inhabitants of Earth, human, and nonhuman, share a common "life force".

_____11. Like a tree can be part of a forest, I feel embedded within the broader natural world.

_____12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.

_____13. I often feel like I am only a small part of the natural world around me, and I am no more important than the grass on the ground or the birds in the trees.

_____14. My personal welfare is independent of the welfare of the natural world.

FIGURE 4.3 CNS survey used to survey the residents from both sites

SURVEY METHODS

Conducting CNS Survey

Thousand Oaks Elementary, Berkeley

Frequent interaction is an important factor that contributes to attachment to a place. Therefore, households that surround the creek are selected to conduct the survey with the intention to study the direct effect of the creek has to its surrounding residents. 35 households were selected to be the participants of the survey. Of the 35 households, 21 are directly facing the creek/park, and15 of the households are facing away from the creek. The participants were recruited by knocking on the door, household by household from the 35 selected households. Then the participants were asked to fill CNS with the understanding that it is for a research project on studying how restored creek helps to increase urban residents' interaction with nature. The survey was conducted on the Sunday of April 10th from 4:00 pm to 6:00 pm, and the Thursday of April 21st, 2016 from 10:00 am to 11:30 am. It should be noted that the community from Berkeley is generally younger, liberal and environmentally aware, which may affect the result of the survey.

FIGURE 4.4 Households selected to conduct survey in Berkeley

Grand Oak Elementary, Citrus Heights

79 households were selected to participate the survey; 47 households are facing the creek and 23 households have their backyards against the creek. The same procedure was performed in Citrus Height, and the survey was conducted on the Monday of April 11th, 2016 from 4:00 pm to 6:30 pm, and Saturday May 7th, 2016 from 2:00 pm to 3:00 pm.

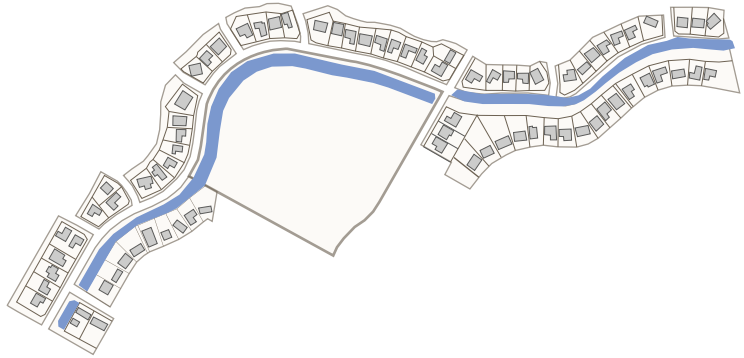


FIGURE 4.5 Households selected to conduct survey in Citrus Heights.

SURVEY METHODS

Data collected from CNS survey

20 households out of 35 selected households responded from Berkeley neighborhood, and 27 households out of 79 selected households responded from the Citrus Heights neighborhood. The average score for each question on CNS is similar from both sites except for question 14, which states "My personal welfare is independent from the welfare of the natural world". Berkeley has an average score of 2.3 and Citrus Heights has an average score of 4.6, with difference of 2.3.

Survey Question	Berkeley	Citrus Heights
• I often feel a sense of oneness with the natural world around me.	4.1	4.6
• I think of the natural world as a community to which I belong.	4.6	4.2
• I often feel disconnected from nature.	2	2
• When I think of my life, I imagine myself to be a larger cyclical process of living.	4.3	4.0
• I often feel a kinship with animals and plants.	4.2	4.0
• I feel as though I belong to the Earth as equally as it belongs to me.	4.2	4.1
• I have a deep understanding of how my actions affect the natural world.	4.1	4.6
• I feel part of the web of life.	3.9	4.6
• I feel that all inhabitants of Earth, human, and nonhuman, share a common "life force".	3.7	4.0
• Like a tree can be part f a forest, I feel embedded within the broader ntural world.	3.9	3.5
• When I think of my place on Earth, I consider myself to e a top member of hierarchy that exists in nature.	2.6	3.7
• I often feel like I m only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.	4.1	4.0
• My personal welfare is independent of the welfare of the natural world.	2.3	4.6

FIGURE 4.6 Survey result from Berkeley and Citurs Heights

Onsite observation of user activities taken place by the creeks

Onsite observation was conducted to document the activities that were happening on each site and to assess the interaction between local residents and the creeks. Activities were assessed on two levels: actively using the creek and passively using the creek. Active activities are direct engagement with the creek and the natural environment it provides, or when the users are consciously using the creek as an asset to benefit themselves. Active activities include relaxing by the creek, walking the dog in the park, playing sports in the park, and children playing by the creek. Passive activities are using the creek subconsciously, such as walking pass the creek, sitting on the bench while waiting for something.

The observation was performed from 1:00 pm to 3:00 pm on the Sunday of April 10th for Berkeley, and 3:00 pm to 6:00 pm on the Saturday of May 10th for Citrus Height.

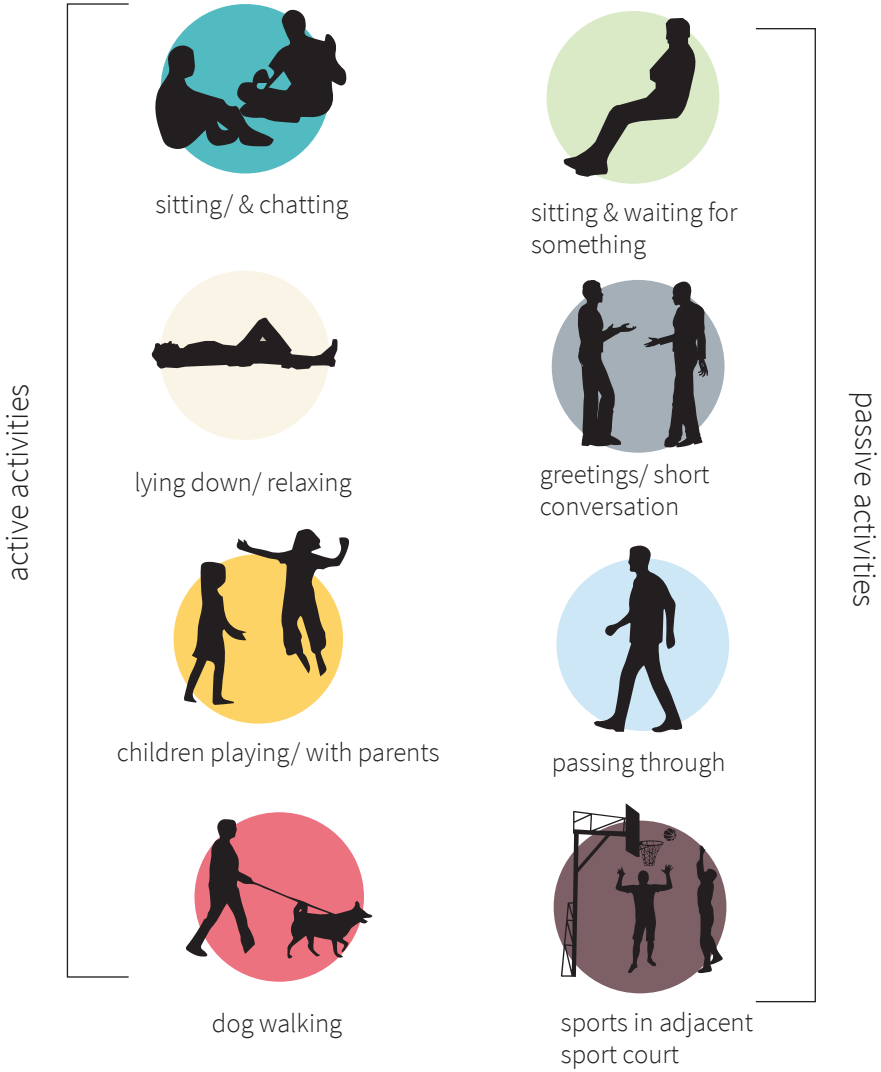


FIGURE 4.7 Passive activities and active activities.

Data collected from acitivity observation

Thousand Oaks Elementary, Berkeley

Within the 2-hour time span of onsite observation, a total of 53 people visited the creek in Thousand Oak Elementary (Berkeley). 23 of the visitors performed active activities, and 30 of them performed passive activities. The average time of active users staying in the park is 23.6minutes, and 32.4 minutes for passive activity users.

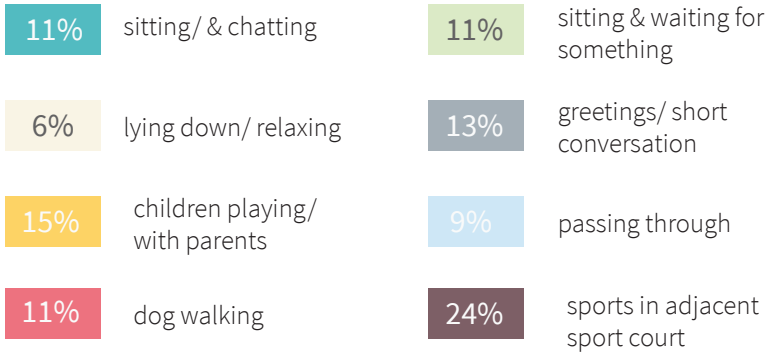


FIGURE 4.8 Percentage of each activity observed in Thousand Oaks Elementary, Berkely

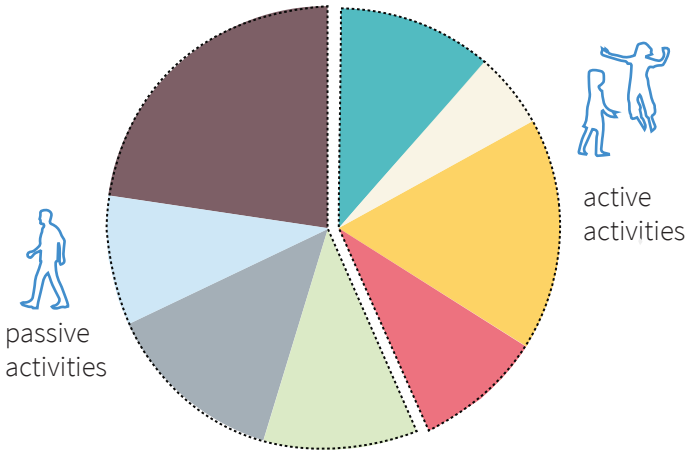


FIGURE 4.9 Distribution of different activities, Berkeley

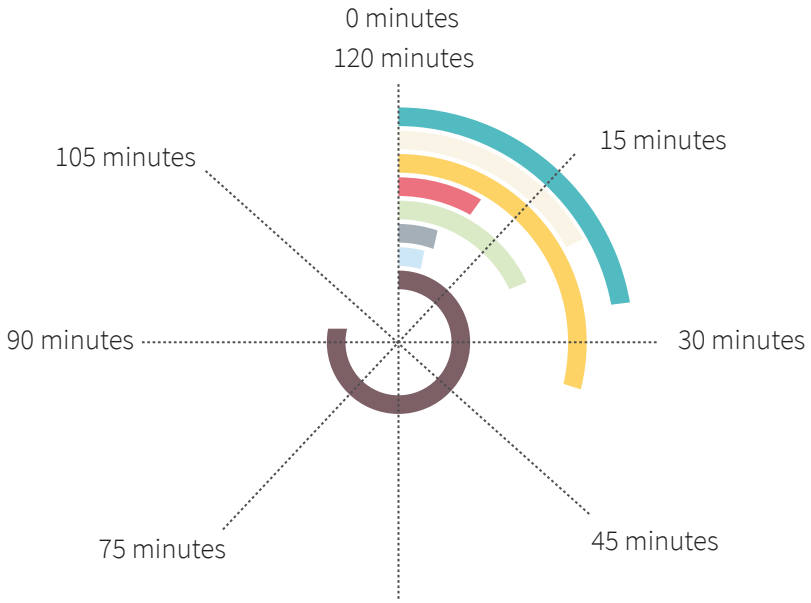


FIGURE 4.10 Average time span of each activity lasted on the site, Berkeley

Data collected from acitivity observation

Grand Oak Elementary, Citrus Height

A total of 4 people visited the creek in Grand Oak elementary (Citrus Heights), all were passive users, and the average time span the users stayed on the site is 1.8 minutes. The creek itself is fenced from both sides and is inaccessible by the community. There is no interaction observed between the residents, school children and the creek, this observation testifies the hypothesis developed earlier: buried and channelized creeks encompass a hostile environment and do not attract people to interact with the creek, therefore place attachment would not be formed between local residents and the creek.

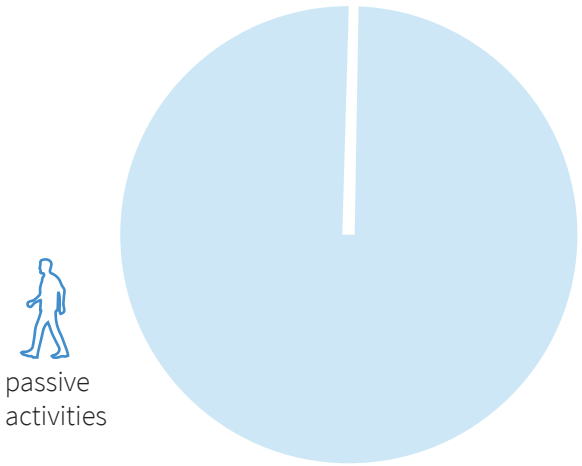


FIGURE 4.12 Distrubition of different activities, Citrus Heights

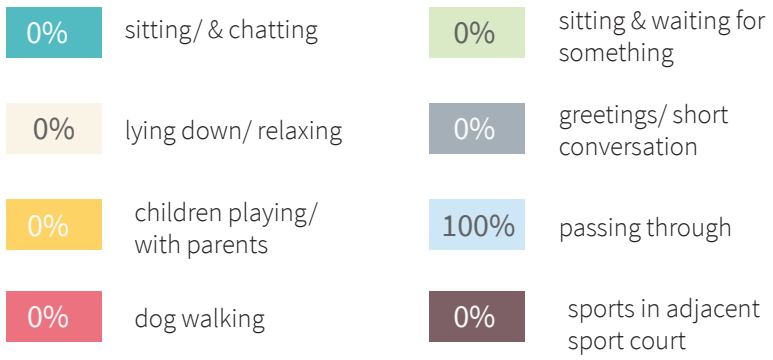


FIGURE 4.11 Percentage of each activity observed in Grand Oaks Elementary, Citrus Heights

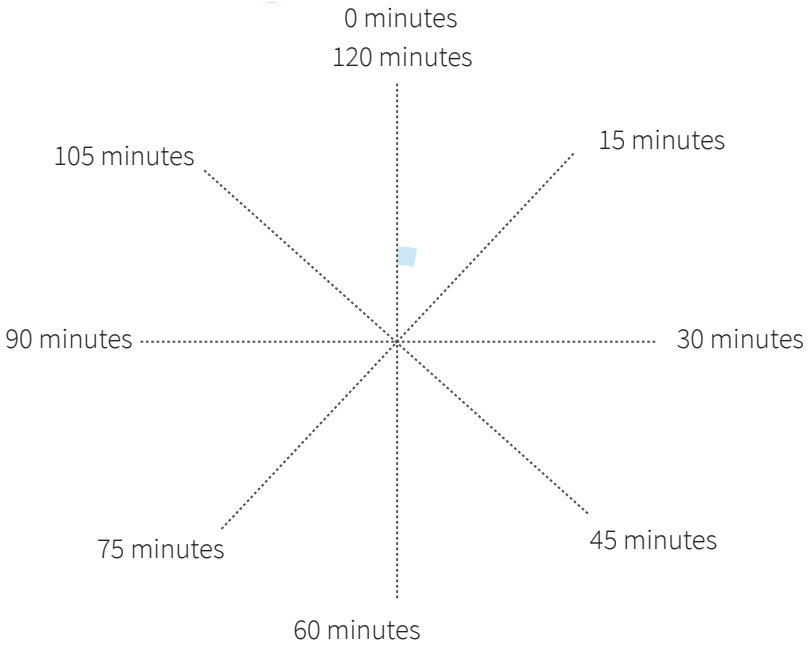


FIGURE 4.13 Avenrage tiems pan of each acitivity lasted on the site, Citrus Heights

INTERVIEW METHODS

Short, informal interviews were conducted to participants who responded to CNS survey from both Berkeley and Citrus Height, and users observed on Thousand Oaks Elementary school yard.

The intention of interviewing Berkeley residents is to study the relationship they have developed with the creek through their personal perception and experiences. Questions such as “what is the experience of living adjacent to the creek like”, “how has the creek impacted your lifestyle”, and “do you use the creek as an asset to yourself ” were addressed to them.

For the residents in Citrus Heights, the interview seeks to find out the extent of their awareness of the presence of the buried creek, and their attitude towards restoring the creek. “Are you aware of the presence of the concrete channel behind your backyard”, “would you have ever thought it was a natural creek”, and “would you like to have it in the form of a natural creek” were the questions asked to residents in Citrus Heights.

INTERVIEW METHODS

Stories collected from interviewing the residents from Citrus Heights and Berkeley

Residents from Berkeley generally agrees they enjoy and appreciate having a greenery nearby, and they use the park about 1 to 3 times a week for recreational and relaxing activities. Residents from Citrus Heights are aware the presence of the concrete channel, but don't have the knowledge that it is a historical creek. The residents do not use the creek as an asset for any activities, and most residents expressed interest that they would like an alternative with ecological creek and habitat. Below are selected stories told by the residents from both areas to highlight the key points of the interviews.

Thousand Oaks Elementary, Berkeley

"I really do like having the creek right in front my house. It's nice to open the door and being able to see greeneries rather than alleys or parking lots. My kids go to this elementary school and we always stay after school to play in the park for a bit."

- Jessie

"He (the son) loves the creek, when I'm with him I would allow him to get into the bushes and he just likes to going through the woods and explore. I think it's just something about kids and nature."

- a mom in the park

"I don't actually live in this neighborhood but I take my son here to play basketball during weekend. I kind of like the basketball court is in this kind of natural area."

- Frank

Grand Oaks Elementary, Citrus Height

"I lived here when it was still a creek, and my kids played in the creek all the time. They loved to catch tadpoles and crayfish from the creek, and I had turtles and frogs in my backyard all the time. I even built a fence to protect the turtles from the racoons ... My son still came here to catch frogs to put in his garden after he moved out ... I wasn't very happy when they filled it, I don't know why they did that ... I used to hear insects and birds all the time, but now there is just nothing "

- Barbara

"I grew up in this city, and both my brother and I went to this school (Grand Oaks Elementary). It was already channelized when we went to the school, but we'd still climb over the fence to try to catch crayfish in the concrete channel and play in the bare creek. "

- Lolita Greco

"I wouldn't mind to have a natural creek behind my house. I think it'll be nice to have some kind of habitat, right now there's just concrete. I like to hear the birds, and I'd like to have a place where my son could play other than in the front yard. "

- Nicole

Chapter 5

DESIGN INVESTIGATION & ANALYSIS

SITE ANALYSIS: GRAND OAKS ELEMENTARY, CITRUS HEIGHTS

As discussed earlier in the literature school yard, residential neighborhood and public parks are the most ideal locations for creek restoration projects to provide immediate access to natural environment for urban residents. For this reason, Grand Oak Elementary is selected as the study area for a design intervention, as the buried creek passes through the back of the school yard and is across residential housings. If restored to a natural environment, the creek can provide interaction with nature by serving as a natural playground and outdoor educational space for the children from the elementary school, and community park for the residents.

The concrete channel is 0.25 miles long with about 12,000 square feet vacant land in the schoolyard. The vacant land is currently not used for specific activities, and the playground for children is a massive black top that is not shaded by trees or shade structure. Both sides of the channel are fenced off by 6 feet wired fence and is completely inaccessible. There is a row of mature oak trees established on the east edge of the channel, and their roots are already breaking the sidewall of the channel. The structure of the channel is failing and is in need for an alternative solution.

FIGURE 5.1 Existing condition of Grand Oaks Elementary

burried creek stripped of habitat

structure failure

large area of vacant land behind the fence

FIGURE 5.2 Detailed photographs of channelized creeks

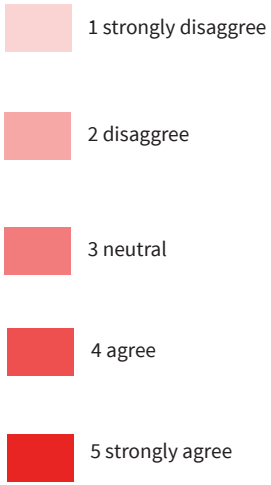
Analysis of CNS survey result

The result of CNS survey gathered from Berkeley and Citrus Heights show that Citrus Heights' residents score on question 14 "*my welfare is independent from the welfare of the natural world*" is much higher than residents from Berkeley, meaning Citrus Heights residents find this statement more agreeable than Berkeley residents.

Figure 5.3 and 5.4 maps the scores of *question 14* on CNS of households participated the survey. The map of Berkeley neighborhood displays a pattern of households that are closer to the creek feel more dependent to the natural world, and houseolds that are farther from the creek feel more independent to the natural world. However, there is no distinct pattern in Citrus Heights neighborhood, all households express an attitude that they are independent from the natural world regardless their spatial relationship with the channelized creek.

As aforementioned in the literature review, place dependence is a major contributor to formation of place attachment. Place dependence is defined as the use and dependence of a place's resources to attain one's need. For an example, Berkeley residents are dependent on the creek's pleasant greenery environment to use the space for recreational purposes.

Residents in Citrus Heights express an attitude of independence from the natural world suggest the creek does not provide the resource for the residents to interact with natural environment, therefore the objective of the design is to include programs that encourages usage and engagement with the creek for the residents and students from Grand Oaks Elementary.



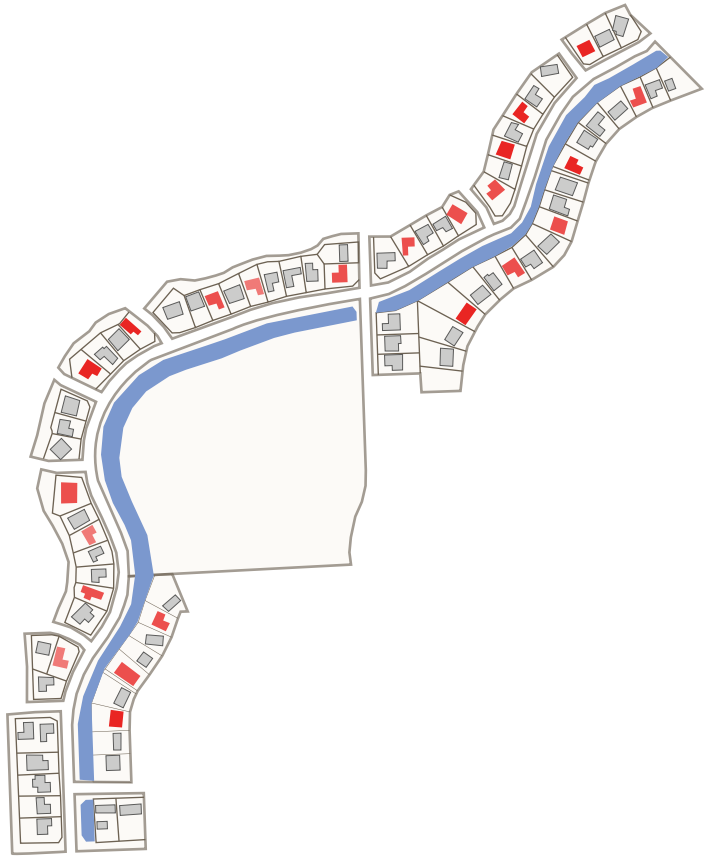


FIGURE 5.3 Scores of question 14 of households responded to CNS survey, Berkeley

FIGURE 5.4 Scores of question 14 of households responded to CNS survey, Citrus Heights

RESEARCH ANALYSIS

Analysis of activities observed in Blackberry Creek, Berkeley

A fine balance exists between active and passive activities in Thousand Oaks Elementary, Berkeley. This is a result of interrelated impacts between passive and active activities. Parents who come to take their children to use the basketball court would use the seating in the park to wait for their children, and therefore bring in "waiting" activity. From there they may start conversations with each other, or relax in the park, thus transforming passive activity to active activity as they recognize that the creek is a pleasant space to spend time in. Active activities can also bring passive activities; for example, some visitors who come to the park for dog-walking run into their neighbors/acquaintances in the park and engage in greetings or short conversations with each other, in this manner prolonging their stay in the site.

The activity study shows that diverse, balanced activities will maximize people's usage of a site. While the design needs to implement programs that encourage direct engagement with the creek, the potential passive activities they may bring should also be considered, and design elements that allow passive activities to occur need to be implemented as well.

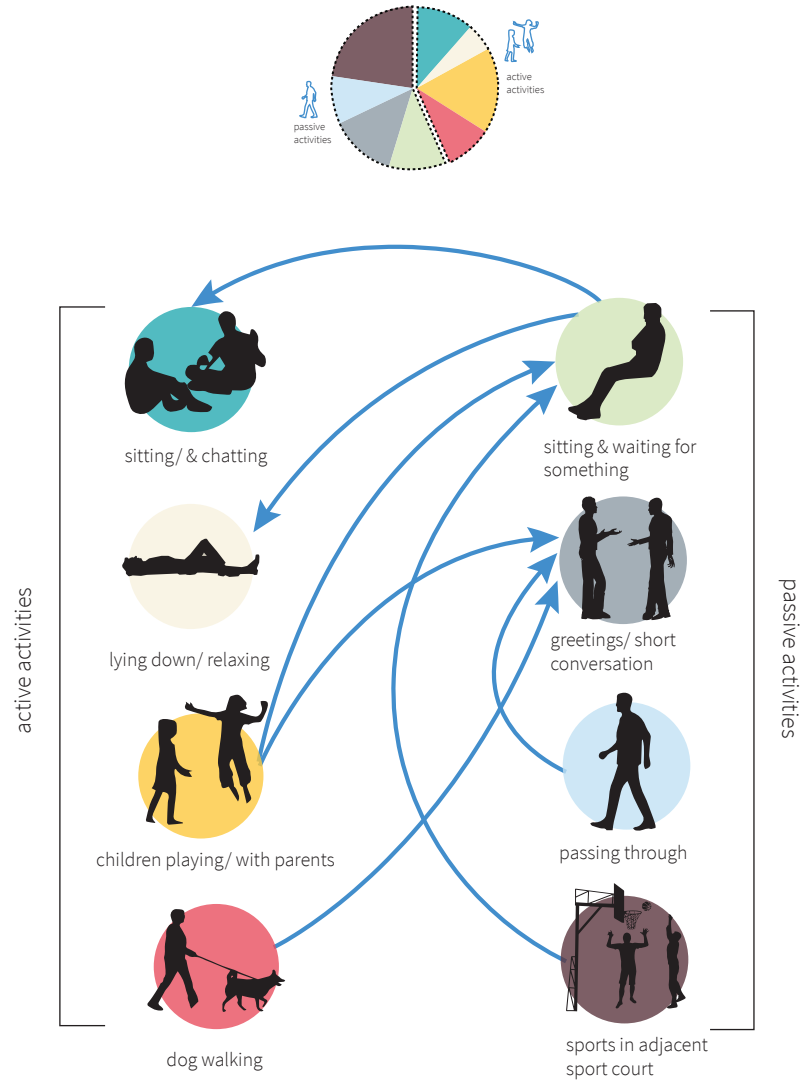


FIGURE 5.5 Relationship between passive and active acitivities

Presence of greenery, shade and habitat attract children to play and interact with outdoor environment. This photograph shows activities are taken place by Blackberry creek.

FIGURE 5.6 Photograph of Thousand Oaks Elementary schoolyard with presence of natural creek in Berkeley.

Empty street and schoolyard. Residents and children from Citrus Heights do not engage with channelized ditch.

FIGURE 5.7 Photograph of Grand Oaks Elementary schooyard and neighborhoold with channelized creek in Citrus Heights.

RESEARCH ANALYSIS

Analysis of stories collected from residents in Berkeley and Citrus Heights

Residents from both locations show appreciation and enjoyment of interacting with natural habitat. Berkeley residents use the greenery provided by the creek frequently as a space for recreational or therapeutic purposes. Citrus Heights residents show agreeableness to restore the creek and desire for presence of natural environment near their homes.

From the residents' stories it is recognized that restoring the creek's natural habitat is a critical feature to attract people to a site.

DESIGN OBJECTIVES DERIVED FROM RESEARCH ANALYSIS

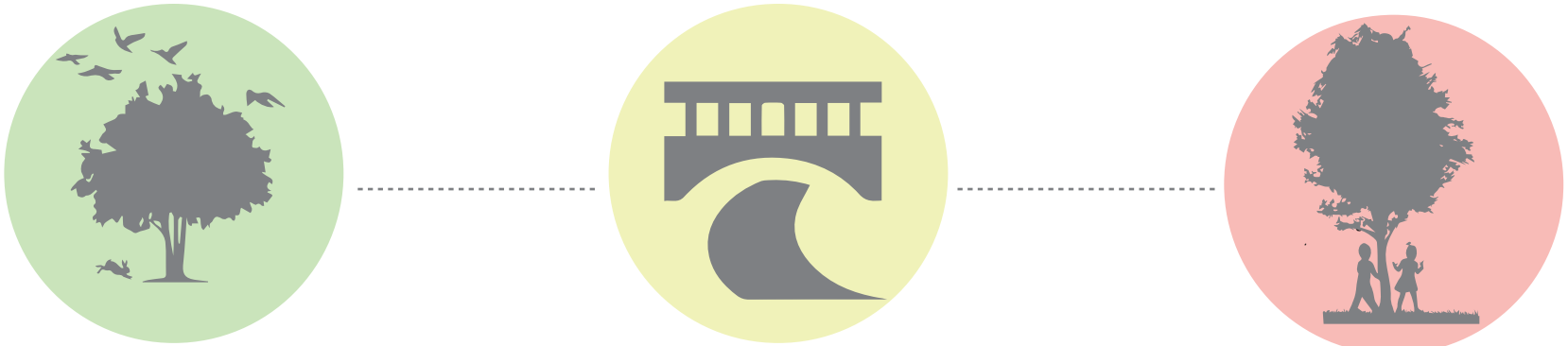


FIGURE 5.8 Summary of design objectives and process for Grand Oaks Elementary design intervention

CONCEPT PLAN

EXISTING OAK TREES

PROPOSED OAK TREES

PROPOSED REPARIAN TREES

PROPOSED STREET TREES

1. UPLAND/ PICNIC AREA
2. CURB EXTENSION
3. FLOOD PLAIN/ UNMOWED PRARIE
4. BOARD WALK
5. SAND BAR
6. MOWED PRARIE
7. SAND PLAYGROUND
8. PAINTING TRIBUTARY CREEK
9. OUTDOOR PLAZA/ LUNCH AREA
10. DRAINAGE SWALE WITH RIVER ROCKS
11. EARTHEN BERM AMPHITHEATER
12. OPEN LAWN SPACE

Project site is about 12,000 square feet large

N

FIGURE 5.9 Concept plan of Grand Oaks Elementary

hydrology

- natural primary flow
- channeled secondary flow
- sediment pool
- sand bar
- weir wall

habitat

- in stream & reparian habitat with large wood debris
- upslope bird habitat
- floodplain/ prarie
- pools for acquatic creatures

access

- direct access from residential area
- trails from classrooms
- large boulders for crossing stream
- natural trails

community

- natural creek feature
- upland picnic area
- sand playground
- outdoor plaza
- amphitheather
- community park

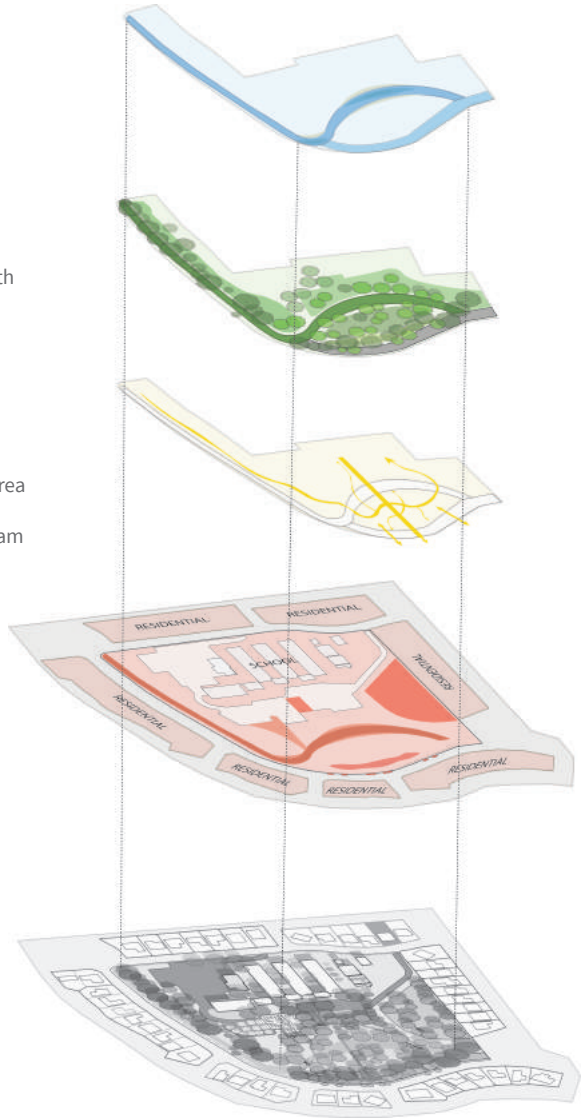


FIGURE 5.10 Hydrology, habitat, accessibility, and community value of the design

Design Components

The design is inspired by the study of historical condition of the site. The dashed-blue line is the trajectory of the creek in 1911. A segment of the historical path runs through the most vacant place in the schoolyard, which calls for the opportunity to restore a piece of historical creek with the possibility of unveiling remnant gravel bed and underground spring. Two oak trees will be removed to restore the natural meander of the creek; however, their debris will be placed in streams to home small wildlife. The concrete channel that follows the curvature of the school yard is left to its current condition to serve as an overflow channel during intense storm event. The restored meander will allow formation of sandbar that allows people to access the creek. The split flow also provides dramatic experience to the space as the visitor travels between two contrasting landscapes: the concrete filled channel and the restored riparian environment, reminding the visitor the importance and beauty of natural creek.

The land will be graded around the grove of mature oak trees on the edge of the old channel. This space will become an upland habitat for birds, and a picnic/ overlook area for the community as the land does not get flood. Adjacent to upland is the flood plain, which becomes marshland that is critical for small aquatic creatures during wet season, and becomes a prairie that blooms with wild flower during dry season. Trails are implemented in the floodplain that allows people to explore the habitat during dry season.

A large boardwalk replaces the existing pathway that allows direct access from residential housings to school. The boardwalk maintains the function of the old pathway, but improves aesthetic value of the site and allows visitors to enjoy the natural landscape as they travel through the space. Other small bridges are also included to increase accessibility to different destination from residential area.

From the schoolyard's side, one basketball court will be sacrificed to plant oak trees to provide shade adjacent sports court, and serve as an outdoor plaza where the children and staff can have lunch. By making the space more pleasant with shade and greenery, people will spend more time outdoors and therefore perform passive activities to interact with the creek. Drainage swales that imitate the pattern tributary creeks are implemented to direct stormwater from the asphalt pad to the creek, and also serves as wayfinding cues to lead people to the creek. The pattern will continue in the form of painting that extends onto the asphalt pad to create visual interest that reminds children the way water travels.

Lastly the space on southern side of the site will remain as an open space with lawn. This place will be used as the community space to hold large events, and serves as a playground for children to run around. An amphitheater with an earthen berm is also implemented in the open space area, which can be used for outdoor classroom, graduation ceremony, and performances by the school.

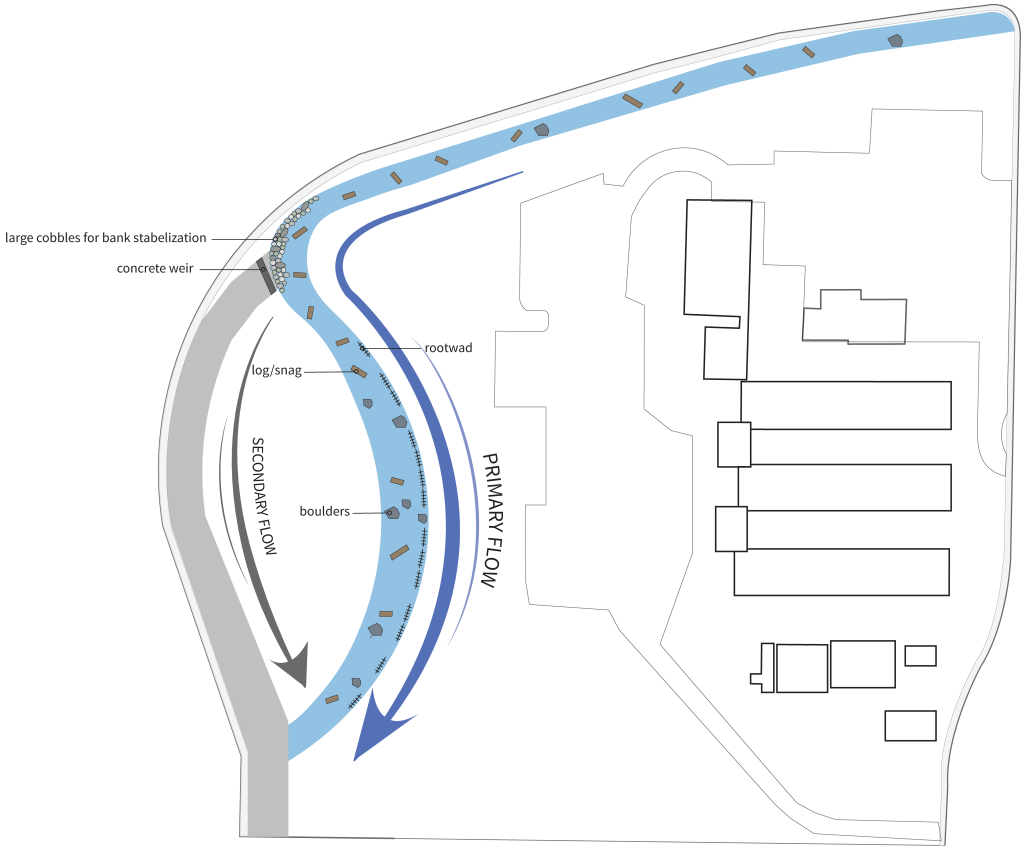


FIGURE 5.11 Detailed plan for stream feature

STREAM FEATURES

The stream will be split into two flows: the channel shown in blue will be the restored natural creek and serves as the primary flow; the channel shown in gray is the existing concrete channel that will serve as an overflow during large storm events. A concrete weir about 12" to 18" high is proposed at the intersection of the two channels to ensure the water level in the natural creek is always below 18", therefore reduces drowning hazard for small children.

Large boulders and woody debris will be placed along the natural creek. These features will attract small wildlife that like to find snags and rocks for shelter, which encourages formation of habitat in the creek. Snags and boulders also increases roughness for water flow; greater roughness decreases the velocity of water, which helps the floodplain to get flooded during wet season. Boulders also increase accessibility to the creek as children can use them as stepping stones to play in the creek or to cross the creek.

Large cobbles will be placed on the bank of the smaller meander to prevent soil erosion into the sidewalk; rootwad will be used for the larger meander for bank stabilization to create a natural look.

GRADING PLAN

The proposed grading plan shows the landform that accommodates the concept design. Soil on the west side of the natural creek will be excavated to similar elevation as the creek channel with a gentle slope to create a flood plain. Slope on the west side of the creek will be much steeper to keep water away from school to prevent flood issue. The slope of open lawn space rises up evenly to allow large events with booths and such to take place.

Note: This grading plan is only a general plan that helps to visualize landform of the site, it does not qualify for an actual construction plan and do not grade according to this plan.

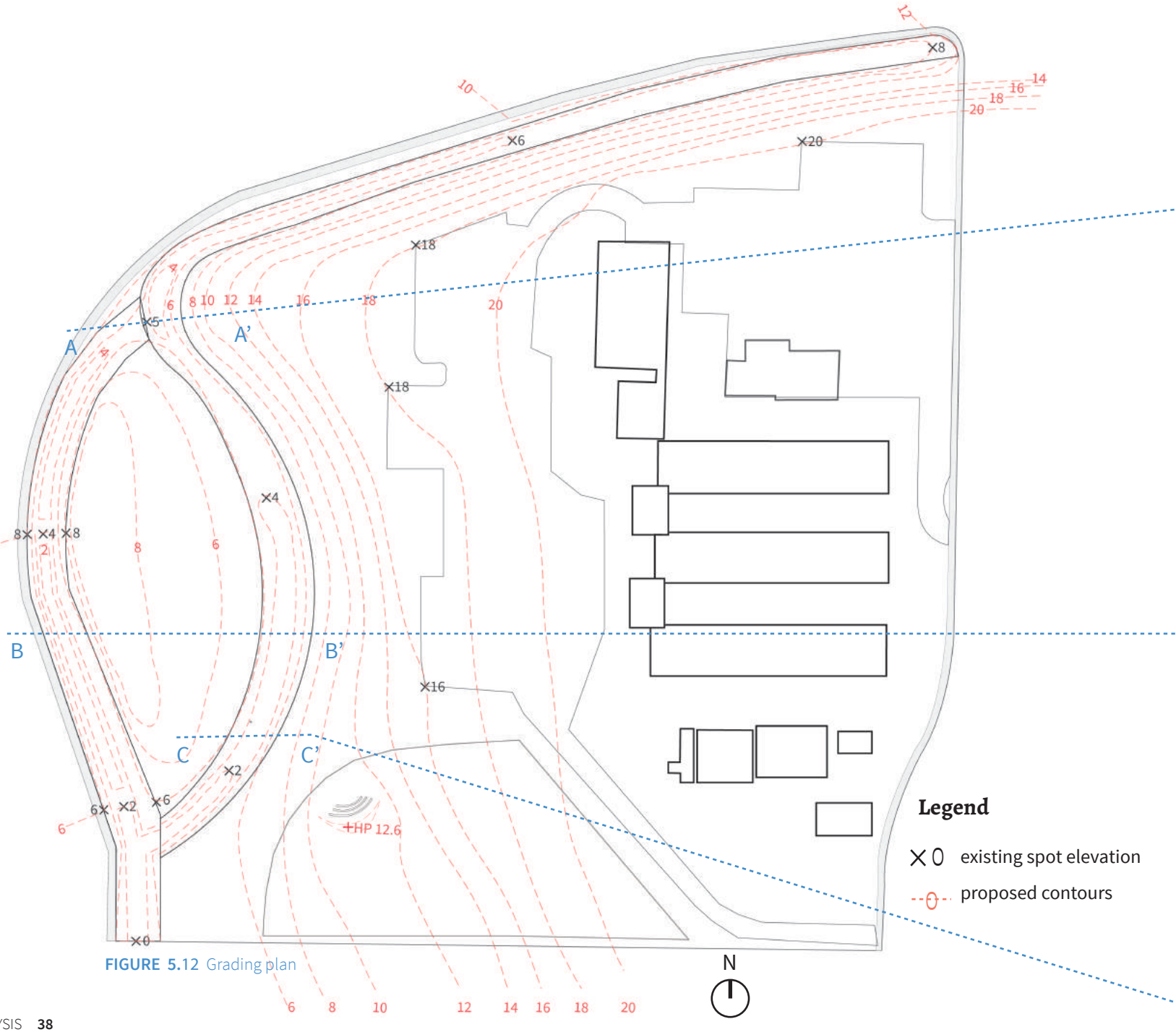


FIGURE 5.12 Grading plan

Section A-A': split fow with concrete weir

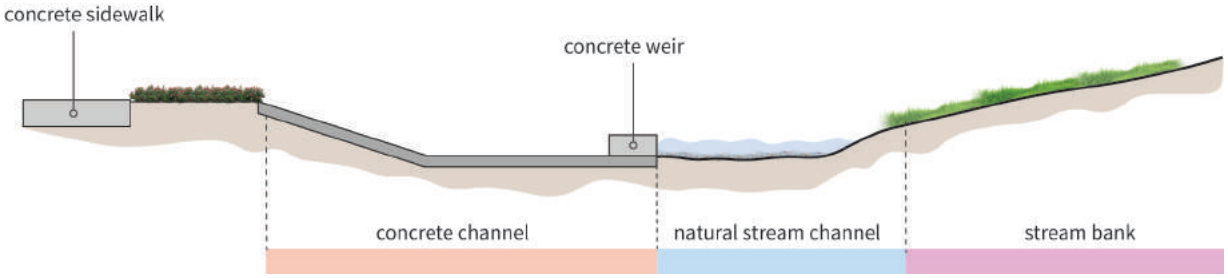
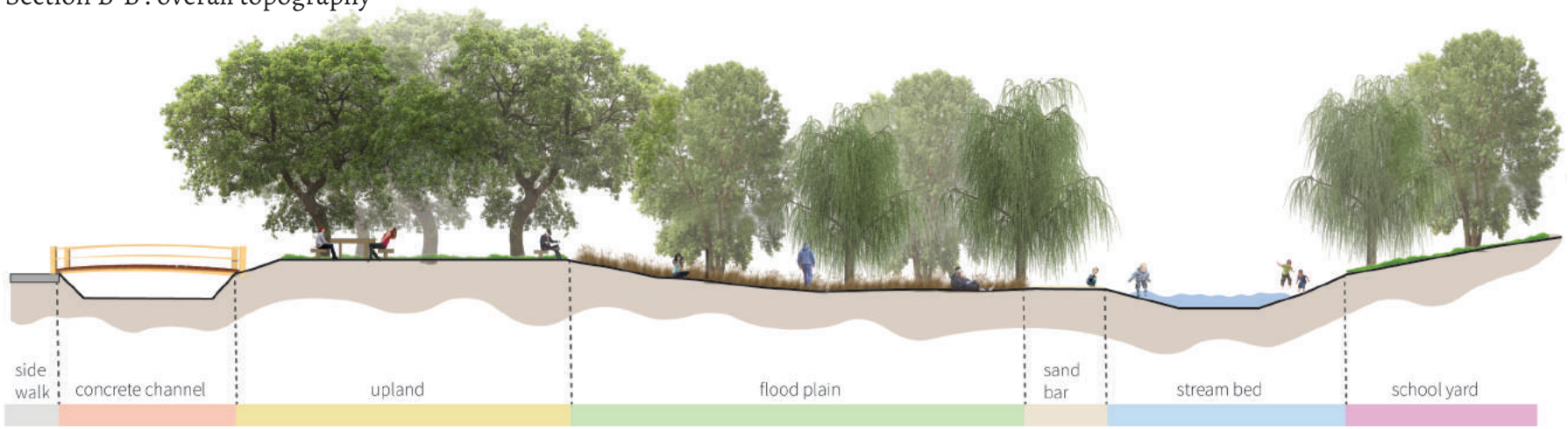


FIGURE 5.13 Section A-A'

A A'

Section B-B': overall topography



B B'

FIGURE 5.14 Section B-B'

Section C-C': enlarged streambank detail

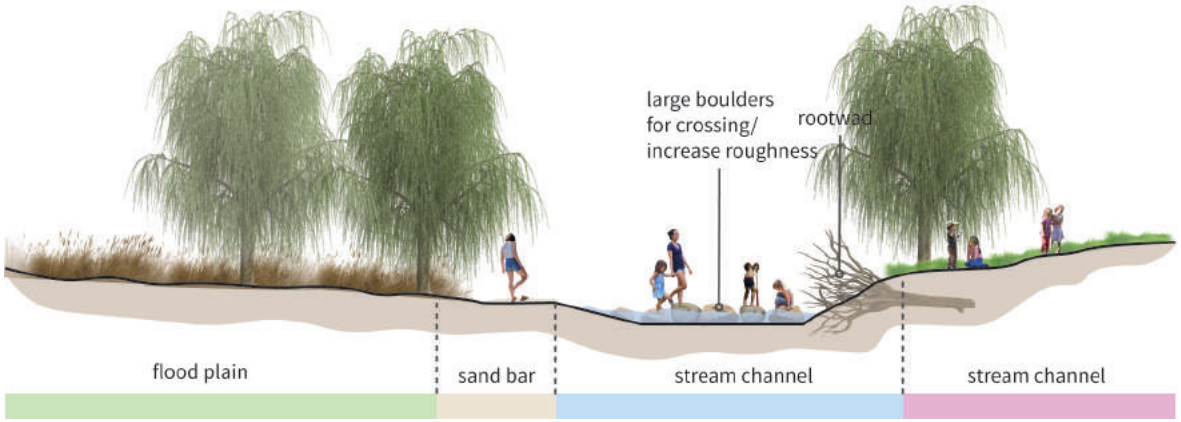


FIGURE 5.15 Section C-C'

C C'

ENVISION OF GRAND OAKS ELEMENTARY

Gateway to creek from residential side

Curb extension with planters are placed on both sides of foot bridges to frame an entrace to the creek. This perspective shows a vision of how flowering vegetations and deciduous trees are used to make the bridg feel welcoming and attractive, which calls for residents who live across the creek to cross the bridge and leads them to the creek.

FIGURE 5.16 Perspective of entrance bridge

Upland oak grove/ picnic area

This perspective illustrates the upland habitat formed as a result of protecting the existing oak trees. Since this space will always be dry and shaded due to its higher elevation and large oak trees, this space is ideal to place picnic tables and benches for families to enjoy the outdoor environment.

FIGURE 5.17 Perspective of oak grove

FIGURE 5.18 Perspective of main boardwalk

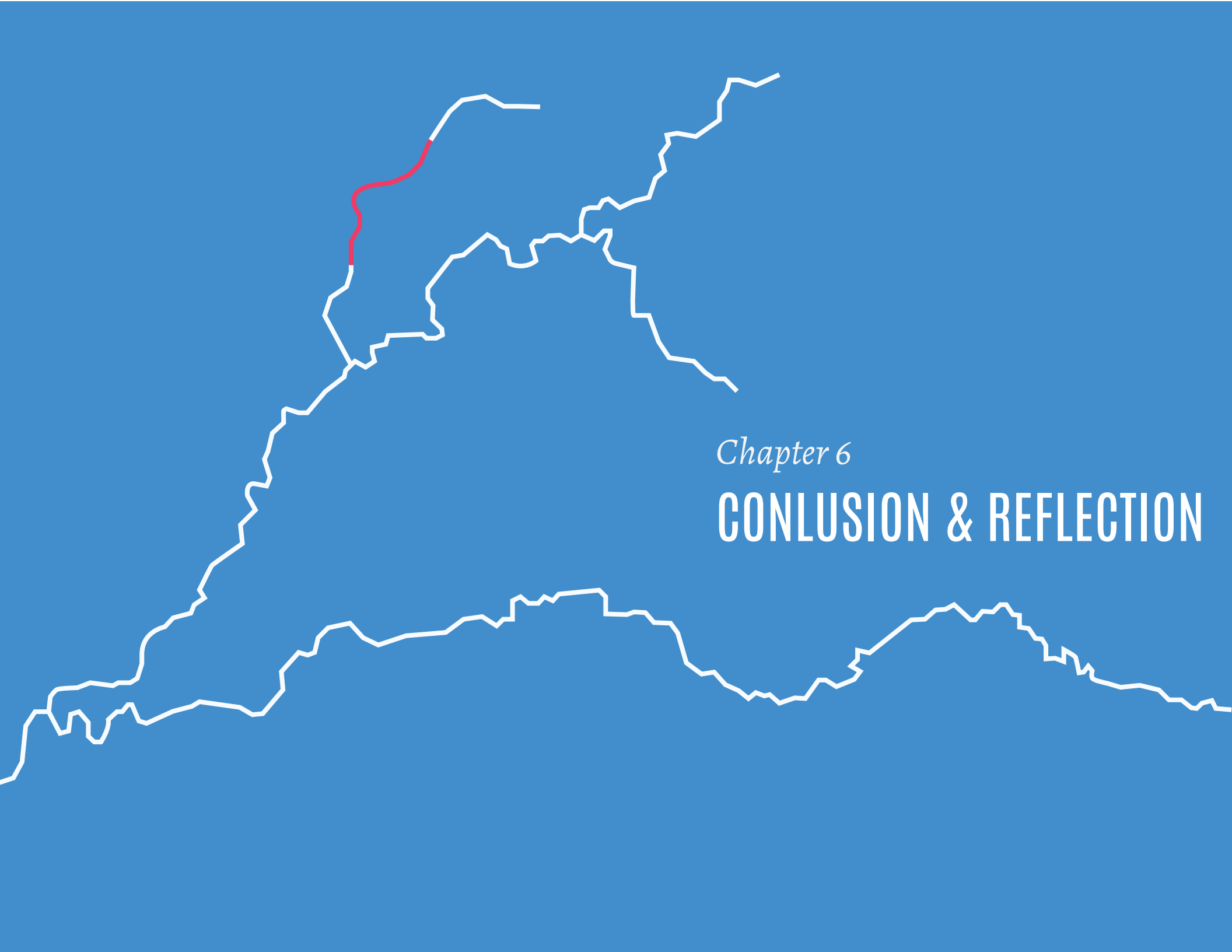
Main boardwalk

This perspective illustrate the structure of the large boardwalk that provides direct access from residential houses to school, and the scenery floodplain. The boardwalk will have extension of observation deck with seating that allows people to look out or relax when the floodplain is wet. The stairs allows people to access the prairie during dry season. Dense reparian trees such as willows, cotton wood and alders will frame the boardwalk. Underneath is unmowed prairie that will bloom with wild flowers and support insect habitat.

Restored creek

The final illustration shows the restored creek and how might residents and children from Citrus Heights enjoy the creek. On the right side is schoolyard with mowed prairie that would keep the vegetation low and allow children to run and play. On the right side is an opens pace of sand bard that allows easy access to the creek. The water level will be kept low to keep children safe. Boulders are placed throught the creek to allow people to cross and interact with the creek itself. Ecological creek will also be able to support biodiversity with wildlife that allow children to observe different creatures.

FIGURE 5.19 Perspective of restored creek



Chapter 6

CONLUSION & REFLECTION

CONCLUSION

Since the 1950s, after industrial revolution had done much destruction on natural environment and habitats in U.S., ecologist Leopold recognizes the disconnection between people and nature that was occurring, due to displacement of people into cities which seemed to separate people from outdoor environment. Leopold stated that this sense of "connection" with nature, defined as viewing oneself as a member belonging to the broader natural community, and emotionally attached to the natural environment, is critical in influencing people's concern and care of our land. Leopold's theory has inspired many eco-psychologists to study what gives a place special meaning to an individual, and theory connectedness to nature and place attachment are developed through the process of studying how people's attitudes are shaped by the environment they interact with.

A substantial body of studies have been done in studying CTN and place attachment and their impact on people's pro-environmental attitude. It has been proven repeatedly that when one is emotionally connected with a place, the individual display concern, care, and protective behavior on protecting that place's existing state. However, little research have been done on how can we apply CTN scale in making policies and planning, therefore helping urban residents, who are most likely disconnected from nature, to re-establish the emotional bond with nature.

The goal of this research project is to provide an example of implementation of CTN scale within design process, and conduct a design intervention that is tailored to helping to increase urban residents' interaction and engagement with nature.

In this project I decided to conduct a comparison study of ecological attitudes between urban residents who live adjacent to natural/ restored creek (Berkeley) and who live adjacent to buried or channelized creek (Citrus Heights). CTN scale, onsite observation of urban residents' interaction with the creek, and interviewing residents' perception to their creeks were the methodologies used to conduct the study.

The findings show a consistent result that testifies the hypothesis developed earlier in the reaserch: urban residents who have less access to natural environment are less emotionally connected to nature, and therefore lack of concern for other species.

CTN scale shows residents from Berkeley express an atittude that they are more depdent to the natural world, while residents from Citrus Heights express the opposite attitude. Residents from Berkeley also use the creek for different activities, while residents from Citrus Heights do not interact with the creek at all.

From the interviews gathered from the residents from both sites, it is recognized that presence of greenery and habitat is a major factor that attracts peope to engage with a space. This finding also testifies the idea of "biophilia" that people have an instinct bond with other living system. From the findings collected through CTN scale survey, onsite observation, and interview, the result shows that restore habitat, and increase access to natural environment are the key components in establish engagement and interaction between people and nature.z

Thank you.

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

- Aldo Leopold