Title
Biodiversity Corridors in Alamo Creek, Vacaville, California

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Abstract:

This thesis focuses on the issue of biodiversity corridors along the creek in the city and uses Alamo Creek, in Vacaville, California, as our site to assess the existing creek situations from different typical sections in urban development and agricultural areas.

Hypothesis:

Some urban development areas in Alamo Creek, Vacaville, California present better wild life corridors conditions than agricultural land areas.

Problem Statement:

When new development happens in natural areas, it is very likely to displace the natural wildlife and cause habitat loss. New development often makes the natural system into disorder and species are unable to get used to the new environment. We need to think about the types and arrangement of land uses within the development area and also the layout of the transition zones along the creek, which will provide a better biodiversity corridor for wildlife animals. It can help species to survive after the human disturbances.

In this short research project, we address this problem after our field trip to Alamo creeks and try to think which is an ideal corridor and situation for wildlife to survive in a transformation environment from natural to urban context. The city of Vacaville has a project for growth over agricultural land in the next ten years. During the field trip, we choose several stations along the creek which resulted in the following findings of this report.

Methods:

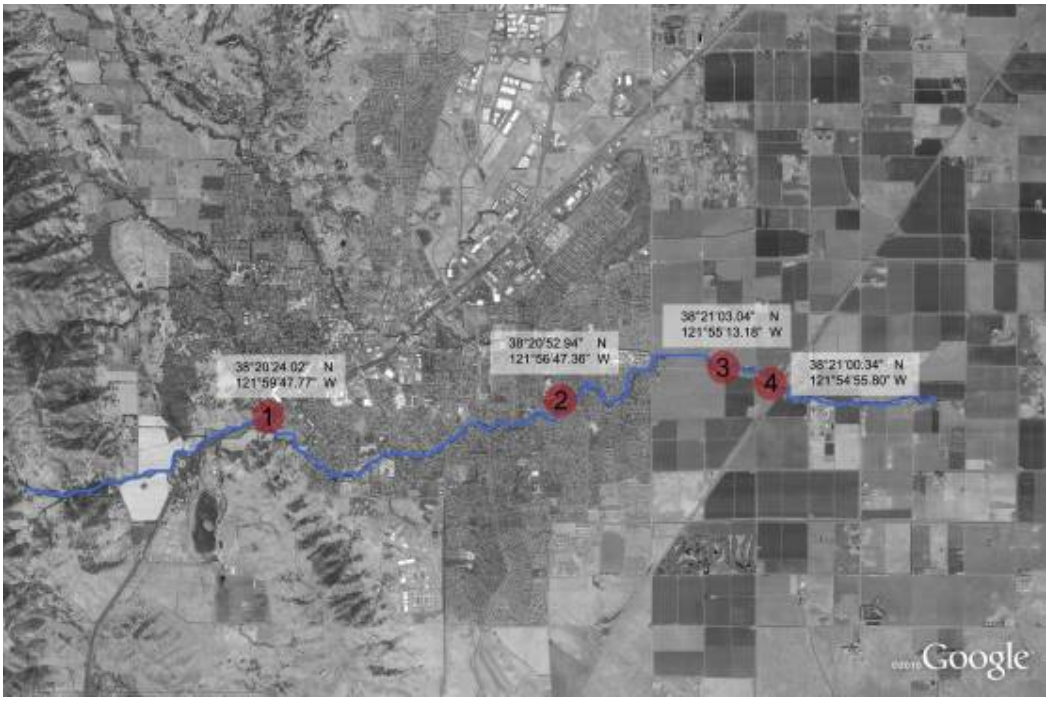
Our basic information about Alamo Creek comes from three primary sources.

The primary information source is from our field trip on April 19th, Tuesday. We drove along Alamo Creek, located in Vacaville, California and were surprised to find such a varied array of conditions. Then, we chose four different typical stations both in urban development and agricultural areas and made measurement of the creek cross-sections and the long profile. They varied from each other in terms of dimension, vegetation and turbidity and are very representative. We borrowed the device such as level, tripod, tape and ruler from the LEAP Department Equipment Room and used the knowledge we learned in LEAP222 Assignment 4B to draw the surveyed cross-sections. Then we analyzed different factors that may influence the quality of the biodiversity corridor and highlighted each factor separately.

The second information source about Alamo Creek is from the internet. We found several useful annual reports such as Alamo Creek final report made in April, 2005 and 2005 Urban Water Management Plan update, city of Vacaville and so on. This information gives us a general understanding of the existing situation of Alamo creek such as the endangered species consideration and water quality concern.

Some other information about Alamo Creek is from the survey and talk to the people who are living in the surrounding area. When we told them that the creek was very stable and hard to see the movement of water, they suggested us to select the station 1 which the movement of water was very obvious. And Professor Matthew Deitch, teaching assistant Zan Rubin and our peer review John Doyle helped us a lot in our final thesis and research. Truly thanks for their help. We will discuss our methods in depth in next three parts as follows:

1. Station points along Alamo Creek



We chose four stations along Alamo Creek, as the map shows above. Station 1 and 2 are in suburban development area while stations 3 and 4 are in agricultural area. The reason we chose these stations to compare is that they are representative of the varying spectrum of typical creek conditions.

Suburban Development area

Station1:

Located in an area where a freeway nearby and there are several houses, a community center development and big green land open space.


Station2:

Located in an area where there are both housing on each side. The houses are enclosed by continuous walls which face to the creek. And there is one jogging route along the creek on one side of the creek.


Agricultural area

Station3:

Located in an area where agricultural land on both sides of the creek. There is a freeway to the south of the station.


Station4:

Located in an area where the creek changes the form to a pond and there are agricultural lands nearby.

2. Elements which influence the biodiversity corridors

Creek dimensions:

We measured the creek dimensions of the creek, which is our basic information for analysis. We measured the long profile, the dimension of river bank cross-section and the depth of the water in each station.

From the sections we observed, we generalize several elements which may have influence on the quality of biodiversity corridors and try to find how these factors will change the living conditions of wild life animals.

Vegetation:

The vegetation has great influence on wildlife living conditions. The diverse coverage of plants could not only provide shelter for animals, but food as well, so the riparian plants have critical role in this issue. When wildlife select habitat, they make decisions based on the species of plants, as well as the growth form of the plants.[1]

In terms of our criteria, we evaluate the vegetation condition in three aspects: the height of the vegetation, the continuity of the vegetation and the amount of vegetation sourronding the creek. The height of the vegetation implies the age of the plants; the higher vegetation could provide more shade and better shelter conditions for wildlife. The continuity of vegetation refers to the percentage of vegetation in the certain length of long profile in each station. The amount of vegetation means the quantity of vegetation in cross-section.

Turbidity:

As for turbidity, we refer to the amount of silt material that is suspended by water and we judge that by clearness of water. Too much sediment is bad and is the pollutant of the surface water. It can smother aquatic organisms that are food for fish and make streams and lakes muddy.[2]

[1] http://www.riverpartners.org/riparian-ecology/veg-wildlife-habitat/

[2] waterquality.okstate.edu

In terms of our criteria, we evaluate the turbidity condition in two aspects: the clearness of water and the movement of water. We judge the clearness of water by way of visibility of the depth of water and the movement of water by comparison between the four stations.

3. Assessment of different existing creek section situations in Alamo Creek

As the factors and criteria of each factor mentioned above, we make assessment of each section situations separately. In order to compare more objectively, we create a scale of 1-5 to judge each factor, with 5 the best and 1 the worst. So the more overall points mean better living conditions for wildlife.

Analysis and Result:

In vegetation factor, station 2 comes first with most diversity and coverage, which is very ideal for wildlife to live. Then come with station 1 and 4. The station 3 is the last, because it provides least kinds of vegetation without enough coverage and most exposure, too.

In turbidity factor, station 1 is the first with most clear water condition and movement situation, although the creek is very deep, we can perceive the bed from top. In terms of percentage of depth we could see from top, station 2 is second and station 4 is third. Station 3 is last, and the creek situation is very muddy without any visibility, which is impossible for aquatic wildlife to survive.

Then based on these factors we assessed, we give an overall rank for ideal wildlife corridors living conditions. As you can see from table 1 below, station 1 and 2 in the suburban area is better than station 3 and 4 in agricultural area in terms of providing good living conditions for wildlife.

Table1. Evaluation Chart	Station 1	Station 2	Station 3	Station 4
Vegetation				
Age-Height	3	5	1	2
Continuity	4	4	5	3
Amount	3	5	1	1
Turbidity				
Clearness	5	3	1	4
Movement	5	0	0	0
TOTAL				
Better condition for wildlife corridor	**20**	**17**	**8**	**10**

4. What needs to be improved in future development of the Alamo creek in terms of the biodiversity corridor

   From research and our survey, we find that several sections of the Alamo creek are not good for wild life to survive. As far as we are concerned, there is another project that will transform the existing agricultural land to housing development. If this suburbanization will happen, we need to think about the potential of changing the existing bad conditions of the creek section in agricultural land area to improve them to a better wildlife corridor condition for animals.

Discussion:

We believe that the stability of the creek conditions will influence the living conditions of wildlife that rely on the creek. If the living conditions for wildlife change dramatically during different seasons, it could not be an ideal place for wildlife to live. Because of the restriction of short period of term time, we only went to the site once. If we could go there in a different season, the creek situation may not be the same and we could observe more information and get more interesting conclusions.

Although we have perception of wildlife living in station 1 and station 2 and no signal of wildlife in station 3 and 4, we need more information about the Alamo creek wildlife to support our thesis, including the first hand observation and other reports and so on.

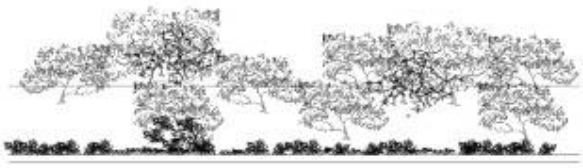
Conclusion:

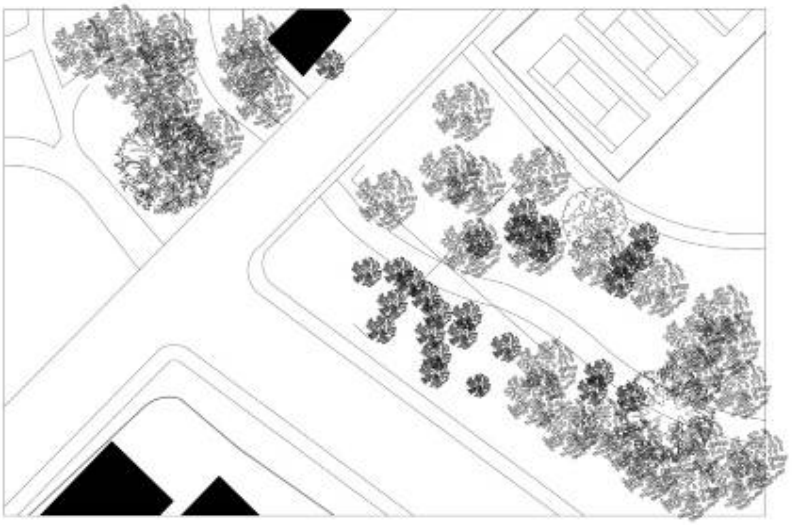
Based on our analysis, we proved our hypothesis is true, which means in Alamo creek, some urban development areas present better wild life corridor conditions than agricultural areas.

Diagrams and figures:

1. Station plan, section and long profile
2. Dimension survey
3. Vegetation analysis
4. turbidity analysis

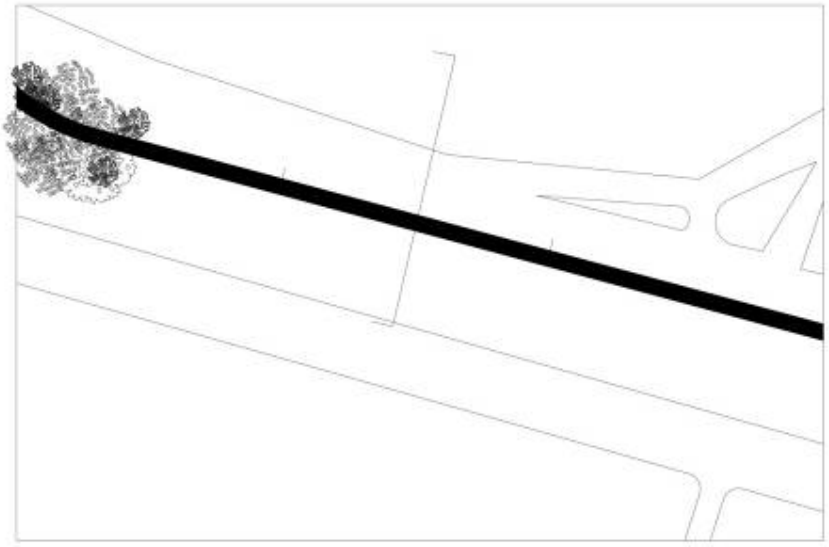
Station 1



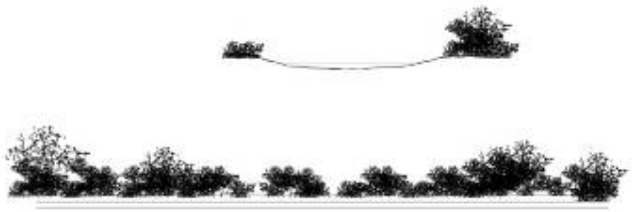


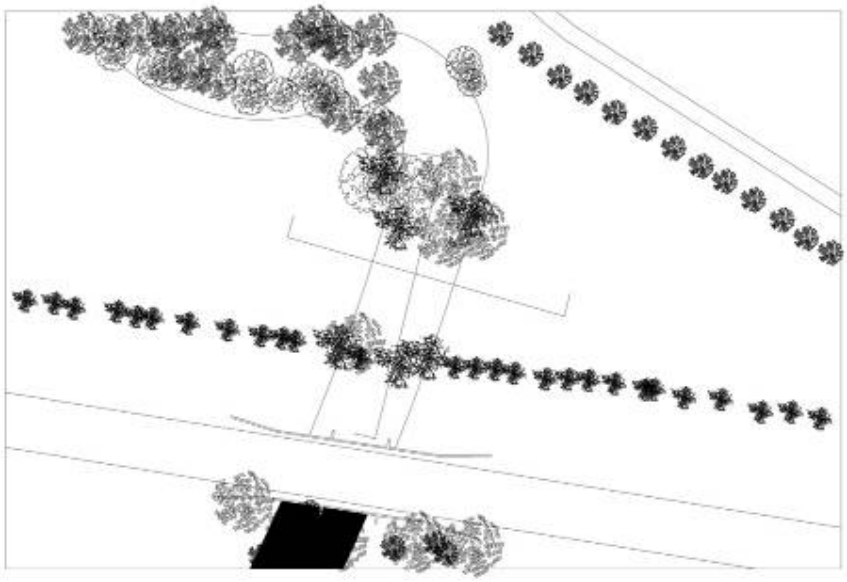
Station 2

Station 3

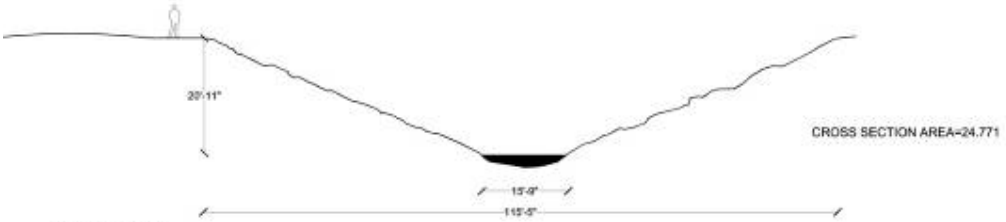


Station 4

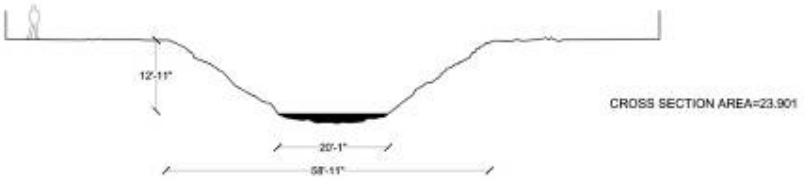




Dimension analysis



Section 1

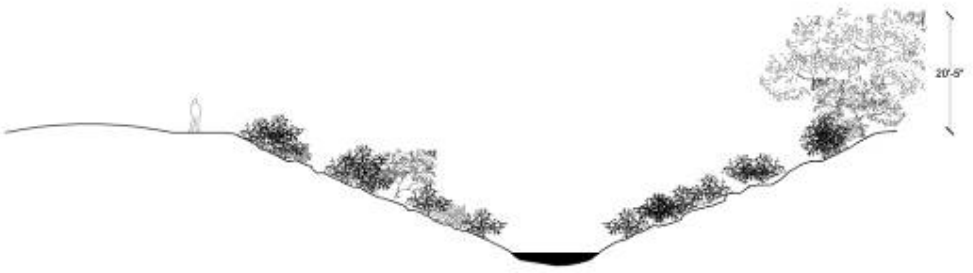


Section 2

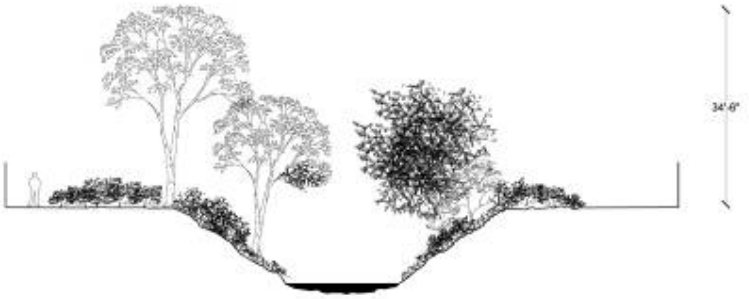
Section 3

Section 4

Vegetation analysis



Section 1



Section 2

Section 3

Section 4

Age Height	Station 1	Station 2	Station 3	Station 4
punctuation	3	5	1	2
height(f)	21	36	4	14

Vegetation

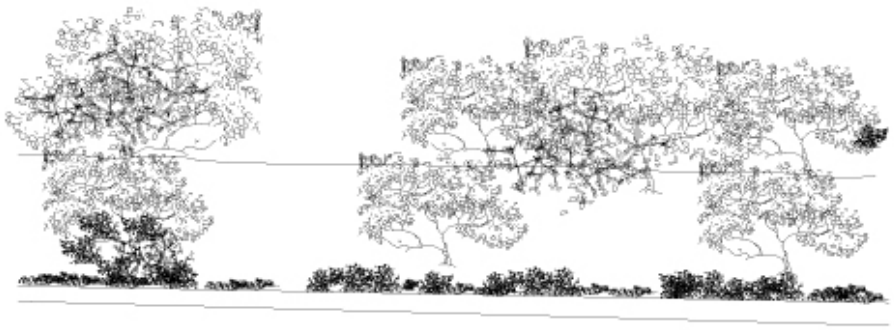
Station 1

Station 2

Station 3

Station 4

Long Profile Study for Continuity



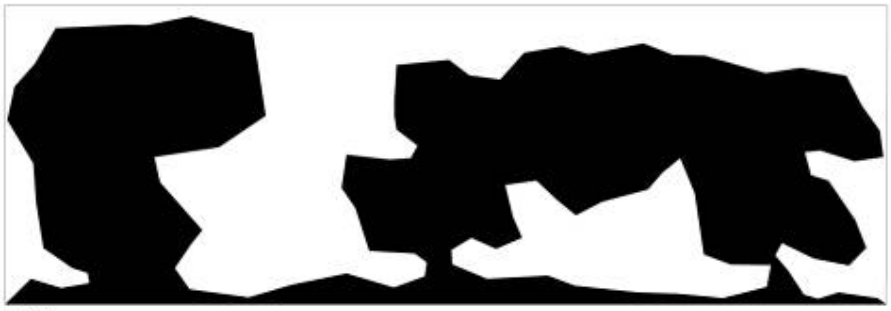
Long Profile Station 1

Long Profile Station 2

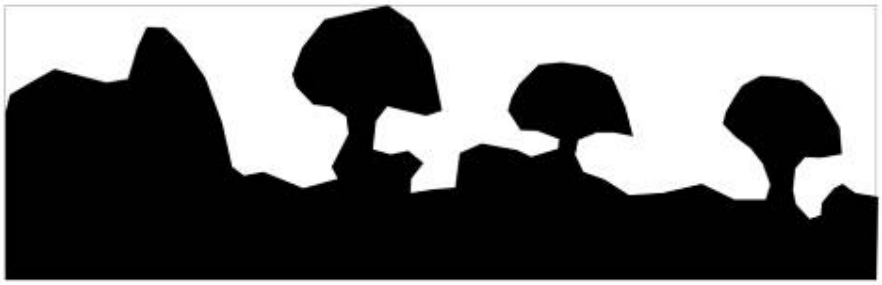
Long Profile Station 3

Long Profile Station 4

Continuity Analysis



54%



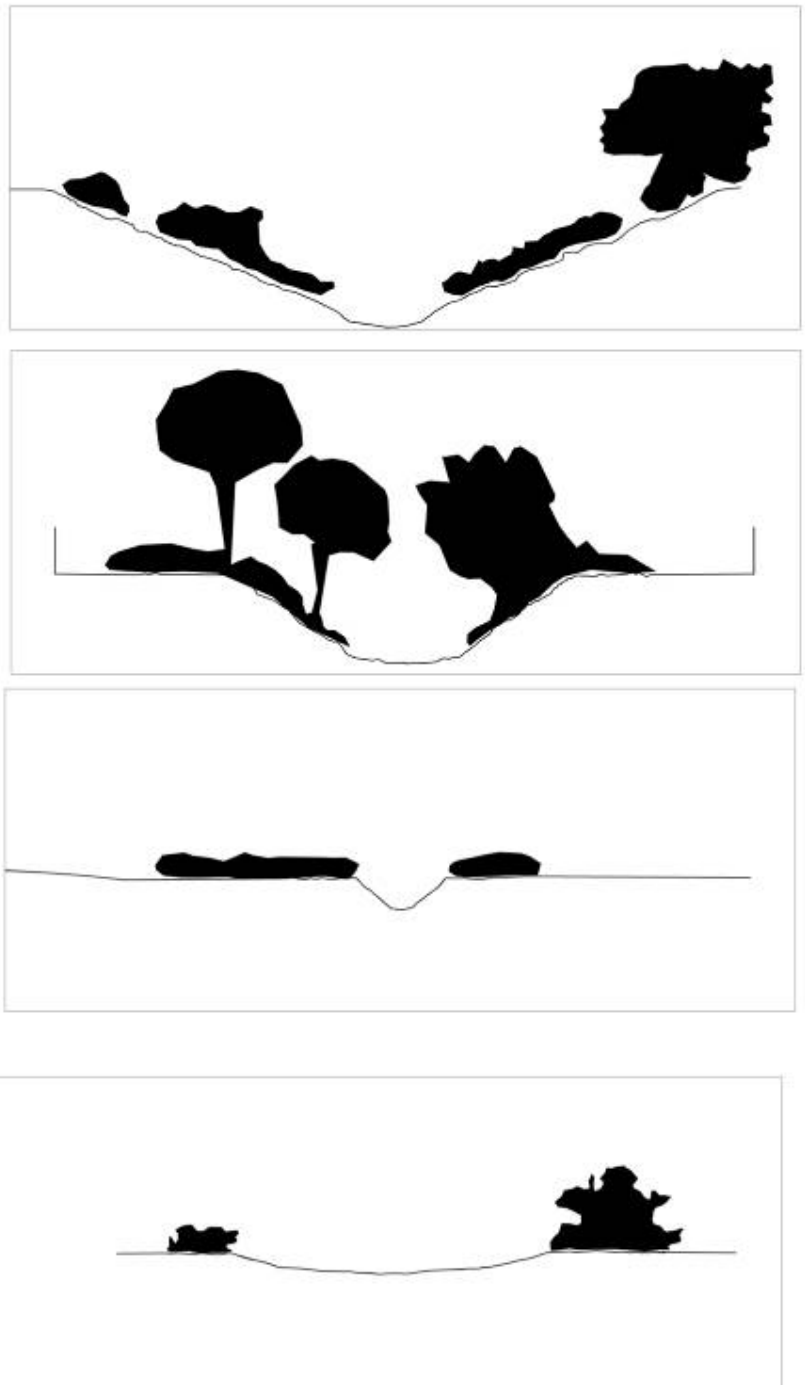
59%

70%

46%

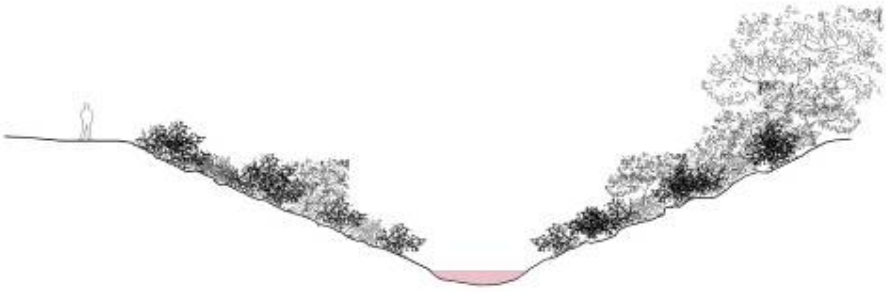
Continuity	Station 1	Station 2	Station 3	Station 4
punctutaion	4	4	5	3
area long profile	54%	59%	70%	46%

Amount of Vegetation

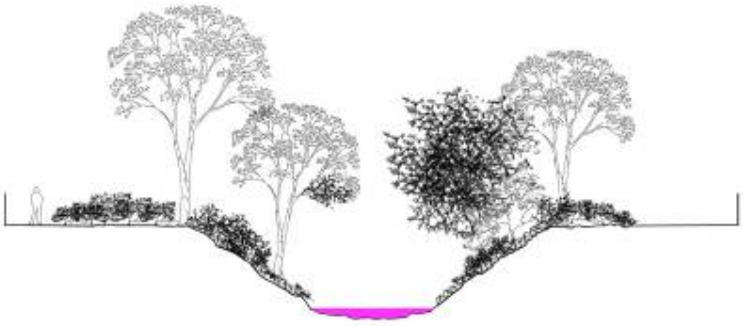


Amount	Station 1	Station 2	Station 3	Station 4
punctuation	3	5	1	1
area section	11%	18%	2%	3%

Turbidity analysis



Section 1



Section 2

Section 3

Section 4

Turbidity

Station 1

Station 2

Station 3

Station 4

Animal Life

Station 1

Station 2

Appendix:
Field Trip Photos

Definition of some terms we used in this thesis:

Biodiversity corridors-

Biodiversity corridors are areas that allow animals to travel from one patch of native forest to another. A corridor provides shelter, food for the wildlife. Birds, reptiles, amphibians, mammals and insects can utilize these corridors to move between patches with relative ease and safety.[3]

Dimension of the basic creek section-

Dimension of the basic creek section means the basic width of the creek and the distance between opposite banks, depth of the water and the height of each bank.

Long profile of the creek-

Long profile of the creek means the section of the longitudinal course of a river from certain upstream to downstream, showing the vertical changes with the horizontal distance change.

Vegetation-

Vegetation refers to the plant life of a region, including the ground cover plants, shrub, trees all together.

Sediment-

Sediment is naturally-occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of fluids such as wind and water.[4]

Erosion-

Erosion is the process of weathering and transport of solids (sediment, soil, rock and other particles) in the natural environment or their source and deposits them elsewhere.[5]

Reference:

1. Sustainable Urbanism urban design with nature/ Douglas Farr
2. Biodiversity Corridors in Practice/ Conservation International, 2002
3. South East Biodiversity Corridors Strategy/ Troy Horn, Oct, 2003
4. Alamo Creek final report, 2005
5. 2005 Urban Water Management Plan update, city of Vacaville
6. River partners

[3] http://www.forestry.sa.gov.au/corridors.stm
[4] From Wikipedia
[5] From Wikipedia