SUSTAINABLE CITY PARK
VISION FOR CARIAPPA PARK, BANGALORE, INDIA

by

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ABSTRACT

The concept of sustainable development emerged as a consequence to a growing awareness of the global environmental crisis. People all over the world are working towards sustainable development. In addition to environmental criteria, quality of life is an important indicator of the health of a city. Urban parks fulfill many social functions and address the psychological needs of citizens, making them a very valuable resource and a key ingredient for a sustainable city. Despite many challenges, countries like India are slowly adopting measures to increase sustainability within their cities. Located in the South Indian city of Bangalore, Cariappa Park is a small urban park. In its present state, it fails to live up to its role as a provider of social, ecological and economic services to its users. In this study, an attempt is made to look into the factors that have led to the failure of this park. The study further proposes an alternative design for the park. The aim of the proposed design is to inspire environmental consciousness and sustainable design construction through example. The new design will fulfill many social, economic and environmental functions, rendering Cariappa Park into a valuable municipal resource that contributes to the well-being of its citizens and to the sustainability of the city of Bangalore.
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Chapter1: Introduction

1.1 Statement of intent

Sustainable development has become one of today’s most topical phrases since the Publication of our Common Future—the Brundtland Report to the World Commission on Environment and Development (Brundtland and WCED) in 1987. This Concept emerged as a consequence of gradual awareness to global environmental crisis. Now this has become a much researched and sought after topic all over the World.

Though sustainable development is a global concept, its elements, practices and activities, need to be addressed at the local level. Some cities have been developing their own sustainability indicators to try and measure quality of life issues in a meaningful way. Besides environmental criteria, quality of life issues are considered pivotal to all the various definitions of a sustainable city (Chiesura, 2004). Urban parks and open green spaces are of strategic importance for quality of life of our increasingly urbanized society. They play an important role as providers of social services essential to the quality of human life, which in turn is a key component of sustainable development. (Ibid).

Despite many problems like population explosion, extreme poverty, resource insufficiency and of late, terrorism, developing countries like India, are also adopting sustainability in their national policies and advancing towards a sustainable future. Nevertheless, they do encounter some limitations due to lack of awareness and education regarding the concept of sustainability.
The inspiration for this project arose during my study program in Canada where I was exposed to sustainable landscape designs. Most of the literature I encountered discussed the situation in, and examples from Western countries where conditions are very different from those in India. This project takes on the challenge of attempting to put this knowledge into and Indian context, to inspire environmental consciousness and sustainable design by practically illustrating them through an urban park. Cariappa Memorial Park in Bangalore, India was chosen as the study site.

Cariappa Memorial Park, opened in 1996, is one of the latest additions to Bangalore’s public spaces (Figure 1-1). Spread over 22 acres, this park is situated in the heart of the city, surrounded by M.G. Road, St. Marks Road, and Cubbon Road on its three sides, and the Army parade ground on the eastern side. After its inauguration it attracted many of the residents because of its strategic location in the heart of the city. However, in a very short time the Park failed to serve its purpose, except that it remained an important green space in a built-up environment. Since it was developed, it has become a neglected space, attracting vandalism and crime, and thus has a negative impact on the society.

Figure 1.1 Park location  
Source: Bangalore City road map
1.2 The project goal

The goal of this project is to revitalize Cariappa Park using sustainable measures, and thus contributing to the sustainability of the city of Bangalore. The focus is not only on the Park, but also on how the Park connects to the surrounding neighborhood and public space, making the area a more safe and vibrant place filled with people, not just park elements.

1.3 Project objectives

The intention of this study is to:

- To Explore an approach to integrate the design with sustainable principles

- Develop a set of new design Goals and Objectives based on sustainability principles for Cariappa Park;

- To offer an alternative design for Cariappa Park, which will make the area more safe and vibrant place filled with people not just park elements.

Figure 1-2: The Park then and now
1.4 Methodology

The following set of steps outline the methodology followed in the project:

- Literature review of the concept of sustainable development
- Use of Mark Holland’s framework for sustainability to connect the concept of sustainable development to the development of design principles and guidelines for Cariappa Park.
- Thesis committee review
- Revision to design guidelines
- Development of site inventory and photo documentation to analyze existing site conditions
- Guided by the guidelines, use precedent studies to explore design strategies and propose a new master plan for the Park.
Chapter 2: Literature Review

2.1 Core Sustainability Issues

The 20th century has seen a marked increase in environmental degradation and an awareness that the levels at which we are using the natural resources of our planet are unsustainable (WCED, 1987). In recognition of the consequences that were becoming increasingly evident, the United Nations (UN) sponsored the World Commission on Environment and Development in 1987 to author the book, *Our Common Future*. As a result of this pivotal study the term “sustainable development” was first coined. In this book, sustainable development was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p.43). This statement addresses the concern over the extent to which ecosystems can continue to survive with the level of demand that is being placed on them by human desire for our present conception of development. In other words, sustainability refers to the “need to improve the human condition, while caring for, and protecting the natural environment at the same time” (Sheltair Group, 1998, p20).

By the turn of the century, nearly half of the world’s population was living in urban areas (WCED, 1987). The manner in which we will choose to develop these urban areas will largely determine our success or failure in overcoming environmental challenges, and achieving sustainable development.

*Cities provide enormous, untapped opportunities to solve environmental challenges, and local governments must and can pioneer new approaches to sustainable development and urban management. They must also assume the responsibility and marshal the resources to address the environmental problems facing their communities* (Roseland, 1992, p20).
In urban areas, the development of any community that purports to be sustainable must use “an evolving set of principles and practices to make decisions that minimize negative environmental impacts while ensuring positive social and economic benefits.” (NIPC, 2004, p.1)

The previously discussed 1987 World Commission on Environment and Development (WCED) has offered the following points of concern as core issues. These core sustainability issues provide a foundation for developing fundamental sustainable principles for sustainable urban development.

**Economic prosperity**

Sustainability recognizes the need for the maintenance of economic prosperity and resilience in order to maintain the health of a community (WCED, 1987). It can be achieved by developing a strong local economy, which stabilizes and revitalizes communities, by providing revenues needed to make improvements in education, government services, infrastructure, and community amenities. A skilled community workforce provides incentives for business investment. This creates jobs for local workers, lowers employee recruitment costs, and increases overall productivity by reducing labor shortages and turnover. When more workers stay within the community to work, overall commute distances are decreased and local transit use is promoted. Supporting small and independent businesses helps keep profits in the community, supports local, family-owned businesses, and provides a stable economic foundation (Ekins, et al., 1992).
Social and community health

Inequity and lack of understanding among citizens are often the major obstacles in promoting the concept of sustainable development. The “satisfaction of human needs and aspirations is the major objective of development” (WCED, 1987, p. 43).

Social sustainability refers to “the ongoing ability of a community to function as a safe, healthy and viable setting for human interaction, education, employment, recreation and cultural development (Sheltair Group, 1998, p.23). Social, cultural and community cohesion can be promoted in many ways. For example, connecting public spaces to surrounding neighborhoods and adjacent open spaces may facilitate interaction between people from a variety of neighborhoods. This type of local planning can have the effect of nurturing a sense of belonging to a particular place (Paterson and Connery, 1997). The use of green streets and linear parks may further enhance these connections by maximizing contact between people and natural processes. Pedestrian movement along green streets, through neighborhoods, past schools, playing fields, libraries, shops and public plazas allows people of diverse ages to experience the multitude of activities that occur on a daily basis (Ibid). This type of interaction is very valuable, especially for children, as it encourages them to safely explore the adult world where, through observation, they can learn invaluable lessons on how to behave and interact in their society.
Food security

The world is experiencing growing concerns over the security of the global food supply due to international political instability and depleted energy reserves that are relied upon to transport food. Consumers are separated from the sources of their food. Spatial distancing refers to the physical separation of producers and consumers; vast quantities of energy are required to process, refrigerate and transport food to the consumer (Fairholm, 1998) In order to adequately address this problem, we must begin by rethinking and redesigning our food system. Local food security ultimately depends upon local food sources. A community that produces a proportion of its own food can contribute to its own security and thus reduce its dependence on expensive imported food. Community gardens can play a crucial role here. In addition to growing food locally, they also bring citizens together to forge new relationships based on common goals and values. These are connections that mark a collectivist society – one based on affiliations of people – rather than on individualism through individual achievement (Kaplan, 1993). It is not surprising that affinitive societies have been shown to cope better with stress and adversity (Ibid) and are therefore healthier societies that express a sustaining hope for the future.

Sustainability in terms of food security therefore, would place a strong focus on maintaining a healthy and local food economy, where the local citizens would be aware of, and active participants (to the extent possible) in the production and processing of their food. The presence of community or personal gardens using healthy and organic methods of farming (particularly in an urban setting), for example, help to connect people and foster their interest, investment and understanding about their food supply.
Air quality

Air quality is one of the most critical issues facing any growing metropolitan area in the world. Air pollutions can result in increased acid rain, which deteriorates buildings and disrupts the chemistry of lakes and soil, impairing their ability to support life. The emission of greenhouse gases can increase the risk of climate change. Ground-level ozone, as one type of air pollution can interfere with the ability of plants to produce and store food (NIPC, 2004).

Strategies to protect air quality often include: practicing compact, mixed-use, transit-oriented, and pedestrian-oriented development to reduce the need to travel by automobile; planting trees and other native vegetation that help cleanse the air, produce oxygen, and require less maintenance (mowing, fertilizers, and pesticides); and maintaining open space networks that provide ample area for trees and other plants that produce oxygen and filter the air.

Energy supply

The combustion of fossil fuels (such as natural gas, coal, gasoline, diesel, and propane), is presently a major resource for energy supply worldwide. The global trend of heavy use of fossil fuels is leading to the depletion of non-renewable resources. It has been estimated that at the 1989 rates of production and consumption, oil will only last until the year 2032, gas until 2053, and coal until 2380 (Sheltair, 1998).

Transportation, lighting and the thermal comfort requirement for buildings are major consumers of non-renewable energy resources. Promoting pedestrian-oriented
development to reduce the need to travel by automobile, using natural site features (such as landform, vegetation, sun angles), building orientation, and landscaping to provide shade during summer and maximizing solar heating during the winter while taking advantage of natural day lighting are some of the measures available to reduce the negative impacts of heavy fossil fuel consumption.

Shifting away from reliance on non-renewable sources in favor of more renewable sources is also a crucial factor in alleviating the energy supply crisis. Such a switch would help to reduce emissions, increase energy security and insulate the economy from energy price shocks associated with real or perceived energy constraints.

**Water Quantity and Quality**

Water forms the backbone of natural ecosystems, and enables life to exist. Water naturally flows in cycles, and human intervention can easily interrupt these cycles. Conventional development patterns, with their prevalence of impermeable parking lots, buildings and roads, serve only to increase the volume of storm water runoff from development sites (Marsh, 1998). This increased volume contributes to downstream flooding as the storm water is quickly removed from the site via storm sewer pipes to the nearest water body. Along with flooding, the added volume of water causes stream erosion and sedimentation; water pollution by toxic compounds washed off the road surface, habitat degradation, and reduced ground water levels (Ibid).

Sustainable urban development endeavors to reduce surface runoff of storm water to levels below that of pre-development. (Ibid). A crucial step in reducing downstream flooding and improving the quality of aquatic environments is to bring old stream courses
back to the surface from the underground drainage pipes to which they were banished. This process is also salient in making the water cycle visible and a part of every day life (Paterson and Connery, 1997). When people can see a stream, they are more likely to understand how it becomes balanced and to take responsibility for its health (Kaplan, 1993).

Holding water on a site for as long as possible after rainfall, and allowing it to infiltrate into the ground, where feasible, are proven methods of reducing surface runoff and channel loading (Marsh, 1998; Paterson and Connery, 1997). Holding storm water on site also provides the opportunity to clean it of industrial, automotive, and domestic pollutants before it is returned to surface or ground water. Retention basins in the form of constructed wetlands and bio-filtration ponds make use of the natural functions of aquatic plants to filter pollutants from water (Lyle, 1994; Marsh, 1998). Wetland plants such as bulrushes (Scirpus spp.), cat tails (Typha spp.), reeds (Phragmites spp.), rushes (Juncus spp.), and sedges (Carex spp.) are variously effective at reducing biological oxygen demand, nitrogen, suspended solids, metals, trace organic compounds, and pathogens (Lyle, 1994). Constructed wetlands and bio-filtration ponds are therefore desirable elements for enhancing biological productivity and diversity.

**Ecosystem Integrity**

All life forms on the planet are connected in a web-like relationship. While the connections may vary in strength, the impact of change occurring in one part of an
ecosystem inevitably has ripple effects on other parts of the ecosystem. Ecosystems, which are high in biodiversity, tend to be more stable and resilient to stress and change (Holland, 1996).

In order to maintain the integrity of ecosystems, it is important that all developments carefully address the issues of ecosystem planning and biodiversity (Ibid). This can be achieved through the protection of ecologically sensitive areas/species, and through the development of areas in ways that minimize negative impacts. Through planning and designing natural plant and animal habitat areas into our local developments, we can ensure that they will be more sustainable over the long term.

Resource Efficiency

Sustainability means that the depletion rates of renewable resources should not exceed the regenerative capacity of the natural system that produces them. According to the World Watch Institute, 40 percent of materials entering the world's economy are used in the construction and operation of buildings (Roodman, 2005). This quantity is well above the carrying capacity of the resource base and cannot be sustained (Sheltair Group, 1998).

Sustainability objectives in terms of resource efficiency highlight the need to increase economic efficiency and performance by reducing the consumption of scarce, non-renewable resources in favor of renewable resources, and by essentially eliminating the concept of waste, in favor of principles of efficiency, re-use and recycling. (Holland, 2003)
2.2 Sustainable landscapes

Robert L. Thayer has defined a sustainable landscape as “a physical place where human communities, resource uses and the carrying capacities of surrounding ecosystems can all be perpetually maintained” (Thayer, 1994, p.235). Sustainable landscapes contribute to the well-being of mankind, do not deplete or destroy other ecosystems, conserve invaluable natural resources like water, soil nutrients, energy, and are considered to function in harmony with the natural environment (CELA, 1988). Sustainable landscapes therefore are an essential grounding element in the transition to a new philosophical framework. They serve as an antidote to the increasingly common world of consumption and technology whose end result is the destruction of nature and the development of human environments which are devoid of soul, alienating and resemble concrete jungles (Thayer, 1994).

2.3 Sustainable Parks

Sustainable parks are the new wave in park development. Dr. Galen Cranz and Michael Boland of the University of California at Berkeley have studied the history of parks and have looked for ways to integrate human and ecological systems in public open spaces. Through their research, Cranz and Boland have come up with a new model for urban parks called Sustainable Parks (Cranz and Boland, 2004). They have identified the following characteristics of sustainable parks.
Sustainable parks:

- Attempt to become self-sufficient with regard to material resources
- Can play a role in solving larger urban problems outside their boundaries when they are integrated with the surrounding urban fabric. New aesthetic forms emerge for parks and other urban landscapes
- Use green building techniques such as solar power, rain water reuse, grey water for irrigation, etc. to minimize ecological costs of construction and ongoing use
- Employ the best management practices to ensure healthy ecosystems, e.g. river buffers, using native, non-invasive, environmentally appropriate plant choices, etc.
- Encourage partnerships with other entities to foster community support
- Have a strong sense of place and identity
- Recycle waste products as much as possible
- Do not waste limited resources
- Enhance the environment, and do not degrade it
- Build community, relationships, trust and goodwill
- Educate the public about the value of natural resource stewardship
- Enhance wildlife habitats
- Create a low impact on the environment
- Do not pollute
- Involve the public in many ways (as partners, customers, volunteers, participants, stakeholders, etc.)
- Respect both nature and people
- Promote alternative forms of transportation (e.g. greenways)

Public parks can profoundly influence the quality of life in urban communities. This influence can be beneficial if the open spaces are planned thoughtfully and it can be deleterious if they are not. Planning public parks with the needs of both people and nature in mind requires intricate and varied connections to be made. The objective in the planning is ultimately to conserve the natural environment while “reshaping” the built environment (Roseland, 1992). These connections can be physical connections – such as linear parks connecting neighborhoods – or conceptual connections – such as those that arise when a child first realizes where the rainwater that falls on his/her roof goes.
Planning sustainable parks that will satisfy the needs of both people and nature requires careful forethought, creativity and attention to the actual and potential relationships that will make such a park, and thus community and the natural environment flourish. The nature of the daily interactions between neighbors and strangers, people and nature, and between the various elements of natural systems must all be given careful consideration. The sustained health of both the natural and social environments relies upon the nature of these complex interactions. Through well thought-out and careful planning, new and dynamic relationships can be formed, facilitating creative, healthy and dynamic environments with a renewed social, cultural and recreational life, as well as opportunities for relaxation, education, and appreciation of the natural environment etc. Such an environment will inevitably foster a coming together of diverse people, along with natural elements, which would otherwise not have the opportunity to interact. The needs of nature also become satisfied, creating more healthy and satisfying environment for all.
Chapter 3 The Site

3.1 Project location

The project site is located in the city of Bangalore (Figure 3.1), in South India. Figure. Bangalore first earned the title of "Garden City" in the mid-19th century, after two of its famous garden landmarks; Lalbagh (1856) and Cubbon Park (1870) were established. Plentifully planted flowering trees, both exotic and indigenous, ensured that the name became a well-deserved one.

As a result of fast growth in software sector, Bangalore is considered as “Techno polis” of India. Because of its cosmopolitan nature, it attracts people from all over India and abroad. With a population that is presently 7.2 million, Bangalore is spread over an area of 500 sq. kms, 3000 ft. above sea level. The warmest months are March through to May. Bangalore benefits from both the Southwest and Northeast monsoons. The average annual rainfall is 900mm. Monsoon season is from October to November and dry months are from December to March. Maximum temperature is 33 degree C and Minimum temperature is 14 degree C

Founded by Kempegowda in 1537, city is also famous for its silks, ivory products, and sandalwood and granite stones.

3.2 Site context

Cariappa Park in Bangalore is located between 12 degrees 8’N latitude and 77 degrees37’ E longitude. It is bounded by Mahatma Gandhi Road (MG. Road) on the South, Cubbon Road on the North, St. Marks Road on the West and Kamaraj Road on the East (Figure 3.2). The site has a good
sense of enclosure. The buildings on MG Road, Cubbon Road, Kamaraj Road and St. Marks Road (Chinna Swami stadium) help to provide this sense of enclosure. A void emerges from a dense urban fabric, making this an ideal lung space in the heart of the city. (Fig 3.2)

Site context

History of the site

The present Cariappa Park is a part of a parade ground or Parade maidan, now known as Field Marshal Manekshaw Parade Ground. It stretches over 1.5 km from East to West, and is surrounded by a ride, or mall called ‘Rotten Row’. This area is more or less the hub of Bangalore Cantonment. Cariappa Park consists of an open field of leveled dirt, which is used as a ceremonial space, as well as a parade ground by the defense services (Deccan Herald, Jan 22, 2005) According to Anuradha Mathur and Dilip da Cunha (2006), the parade ground was a segment of a mile long esplanade. The site was a tank that was filled by the British army to the level of the bund that ran along its Southern edge. (The raised walk or promenade adjacent to the Cariappa Park on North side South parade (MG Road today.). During the colonial times South Parade was a place where much business was conducted in Bangalore. During these times also, the Parade Ground was an important ceremonial space with a bandstand, where military bands played, and parades were held. The bridle
path, also known as the "Rotten Row" was a popular promenade where people came to see others, and to be seen. In June 1996, a part of the parade ground was converted into Cariappa Memorial Park. Today, the Parade Ground continues to be used mostly for military ceremonies, and occasionally for concerts, and also as a temporary parking space.

The Indian army owns the Field Marshall Cariappa Park grounds. Since it is in the heart of Bangalore city, where commercial development is extremely high, the importance of keeping this area as a ‘lung-space’ cannot be over looked. While the army is trying to keep this as an open-space, the civil administration is lobbying the army hierarchy for allowing it to be used for developmental purposes (Deccan Herald, June 23, 2005). The army, in keeping with its principles of environment protection, and in an effort to not allow the civilian plans for the area to take hold, tried to develop it into a park in 1994. The public lobbied to have this done, and a landscape architect came up with a plan. Due to various reasons, the LA’s plan was not implemented. Instead, a separate plan, which included a twenty-seven foot waterfall, was created. The overuse of water energy and the lack of proper management were cited as some of the reasons for the plan’s ultimate failure.

Increased terrorist activity in Bangalore, such as the recent incident at the Indian Institute of Science in Bangalore has become a continued threat to Cariappa Park since this park is located in a VIP-frequented area. Sales of food products, and dog walking were not permitted in the park. The absence of drinking water facilities and park amenities like benches and washrooms also kept people away from the park. The park failed as a social gathering space. The army named the park as an “Army Environmental and Ecological Training Area” without incorporating any sustainability principles, as the name would suggest. Although, the Army failed in its main objective of creating an environmental education area, it did succeed in retaining its land ownership by converting it in to a green space. Today, the park is a weed-infested area that is totally neglected by the public. This
study is undertaken in order to come up with a plan to revitalize Cariappa Park using sustainable technologies, and to further make it into a model of a Sustainable Park.

**Street character**

The streets surrounding the parade ground each have a distinct character, which is strongly influenced by the surrounding land use. MG Road is a very busy commercial street with heavy vehicular and pedestrian movement. Cubbon Road has a distinctly military atmosphere, with its parade ground and Cariappa Park on one side, and military buildings on other. Compared to MG road, Cubbon Road has lesser vehicular movement. St. Marks Road and Kamraj Roads are comparatively calmer with regard to traffic.

**Land use around the Cariappa Park and parade ground**

Cubbon road is the northern boundary of Cariappa Park. The area on its Northern edge of has a mix of military and commercial land use. The head quarters of KK&G sub area, responsible for the park management is also located in this complex. The 200-year-old St Andrews church, is an historic landmark, which dominates the area with its tall spire. The land on western edge of Cariappa Park is classified as open space and is used as police parade ground.

The area on the southern edge of Cariappa Park and parade ground is MG road, which consists of offices, shops, restaurants, pubs, and a movie theatre. It is the busiest part of MG road supporting heavy pedestrian traffic. Pedestrians like to linger in this area and. The adjacent promenade which is physically part of Parade ground and is visually a part of MG road. People like sitting on the benches along the promenade and observing street life.
Sidewalk along the eastern edge of parade ground is a major pedestrian axis extending from brigade road in the south to Commercial Street on the North (Both are two busiest roads in Bangalore). The western edge of Cariappa Park is St marks road is used as police parade ground.

3.3 Site inventory and analysis

3.3.1 Site inventory (Figure 3.5)

| 1. Pedestrian entry and service vehicle access | 9. Golden palm | 13. Cubbon road |
| 5. Band stand | | |
| 6. Cariappa memorial area | | |
| 7. Main gate and entry plaza | | |
| 8. Children's play area | | |

Legend:
- Primary pedestrian routes
- Secondary pedestrian routes
- Boundary walls

The Cariappa Park is a part of the Army Parade ground extending in an area of 22 acres. A surrounding boundary wall protects the park with main public entrance at St. Marks Rd. and a private entrance for military management at the Cubbon Rd. The major attraction to the park is the 27 feet waterfall at the northwest corner of the park and a mini waterfall with a lily pond in the
center (both are derelict now). This park was made to honor FM Cariappa for his contribution to the Indian army. There is a memorial area for field Marshall Cariappa with an eight-foot tall granite statue. This area is well maintained by the army and is used on ceremonial occasions. There is a bandstand set in a lawn in the center of the park. The bandstand is surrounded by grassy mounds meant for people to sit and watch the military band performances. There is a manmade lake at the south end of the park that has been filled due to silting and poor management. Another attraction to the park is the adventure play area for children. This area was previously well used before but is not now.

3.3.1 People flow and access analysis

Figure 3.4

The only public entry into Cariappa Park is from St. Marks Road, and there is no public parking available on this Road. The MG Road consists of offices, shops, restaurants, pubs, and movie theatres and supports heavy pedestrian traffic as well as vehicular traffic. The primary people flow to the park is from MG Road. When people are driving through this busy road, they fail to
notice the park, as no entry exists from this side. Even if they find roadside parking along MG Road, they have to circle the park on foot to reach the park entrance at St Mark's Road. The sidewalk along the Kamraj Road is a major pedestrian axis, extended from the busy Brigade Road in the south to Commercial Street in the north. Based on the analysis, there is a need for more entrances to the park, which would meet the requirements of people, vehicle flow and parking availability (Figure 3.4).

3.3.2 Circulation and View Analysis

10. Lake site

11. Foundation stone

12. Parade ground

1. Entrance from cubbon road

2. Office building

3. Mini waterfall

4. Main waterfall

5. Band stand

6. Memorial

7. Entry plaza area

8. Children's play area

9. Golden palm

Figure 3.5
The circulation analysis (Figure 3.5) shows us that, there are two paths of circulation in the existing park. The jogger’s path forms an outer ring, and few secondary pathways reach the other areas in the park. There is no vehicular entry or parking, except for a service road at the northern end that goes to the main waterfall. Walking through the park, people get only one impression -- that of scattered trees and open spaces, with no benches on which to sit. There are very few significant viewpoints, as once again the main features are now dysfunctional and overgrown. More programs have to be developed in the Park so that more people will be attracted to visiting and using it. Furthermore, comfortable seating and diverse viewpoints need to be created. The lack of parking and the single entry makes the park less accessible and people-friendly.

3.3.3 Degree of use Analysis

According to the site analysis, the most intensely used area is the jogger’s path, which addresses the fitness needs of Army officers, some senior citizens and a few teenagers from the surrounding area. The Memorial area is maintained by the Army, and attracts few visitors during a military ceremony or a parade. All other areas of the Park, which at one point attracted many residents are seldom used or visited. (Deccan Herald, Jan 22, 2005) This state of neglect needs to be addressed.

3.3.4 Vegetation and slope analysis (Fig 3.6)

When Army authorities, turned the parade ground into a park, some trees such as gulmohr, trumpet trees or *Tabebuia, Peltophorums, Spathodia, Cassias, Jacarandas*, a few fruit trees like mango and guava, pride of India and a good bamboo grove were already established at the Park.) These trees help to make the jogger’s path an attractive spot. In fact, the Park enjoys a year-round sequential blossoming of these trees throughout the year. There is a patch of exotic ornamentals,
which were introduced into the Park. These need to be removed. Army authorities have already removed several _Eucalyptuses_ shown around the present lake area, as they have been found to bring down the water table in the already drought-prone area. (Deccan Herald, July 22, 2004) some more are recommended to be removed and planted with indigenous fruit or ornamental trees.

![Figure 3.6](image)

Examining the slope of the Park, we see that the Park is almost flat, as Army authorities previously leveled it. The current lake area is the lowest point in the Park. Because of its consistent slope, the site drains naturally from the Northeast and Northwest corners of the park to the lowest point, into the present lake location. The water input into the man-made lake was from surface runoff from the surrounding parade ground area, direct rainfall over the surface and minimal ground water flow from the surrounding soil body. Now, due to silting, these areas are covered up and overgrown with vegetation. This condition has to be changed in the redesign.
3.3.5 Users and preferred activities

The main users of the Park are Army officers and their families, including senior citizens residing just one block from the Park in the Cariappa officer’s colony. They use it mainly for their jogs and morning / evening walks. An exciting opportunity exists to further involve the officers, their families, and the senior citizens in more sports activities and active recreation. The second main group of Park users includes children from the nearby Army school, as well as the children of the colony. Potential exists to engage them with the landscape and provide them with places to play. The next important category of users includes young professionals who work in the surrounding office buildings. Potential exists for providing them with lunchtime relaxation and passive recreation. The last group of users includes shoppers and families coming for an evening outing to MG Road and Brigade Road. One could potentially attract them through various programs such as a village market, which would provide local food, entertainment and handicrafts at a low cost.
Chapter 4: Precedent Studies

4.1 Rock garden, Chandigarh, India

The Rock garden, built by artist Nek Chand, is a monument of international importance, which expresses the conflict between productive industry and a healthy, sustainable environment through originality and imagination. Nekchand, a road inspector believed in waste recycling and this motivated him to work secretly for 12 years sculpting figures from urban and industrial waste. Discovered by the government in 1972, rock garden was officially opened in 1976. Spread in 25 acres, this garden is funded by city and maintained by Nekchand foundation. This park attracts over 500 visitors each day.

*Figure 4.1 Citizens donate solid wastes to the artist Nek Chand to make artworks. Source: The Tribune, march 1, 2001*

*A case of resource efficiency*

Rock Garden highlights the value of recycling waste (Figure 4.1). Discarded tube lights, rusting oil drums, broken tiles, shattered china and sanitary ware, glass bangles, unused building material, street lights, burnt bricks, electrical fittings and wires, caps from soda bottles, bicycle handle bars, and even human hair harvested from barbers'
shops were transformed as art. Streams and waterfalls weave around these paths and buildings. All are constructed of various combinations of porcelain, concrete, and stone (Figure 4.2).

A case of Social and community health

This garden uses sculptures to educate the public about the need for conservation of the earth's natural resources and the importance of balancing industrial development and sound environmental practices.

For example, the group sculpture of Indian women collecting water is especially relevant in a forum, which addresses the need to protect the environment and to conserve water (Figure 4.3). The dearth of viable wells and quality water in some areas forces women in village India to devote an estimated 30 percent of their day to the collection of water. Another typical example is the monkey watching traffic (Figure 4.4). It reveals an appreciation and concern for the diverse wildlife found on the Indian subcontinent.
Implication for the project: Invite the artist Nek Chand or local artists to make sculptures in the proposed project to emphasize issues of water, wildlife, and efficient use of resources;
  - Use discarded materials for making benches, lampposts, walls, and other structures in the proposed project;

4.2 Osho Teerth Park, Pune, India

Osho Teerth Park is in a prime locality in Pune, India and this area was an oil-slicked, foul-smelling stream. Swarms of mosquitoes formed a floating population, thus completing a picture of the decrepit face of urban India. This area is now converted from an open sewage to a verdant, undulating landscape, complete with a gurgling stream and myriad shades and textures of green (Figure 4.5). This is an example unique community effort of Osho commune, a community consisting of people from all over the world and founded by Bhagvan Rajneesh, a religious guru in Pune, India. Swami Vedant Bharati, a Japanese landscape architect of Shunyo foundation, designed this 850m by 75m wide park. More than 5000 visitors visit this park every day.
Design methodology for improving water quantity and quality

First the stream was routed through a steel gate and the gate was provided with a mesh to separate the floating garbage. Then it was guided through a series of four ponds, created on natural bedrock, which alternates between functions as settling tanks for slugging and bio filtration by means of plants such as water hyacinth, bulrushes and alocasias. The ponds cascade into each other by maintaining a level difference of 300 mm, thereby encouraging natural aeration and oxygenation of the flowing water, as it is designed to course in a winding stream bed created for maximum aeration surface (Figure 2-6). Fish called gambusia have been specially incorporated in this system to further clear the water of mosquito larvae.

Finally, wetland zones were created to catch the extra gallons of water inevitable during heavy showers, thereby helping the bio filtration ponds retain their unique ecoculture, and to function as cleansing agents. After continuously passing through the natural filter courses, now the water is 80 percent purified.

The bio diversity of the park is also increased. kingfishers, herons, sunbirds and lapwings have made the Park their permanent home. The Park remains a lesson that with nurturing care and respect for nature, we can once again green the barren stretches of earth ravaged by mankind.
**Implications for the project**

- Direct storm water and waste water generated from the proposed housing to the existing lake area through grassed swales to make natural processes visible to people
- Design the existing lake area as bio filtration ponds to treat storm water and wastewater.
- Use plants such as water hyacinth, bulrushes and alocasias for retention/detention ponds to function as bio-filtration ponds in the proposed project;
- Use design to reveal the natural world

**4.3 Dilli Haat, New Delhi, India**

The Dilli Haat Food & Craft Bazaar is a joint project of Delhi Tourism & Transportation Development Corporation (DTTDC) and New Delhi Municipal Committee. The project has received technical and financial support from the Ministry of Textiles through the offices of Development Commissioner (Handicrafts) and Development Commissioner (Handlooms).

Designed as a traditional market (Fig.4.7) with imaginative architecture, stone and brickwork paved paths; Dilli Haat attempts to provide leisure and recreational facility for the tourists and the citizens of Delhi and has been success ever since it opened in the
spring of 1994. The 6 acres of land on which this sprawling complex is situated was salvaged as part of a reclamation project and transformed into a magnificent dream plaza.

Extensive foundation work, small thatched roof cottages and kiosks with a village atmosphere have made the place into an attractive multiple centers. The area has been developed as a park where the constructed area has been limited to around 10% of the total plot area. Dilli Haat has gained a considerable popularity and around 5000 visitors visit Dilli Haat every day and during festivals and particularly weekends the number of visitors goes up to 10,000 to 15,000 every day.

The shop/stalls have been set up on platforms, which act as a link in the Bazaar design. The country-yards in between these shops have been paved in stone and spaced with grass to retain visual softness and provide a conducive environment for recreation and leisure. The crafts section of the Bazaar has a total number of 62 stalls. These stalls are allotted to national level craftsmen and other artisans from all over the country, for a maximum period of 15 days. The food section of the Bazaar consists of 16 big and nine

Figure 4.8 The Stalls

Source: The Tribune, October 30, 2003
small foods stalls making available ethnic food from different parts of India at one place. There is an open air cultural complex where programs are organized displaying the cultural aspects of different States of India. The Dilli Haat offers a delightful amalgam of craft, food and cultural activities.

_A case of social and community health_

The word Haat refers to a weekly market in rural India. Situated in the heart of Delhi, the unique Dilli Haat is an upgraded version of the traditional weekly market, offering a delightful amalgam of craft, food and cultural activities. However, while the village Haat is a mobile, flexible arrangement, at Dilli Haat, it is the craftsmen who are mobile and ever-changing thereby offering a kaleidoscopic view of the richness and diversity of Indian handicrafts and artifacts. The ever-changing and colorful cultural activities attract people both nationally and internationally (Figure 4.8). It facilitates to bring awareness among the consumers about how these commodities are grown and processed to develop into a finished product (Figure 4.9). It would also serve as a platform to educate the public on how it contribute to the employment, livelihood, biodiversity and creating an eco-friendly environment.
A case of economic prosperity

The objective of the project is to provide marketing facilities to rural artisans and craft persons in the Capital city, without the intervention of middlemen (Figure 4.10). To establish the contribution that craft people and biodiversity-based economy are making to the national economy.

Implications for the project

- Create a market in Haat style in the park to encourage high level of social activity across the site as well as to generate income for the park maintenance.
- The Park will be funded and maintained by the KK&G sub area of the Army

4.4 Field Marshall Cariappa officer’s colony, MG road, Bangalore

Located at the eastern end of Cubbon Road is the FM Cariappa officer’s colony, which is a housing complex fully owned by the Government of India, ministry of Defense meant for housing for the Army officers and their families (Figure 4-11). Placed right in the heart of the city, with MG road in south and Cubbon road in north and Dickenson road in the east, this prestigious housing colony caters for housing 90 officer families (9 buildings with 2 units in 5 floors). There are two bedroom and 3 bedroom units. Each unit comes with servant quarters, which houses the house keepers/Nanny/ or
others meant for domestic help. It may be noted that more than 12 per cent of the total land area in Bangalore City belongs to the Army and this is a piece of land that was earmarked to meet the demand for housing for army personnel's as many of the army establishments are located in this central hub of the city. So this serves as an ideal Live and work area for army officials.

Figure 4.11 Field Marshall Cariappa officer's colony, MG road, Bangalore
Source: Google Earth, 2006

The Military engineering corps is in charge of all construction and maintenance of these units. There is a children's park placed ideally in the centre with many play structures. Parking is on the ground floor. Some of the units are provided with garages as well. There is a play ground/cricket ground on the western end, which caters to the main sports activities of both adults and children in the housing colony. This
housing colony is also located close to the Army school and many public schools. The famous tourist destinations like Ulsoor Lake, Russell market (famous for its flowers, fruits and vegetables, shoppers paradise like Commercial Street, Brigade road and recreation centers like Army officers mess and gymkhana club (The Gymkhana conducts various sports like Polo, Paper chase, Racing, and Trap-Shooting besides Cricket, Hockey and Tennis) all are at walking distance from this colony.

Implications for the project
Since there is acute shortage of housing for army personals, (Deccan Herald, June22, 2005) and as the project site is located in close proximity to various army institutions, a part of the site can be allocated for housing to maximize revenue. As the housing units will be sited overlooking the park, safety of the park will be ensured.
5.1 Research methodology

For the purpose of achieving the sustainability objectives for the re-design of Cariappa Park, Mark Holland's sustainability matrix is used as the main framework or tool in this project. The sustainability matrix is based on 2 axes. The x-axis contains all core sustainability goals discussed in detail in the previous chapter, and the y-axis contains the core issues or challenges faced by the Park. The axis of sustainability matrix, which typically contains the sustainability goals, contains a minimum of the following (Holland, 2003)

<table>
<thead>
<tr>
<th>Sustainable development goals (X Axis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Climate Change / Air quality</td>
</tr>
<tr>
<td>2. Energy supply</td>
</tr>
<tr>
<td>3. Resource efficiency</td>
</tr>
<tr>
<td>4. Water quality and quantity</td>
</tr>
<tr>
<td>5. Ecosystem integrity</td>
</tr>
<tr>
<td>6. Food security</td>
</tr>
<tr>
<td>7. Economic prosperity</td>
</tr>
<tr>
<td>8. Social and community health</td>
</tr>
</tbody>
</table>

Based on the sustainability matrix, a framework is developed as illustrated in Table 1.
### 5.2 Sustainability Matrix for Site plan of Cariappa Park

*Table 1* (Developed using Mark Holland’s Sustainability Matrix ©)

**Goal:** Design FM Cariappa Park contributing to the sustainability of the city

<table>
<thead>
<tr>
<th>Challenge</th>
<th>On site issues</th>
<th>Design Principles</th>
<th>Design goals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy Supply</strong></td>
<td>No electricity and high cost</td>
<td>Protect local and global environment using less Energy</td>
<td>➢ Provide for lighting with energy efficient bulbs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Use lights only when required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Design structures which requires less electricity or no electricity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Use energy saving buildings with natural ventilation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Provide a percentage use of efficient irrigation system.</td>
</tr>
<tr>
<td><strong>Water Quantity and Quality</strong></td>
<td>No water in the park. Drinking water of the city is used for park functioning.</td>
<td>Increase water retention, water efficiency, and reduce storm water run off</td>
<td>➢ Manage and celebrate storm water on the site</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Purify waste water on site</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Maximize water infiltration</td>
</tr>
<tr>
<td><strong>Eco System Integrity</strong></td>
<td>More plantings with exotic plants, low bio-productivity</td>
<td>Enhance the soil and biological productivity, bio-diversity and ecological connectivity in the site</td>
<td>➢ Provide for high soil organic matter level</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Maximize the use of native and low maintenance Vegetation throughout the site that attracts Wildlife and insects</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Provide for vegetative vertical stratification</td>
</tr>
<tr>
<td><strong>Resource Efficiency</strong></td>
<td>The Park generates waste which has become a source for urban garbage</td>
<td>Design the park using urban waste as resources Design the park to produce less waste</td>
<td>➢ Use recycled or reclaimed material wherever Possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Decompose leaf litter onsite</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Provide for waste management on site</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Use long lasting building materials</td>
</tr>
<tr>
<td><strong>Economic Prosperity</strong></td>
<td>High cost for maintenance resulted in failure of the park</td>
<td>Meet needs at the lowest cost</td>
<td>➢ Maximize revenue from the site</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Maximize recycling of resources and waste Materials</td>
</tr>
<tr>
<td><strong>Food Security</strong></td>
<td>No effort made to contribute to food security</td>
<td>Use site to produce food that can be consumed locally</td>
<td>➢ Use the site to produce food that can be consumed locally</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Create edible landscapes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Create a fruit and flower market facility that encourages the consumption of locally produced food</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Access to the Park is a concern for people</td>
<td>Promote air quality of the surrounding environment</td>
<td>➢ Increase multiple entry points to promote Pedestrian visitors, thus calming down vehicular Traffic and reducing air pollution</td>
</tr>
<tr>
<td><strong>Social and Community Health</strong></td>
<td>Park does not attract people: Lack of seating, Lack of functional spaces for traditional social activities, Lack of shelter from rain, Lack of engagement with the landscape</td>
<td>Promote Quality of life and encourage high level of social activity across the site</td>
<td>➢ Optimize socializing while remaining flexible For larger social functions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Provide opportunity for education</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ Maximize connection between the site and Surroundings</td>
</tr>
</tbody>
</table>
5.3 setting priorities for the Site

In the context of this study, from amongst the eight core issues discussed in the matrix, the Cariappa park project will focus on three core issues of sustainability:

- Social and community health
- Water quantity and quality
- Economic prosperity

Social and community health

As explained earlier, the urgency for a re-design of Cariappa Park came to the fore when the prime land of the Park became a site of interest for development to both government agencies and real estate developers. When the state government of the time had considered developing a parking lot on the site, the Army, fearing a take-over, decided to convert the area into a park. This plan was strongly endorsed by environmentalists of all hues. However, less than a year after its inauguration, Cariappa Park became a deserted and overgrown place. Having consulted residents, military authorities, and other users, regarding why they believed the Park to have been a failure, one of the major reasons quoted was that the Park didn’t play a role in enhancing any social activity. The design provided no opportunity for any kind of social interaction. When a designer takes a community development approach to recreation planning, strong communities are built, and strong communities develop into healthy communities (Sparrow, 1998). Besides environmental services such as air and water purification, wind and noise filtering, urban parks also provide social and psychological services, which are of crucial significance to livability of a city. (Chiesura, 2004). Urban parks can be designed as a domain of active experience providing a sense of challenge, privacy and intimacy. (Ibid). Unfortunately, these aspects were not given adequate thought in the original design of the Park. Hence, social and community health will be given the first priority in the re-design.
Water quantity and quality

The second reason quoted for Park failure involved concerns and problems related to water supply. In a city like Bangalore, which has no perennial river sources, and where the population is estimated to have reached 6.5 million, there is acute shortage of water. In Bangalore, only 35% of the city gets water on daily basis, the rest on alternative days. (Nagesh et al, 2005) In Peenya industrial area, it is common for street fights over water to erupt among the women. Social conflict and tension is high due this water crisis. (Deccan Herald, June 2004). There are around 4 hundred thousand-bore wells in the Bangalore urban district and 750 million liters of water is extracted ever day. (Nagesh et al, 2005) Apart from domestic use, private suppliers through tanker lorries are selling ground water commercially. Over exploitation by mineral water companies has resulted in severe stress on the aquifers, hence ground water levels are coming down to a large extent. (Ibid).

In Cariappa Park, the main waterfall, as well as the mini waterfall and the irrigation of exotic ornamentals required large amounts of water. Considering the situation overall shortage in the city, the existence of this design can be considered unconscionable. As a result, the Park management got a very high water and electricity bill, which they could not pay. The consequence was that the city cut off all water from the Park. No thought was given, or action taken regarding the efficient use of rainwater, and no efforts were made to manage the storm water. In the past, park planning tended to revolve merely around providing green spaces for recreation. (Reid, 1989). Today, in contrast, ecological problems may be counted among our most pressing social problems. (Cranz and Boland, 2004). The possibility then exists to enhance the ecological functioning of the urban fabric, while visually enriching the urban experience with the use of storm water management
Economic prosperity

Another reason identified for the Park failure was economic. Economic aspects of park maintenance were not kept in mind while the design was being made. No effort was taken to make the park self-sustaining. There are various ways to generate income in a park. Sustainable parks employ a diverse array of strategies to reduce the need for resources, and to increase self-sufficiency. These strategies are woven into every aspect of park design, construction and management. (Cranz and Boland, 2004). The strategies identified include increasing resource self-sufficiency through sustainable design, construction and maintenance practices, plant choices, composting, water harvesting, public/private partnerships and community stewardship. Hence, in the redesign, emphasis will be given to maximizing the revenues to the Park. This will not only make the Park economically sustainable, but also will attract more people into the Park.

5.4 Developing Principles, Goals and Objectives for Site plan of Cariappa Park

5.4.1 Social and Community Health

Issues on the site

- The Entire park is enclosed by a wall and there is only one entry at St.mark’s road, into the park
- There is no provision for Parking space
- Lack of legibility
- Lack of protection from adverse weather conditions
- Lack of Connection to the surrounding area.
- No opportunity for educational programming
- No programs provided to enhance social activity
Opportunities

- Large volume of people flow, hence great potential for social activities
- Existing promenade invites People
- Urban Core area, full of diverse city functions and replete with historic and cultural heritage

**Principle:** Promote quality of life and encourage high level of social activity across the site

**Goal 1:** Optimize socialization while retaining flexibility for larger social functions

**Objectives:**

- Design an on-site traditional art, craft and food market, or Haat, to be strategically placed between the Park and parade ground to attract more people into the Park and cater for diverse activities and different sized events. Handicrafts from local artists will be sold here
- Provide for a sports area with tennis and basketball facilities for active recreation. Basketball courts should have removable basketball hoops that would allow the area to be turned into a dance floor, a common requirement in most Army parties.
- Providing a sculpture avenue through the centre of the park will create interstitial spaces that will encourage social interaction, encourage people to stop and talk and will bring in a close knit sense of community.
- Provide a community centre for community interaction. The centre should have many indoor sports facilities, as well as facilities for various art classes, classes for organic farming, plant propagation and nursery training etc.
- Provide for an outdoor gym to cater to the needs of main user groups i.e. officers and senior citizens.
• Provide a community garden, which will foster a sense of community, belonging and purpose.

• Include a sheltered performance area / bandstand as a venue for band music, plays, summer movies, festival performances of various Indian states, music concerts etc. The shelter will also serve as a venue for outdoor community gatherings, community talent shows and a variety of other social events.

• Enhance existing promenade by providing seating, water fountain, garbage receptacles, and lampposts. Local artists would be included in the design of these street furniture

Goal 2 -- Provide opportunities for education

Objectives:

• Showcase solar aquatic facility as an educational tool

• Vegetated infiltration basins

• Children’s experiential play

• Sculptures in Sculpture Avenue will serve to educate citizens about the need to conserve natural resources and draw people’s attention to water issues and efficient use of resources.

• Butterfly roof structure for rainwater harvesting along Sculpture Avenue and similar roof for performance area serving to draw public awareness to the fact that rain water is a valuable asset and should be conserved.

• Community garden

• Direct storm water from village market, officers housing and sports area through a system of swales to the detention pond in order to reveal the ecological process.

Goal 3 - Connect Park to the surrounding area
Objectives:

- Add a new residential road with side parking between the park and local housing to increase accessibility to the Park
- Position the village market in such a way as to connect MG Road and Cubbon Road, the two busy roads from which there will be a maximum people flow to the Park
- Create more entrances that are legible. Adding additional entrance gates at St Mark’s road and MG road that are strong and legible, will make, Cariappa Park gain a sense of identity.
- Make the Site more accessible by adding many wall punctures, and more cross roads and step ways. This will also help to calm traffic and will invite more pedestrian visitors to the Park

5.4.2: Water quality and quantity

Issues:

1) Drinking water was used to run a massive waterfall of 27ft height.
2) No effort made to harvest rainwater
3) All run off is directed to storm water sewers.
4) No efforts taken to recycle water
5) No effort taken to treat wastewater
6) No design component to reveal and celebrate water

Opportunities

- Existing lake area is the lowest point in the site which is ideal for storing water on site
- Park area is ideal for designing a system of swales to direct storm water runoff

Design Principle: Increase water retention, water efficiency and reduce storm water runoff
Goal 1: Manage and celebrate storm water on site

Objectives:

- Restore the existing lake area at the lowest point in the Park, and convert it into a detention pond. Daily flow of treated water from solar aquatic facility will ensure to keep the detention pond topped up during dry season.
- Through a system of swales, storm water will be re-infiltrated to the site, and the swale will meander its way though the site before reaching a large detention basin located at the south end of the site.
- Provide for green roofs and rainwater harvesting systems in the housing and community building.
- It is proposed to have butterfly roof structure for the performance area and a similar structure all along the sculpture avenue that will act as a showcase for rainwater harvesting.

Goal 2: Treat waste water on site

Objective:

- Provide for solar aquatic facility to treat wastewater from the officer’s housing. This will make an impressive visual presence in the park and will invite more visitors; as such a bold move to treat wastewater will be one of the first attempts in the city of Bangalore.
- Provide bio filtration ponds to clean water using plants.

Goal 3: Maximize Infiltration and creative approaches to storm water management across the site

Objectives:

- Provide permeable parking lots
- Provide for vegetated infiltration basins in the open spaces in the housing region
- Pavement in sculpture avenue and all other hard surfaces to be made of permeable materials
5.4.3: Economic Prosperity

Issues

High cost of maintenance

Opportunities

- High real estate value of land, hence has good potential for generating income
- Close to civil and Army offices, main shopping plazas of the city, hence good potential exists for buying and selling
- This is the main area for tourist flow. So good potential to promote the site as a tourist destination.

Principle: Meet needs at the lowest costs

Goal 1: Maximize revenue from the Park

Objectives:

- Provide for housing in the Northwestern corner of site thereby adding to the revenue of the park and to pay its maintenance cost
- Provide a village market, or Haat thereby adding to the revenue of the park. This will make cariappa Park one of the most favored destinations for local citizens and the many tourists, which in turn will bring in revenue as well.
- Provide a plant nursery thereby adding to the revenue of the park at the same time attract lot of plant lovers to the park.
- Remove all exotic plants and replace with native plants that require low maintenance

Goal 2: Maximize recycling of resources and waste materials

Objectives:

- Use recycled materials for public art sculptures, park benches, etc.
- Recycle all waste produced in the Park by providing composting facility.
Chapter 6: Creating Sustainability together - The Design

6.1 Proposed program

Based on the research on sustainable principles, goals and objectives of the project, precedent studies, and detailed site analysis the following programs have been identified (Figure 6.1).

Social and community health

- **Social activities**
  - Haat (village market)
  - Entrance plaza
  - Parking
  - Outdoor gym
  - Plant nursery
  - Community garden
  - Sports area
  - Community centre
  - Memorial area
  - Children’s experiential play area
  - Sculpture promenade
  - Bandstand / Performance area
  - Picnic area
  - Walking trail

- **Education**
  - Washrooms (composting toilet)
  - Experiential play area
  - Community garden / Compost unit
  - Sculpture promenade
  - Rainwater harvesting from rooftops
  - Grassed swales
  - Bio filtration ponds
  - Edible landscape
  - Signage highlighting sustainability awareness,
  - Functional works of art
  - Sculptures

- **Economic prosperity**
  - Housing
  - Haat (village market)
  - Community garden / Compost unit
  - Solar aquatic
Plant nursery

- **Water quantity and quality**
  Storm water detention pond
  Grassed swales
  Solar aquatic
  Rainwater harvesting from rooftops
  Biofiltration pond

**Figure 6.1**

6.2 Program relationships

1. Entrance
   a) Parking; b) Washroom; c) Community centre; d) Walking trail; c) Sculpture promenade

2. Parking
   a) Entrance plaza; b) Haat; c) Community centre; d) Walking trail; e) Sculpture promenade
3. Washrooms  
   a) Entrances; b) Community centre; c) Haat; d) Sports area;  
   e) Performance area; f) Walking trail  

4. Community centre  
   a) Washroom; b) Parking; c) Entrances; d) Walking trail; e) Sports area  

5. Sports area  
   a) Community centre; d) Washroom; e) Walking trail  

6. Experiential play area  
   a) Storm water detention pond; b) Solar aquatic; c) Plant nursery;  
   d) Walking trail; e) Grassed swale  

7. Storm water detention pond  
   a) Experiential play area; b) Grassed swale; c) Solar aquatic; d) Plant  
   nursery; e) Walking trail  

8. Grassed swale  
   a) Storm water detention pond; b) Solar aquatic; c) Experience play area;  
   d) Children’s play area  

9. Memorial area  
   a) Parking; b) Community centre; c) Walking trail  

10. Housing  
    a) Solar aquatic; b) Community garden; c) Outdoor gym; d) Children’s  
    play; e) Rain water harvesting  

11. Children’s play area  
    a) Housing; b) Community garden; c) Walking trail; d) Washrooms  

12. Community garden  
    a) Housing; b) Children’s play area; c) Solar aquatic; d) Walking trail  

    Solar aquatic  
    Grassed swale; b) Walking trail; c) Plant nursery; d) Experience play area  

14. Sculpture promenade  
    a) Entrances; b) Walking trail; c) Haat d) Housing; e) Parking  

15. Walking trail  
    a) Entrance; b) Community centre; c) Memorial area; d)  
    Bandstand/performance area; e) Children’s play area; f) Community
garden; g) Solar aquatic; h) Washrooms; i) Sports area; j) Sculpture promenade; k) Experiential play area

16. Haat
   a) Entrance; b) Washrooms; c) Sculpture Avenue; d) Performance area; e) Parking; f) Community centre; g) Walking trail

17. Bandstand / Performance area
   a) Haat; b) Washrooms; d) Community centre; e) Walking trail

18. Rainwater harvesting from rooftops
   a) Housing; b) Community centre; c) Swales; d) Storm water detention pond

19. Plant nursery
   a) Storm water detention pond; b) Solar aquatic; c) Haat; d) Grassed swale

6.3 The Master Plan (Figure 6.2, 6.3)
The Golden Palm Officer's Colony.

One of the major reasons for the park to fail was the lack of financial support for the park maintenance. In order to bring in more revenue, The Northwest corner of the park adjacent to Cubbon road and St Marks road has been chosen for the layout of the officers' housing, and would be named Golden Palm Officer's Colony, after the gold palm insignia of the Army sub area which manages the Park. The 4 storied units, some of them facing the park, would contribute to public safety by adding more "eyes on the park". A one-way residential road entering from St Marks road, and opening to Cubbon road, would be equipped with parking spots, thus bringing people into the park and allowing for much-needed parking for park visitors. A courtyard would be created within the centre of the housing units. This courtyard would houses an outdoor gym, a children's play area (with adequate shelter and benches for supervision), a garden for passive recreation and a community gathering space for the residents of the colony. The ground floor of the housing units would be allotted for parking, utility and for recreational activities that could be used as shelter during times of inclement weather. There would be
6 units, 57 car parking spaces, and 33 scooter parking spaces in total and average the unit size is about 110 sq. meters.

Value of adding the housing here is not only to generate income but also for safety, to keep the park open to everybody free of cost (equal access of the site), and to cater for more mixed city function thereby reducing automobile travel distance (decreasing resident's travel needs).

**Sculpture Avenue**

This Avenue, extending from the St Marks road main gate along the main east west axis of the park is designed as a narrative element. This promenade will span 8 meters in width to accommodate a minimum of 6 to 7 people, reflecting the need for a social strolling facility, which was lacking in original design for Cariappa Park. The avenue will be lined with flowering trees and benches, providing the users with resting spots, which in turn would encourage more social interaction and contribute to community cohesion.
Sculptures are placed all along the avenue. All the sculptures would be made from recycled urban waste, which highlight the fragility of the environment, and the need for conservation of the earth's natural resources. Another attraction to the avenue will be a rainwater harvesting structure leading the park visitors along the walkway to the performance area and haat. Designed with a butterfly roof this structure will echo the structural and functional commonality with the roof of the performance area both designed as rainwater harvesting structures (Figure 6.4). As the avenue is adjacent to the solar aquatic and sculptures it will also serve as a showcase for sewage treatment, rainwater harvesting and urban waste recycling (Fig 6.5).

Experiential play area for children

This area, set in the lower southwest corner of the Park is intended to promote creative play for children. Considering the proximity of both the Army school and the Stracey Memorial School, this area would be well used by school children. It is intended for use as both as an outdoor classroom for interacting with landscape and for creative play.

The play area would include grassy mounds, ideal for encouraging games such as "King of the Castle" or "Capture the Flag". It would also serve to foster developmental skills such as rolling or walking on an incline. Provision will be given for encouraging unstructured play by providing wooden platforms of 5’ x 5’ in size that would be spread across the swale and tucked into nooks. These platforms could be used by children for impromptu drama shows or story telling (Fig 6.6.) Stepping-stones, buried in the grass,
would provide for optional informal play activities such as hopping or jumping games. Trees would be chosen for their unique looking features that would be memorable and intriguing for both the young and the old, and would be considered for such qualities as the suitability of their branches for climbing, interesting looking seed pods or edible berries. Benches, intended for those supervising the children, would be provided along the periphery of the play area.

Keeping with the Army’s accent on fitness, children would be provided with a number of fun and physically demanding opportunities for activity including obstacles courses, tunnels, tree stump rings for climbing, tree houses, Tarzan swings, balance
beams for walking along and crawling under, or any number of activities imagined by a child.

The goal is to demonstrate that play environments can be created at low cost, and yet also provide health and educational values that far exceed the relative costs of traditional play equipment and learning ground designs. The grassy swale would pass through this plays cape. As the water level in this swale naturally rises and falls, children would be made aware of the role that the site plays in reinfiltrating storm water back into the natural system. A native plant wildlife habitat would be incorporated in this area for nature study. Plants would be carefully chosen to be conducive for nectar and larval butterfly habitats, with the inclusion of different plants that highlight smells, tastes, and leaf/flower shapes. Edible landscape plants/trees would be added into this space through a kiwi tunnel, raspberry arbour and through the inclusion of fruit orchard of guava, mango, custard apple, gooseberry etc. Children from the above mentioned schools could participate in the yearly harvest and in planting and propagation activities. This area would become a great outdoor classroom of the neighbouring schools.

**Solar aquatic system**

A state of art solar aquatic facility would be located near the main entrance of the site. This would involve a bold move in treating wastewater from the 98 units of the Golden Palm Officers Colony. Additionally, it would also be the first step taken towards creating a sustainable urban model for wastewater treatment in Bangalore. A specially-designed green house named ‘The Manekshaw Pyramid’ would clean the wastewater. The green house would have a pyramidal Shape, which would provide a simple volume
with reduced surface area for energy conservation, and take into consideration solar exposure, shading, and views from the surrounding area. All wastewater from the residential block would be collected and pretreated in a small underground mechanical-biological sewage treatment plant. It would then be pumped to the Pyramid, and processed through a series of biological tanks. Each tank would represent a different level of biological breakdown (from algae to plankton to fishes and mussels). After leaving the last tank, the water would be pumped to the swale leading to the detention pond. The Manekshaw Pyramid would be an impressive visual presence showcasing an intensive ecological system, that treats waste water and supports aquaculture and horticulture. This would also serve as a great educational tool and would attract a number of visitors, including tourists, to the Park.

**Cariappa Haat - Village market** (Figure 6.7)

A traditional art, craft and food market, which would be named Cariappa Haat would be designed...
to cater to diverse activities and events of different sizes. Spread over an area of 2500 sq meters, the Haat would be located between the Park and parade ground at the eastern edge of the site. Two entry plazas, one at MG road, and one at Cubbon road would invite visitors into the Haat. The Haat would offer visitors the opportunity to see and buy arts and crafts from different parts of Karnataka, as well as to taste cuisines and witness performances from different parts of the country.

The arts and crafts area would be set up on platforms located at the northern end of the Haat, with 14 permanent stalls and 20 temporary stalls of 4 m² in size. The food plaza would be oriented towards the south end of the Haat, with 8 permanent stalls 4 m² and 15 temporary stalls. The placement of the food plaza at the south end would facilitate the separation of the food area from the craft area, and would also allow people to walk down into the picnic area around the detention pond (Fig 6.7)
A pathway paved with pervious cobblestones sloping towards a central line of granite stones (Fig 6.8) would drain all the water from the Haat and community center rain chains into a water collecting point at the south end of the Haat (Fig 6.9). A swale would then empty excess water into the detention pond. Focus would be placed on promoting organic foods and produce grown and sold at the market by local farmers. The primary aim would be to support local farmers and to conserve traditional crops and plants that are being pushed towards extinction. Selling them at the Haat would secure their continued existence and make them available to the urban public of Bangalore. The Haat (or village market) would also be used as a venue for regional food festivals. It would simultaneously help to generate revenue, add to a colourful urban life, and support the local economy by promoting local business and craftspeople.

The performance area/band Stand (Figure 6.10)
Located at the western end of the Haat, in an area 900m\(^2\), this space would offer a venue for cultural performances from different parts of India. The performance area will have a roof, sheltering the performers in case of bad weather. The structure would be designed as a butterfly roof to harvest rainwater (Fig 6.10). There would be a ‘green room’ for the performing artists to get ready, and a space to store chairs to accommodate the audience. Seating would be provided through a seating wall and removable chairs. The stage could additionally be used for ceremonial Army Band performances. Such performances were traditionally hallmark events in all parks in Bangalore and have strong historical roots in this city from as far back as Colonial times. The performance area would be designed as a flexible space for a great variety of activities. The performance area could, for example, be used as a venue for outdoor community meetings, summer movie nights, and annual Army events like the May Queen Ball, community talent shows or other social gatherings.

**Community Garden**

The community garden would be located in an area of 1160m\(^2\) at the southwest end of the Park (Figure 6.11). It would be located close to the housing units and the main entrance, and would be well connected to the Park. Three by two meter plots would be allotted to community members.
and residents of the officer’s colony. A gazebo of 3 m$^2$ is located in the centre and would provide space for social interaction and resting. There would be a tool shed for storing tools, and a compost pit for decomposing the leaf litter and other Park wastes. An herb and medicinal plant garden would also be provided in the community garden. Espaliered fruit trees would be planted along the edges of the fencing. The community garden, along with all these elements would aspire to bring in more social activity, and serve as an educational tool for children as well as all members of the community. It will also help to build in a sense of community, local spirit and pride.

Sports Area

Taking into consideration the need for active recreation space for the army officers and youth, a sports field would be provided in the central area of the park. This region was chosen because it is very flat and almost devoid of any vegetation. The field would be equipped with two badminton courts and a basketball court. Trees would be planted on both the west and east sides of the sports field to provide shade. The area would be paved with permeable paving and benches would be provided in a north-south orientation.
Community centre

Located close to the entrance plaza at Cubbon road and the parking area, the old Park Office would be converted into a community centre, which would house the main offices for Park management, as well as serving as a centre from which to coordinate the many community-based activities and programs for both adults and children like painting and dance lessons, Martial art sessions, yoga camps etc.

An effort would be made to celebrate the aesthetic and sensory qualities of rain through rain chains, a series of connected copper funnels that would hang from the gutters on the roof of community center, and would direct runoff from the roof into the Park (Figure 6.12). As rain would fall, it would make a pleasant tinkling sound against the funnels. The rain chains would drape over the sides and corners of the building, enhancing the aesthetic and sound qualities of cascading water on rainy days. They would hang down to ground level with a weight buried in the pebbles, keeping the chain taut in the wind. Thus, the rain chains would function in helping to break the fall of the water, guiding it visibly downward onto a drain covered in pebbles.
Plant nursery

Bangalore is known for its gardens and garden lovers. It is therefore proposed to have a nursery located near the detention pond (Figure 6.13). This nursery will house two green houses and will be used to produce seedlings of various ornamental plants. Espaliered apples will be adding to the beauty of the fences. The plants produced in the nursery will be sold through the stalls located in the Haat area closer to the Parking. This nursery can also serve as a learning ground for plant propagation techniques.

The Memorial

It is proposed to preserve the original memorial area (Figure 6.14). The memorial house with the eight-foot granite statue made by the shilpis (craftsmen) from shivarapatnam, Bangalore would be
maintained with a formal garden around. The pathways leading to the memorial will have bricks engraved with the names of those soldiers who have made significant contributions to the Bangalore cantonment.

The swale and Detention pond

The swale system will act as a natural drainage system of the park. The main drainage swale is designed to collect and rein filtrate storm water and treated wastewater from the Golden palm officer’s colony from the western end of the Park and meander its way through the children’s experiential play area before reaching the large detention basin at the southern end of the Park. While running down this swale system, storm water will slowly seep back into ground water system. Water from the north end of the Haat area will be drained to the south end through the pavers and taken through another swale to the detention pond. The area around detention pond will serve as a good setting for picnics and for other passive recreational activities. The swale system makes the ecological process visible and would remind the public that the city is a part of natural environment. During dry months the daily discharge from Solar aquatic facility will help to keep the pond with adequate water for irrigation requirements of plant nursery. During heavy monsoon, the overflow valve in the detention pond will help direct water away to the storm sewer pipes.
The Gates (Figure 6.15)

Four separate gateways would lead onto the site, and all four would be accessible to the public. Two of them would be directed towards the Park, and the other two, to the Haat. The main entrance to the park would be on St. Marks road, and would be known as Kanteevara Gateway, echoing the name of Kanteevara Stadium, a stadium that is located close by (Fig 6.15). The second entrance would be at the corner
of St Mark’s road and MG road, and would be named Kempe Gowda Gateway to commemorate the great ruler of Karnataka. The entrances to the Haat would be respectively on MG road and Cubbon road. The entrance of the Haat at MG road would be named the South Parade Gateway in memory of the South Parade, the name by which MG road was known in colonial days. The gate of the Haat at Cubbon Road would be named Lt. Blakiston Gateway, after Lt. John Blakiston, a British Army officer, who first levelled the parade ground from a tank to its present condition. This gateway, unlike the other three pedestrian entries, would incorporate a vehicular entryway. In addition, smaller gateways would be added at 50-meter intervals by creating wall punctures to the existing wall at MG road and Cubbon road and St Mark’s road. A hierarchy would be maintained in the gate structures in order to easily differentiate between the different gates. All the gateways would be designed using traditional architectural forms and as such would help to increase the legibility of the site. Together with their names, they would connect the Park to the rich cultural past of the city.

Enhanced promenade

![Figure 6.16](image)
The promenade alongside MG road was known as South Parade Boulevard in colonial times. It was one of the most famous and celebrated roadways of the Civil & Military Station, Bangalore. A cool and comfortable place for shoppers and families to spend time, this project proposes to enhance the promenade by adding additional benches, drinking fountains, streetlights with hanging flower baskets, garbage receptacles and bicycle stands (Figure 6.16). MG road is a busy road with heavy traffic. A 1.5 m wide sidewalk and 7 new cross walks would be added to allow for safe pedestrian access to the park and enhance connectivity of the Park to surrounding area. The paving material would consist of pervious concrete to allow for maximum filtration of storm water. Local artists would design all the street furniture.

6.4 Detail Design

The area chosen for detail design is the Golden Palm Officers Colony, which would be the Park’s newly added residential area (Figure 6.17). A 4 m wide one-way residential road between St Mark’s road and Cubbon road would be designed and built. Side parking, which would provide much needed parking for the Park would be located along this area.

This road would also serve to separate the housing units from the Park. The entrance to the residential area would be from St Mark’s road through the new gateway, which would be named Golden Palm Gateway. This residential area would include 4 building blocks, of four floors each, with a courtyard in the centre. A half
portion of the ground floor of the buildings (except for one building in the western corner) would be designated for car/scooter parking. Fifty-seven stalls would be allocated for car parking, and 33 for scooter parking. The other half of the ground floor would be allotted for utility and recreational activities. A half wall with planters would separate the parking space from the sheltered recreational space (Figure 6.17, 6.18).

Figure 6.17
would be designed with a curvilinear bench with a seating wall (Figure 6.19). This wall would have several planters with shade loving plants such as Coleus, Chlorophytum, Pothos, Dieffenbachia, and Hosta. The other half-portion would be assigned as a tiny tot play area, with benches provided for supervision. All the entryways to the building would be clearly demarcated using colored granite
The recreation area under Block C would be designed as seating steps. (Fig 6.20)

This would allow for people to sit and watch community activities or stage performances taking place in the community activity area of the courtyard. This block would also accommodate 3 ping-pong tables. The recreation area under Block D would be designed with a curvilinear seating bench and a few multifunctional tables. These tables would be designated as utility areas for officers’ orderlies and would serve as places for the ironing of uniforms, polishing of shoes, and the decorating of uniforms etc. The other half, would function as the security guard lunch or coffee break room and utility area for electrical fittings. The central courtyard
would be designed with a swale running through the centre of it to direct storm water to the main swale of the Park (Figure 6.21).

Additionally, there would be an outdoor gym at the south end of courtyard with a long jump pit, monkey bars, balancing beams and a rock climbing structure. Placing the outdoor gym in this courtyard would allow easy access and privacy to the main users - the officers and seniors living in the residences. A community activity area would be placed diagonally opposite the outdoor gym across the swale. This area would provide possibilities for an endless variety of activities such as during Bada Khana (grand buffets and barbeques), community talent shows, movie nights and for performances during festival times such as during the Spring Festival, Vasantha Habba. A 1.5 m wide east-west pathway lined with Ashoka trees would run along the swale, and would function to divide the community activity area from the children’s park at the northern corner of the courtyard. The children’s park would be outfitted with play equipment and playhouses. Benches would be provided for supervision, and hedge plantings would further add to enclose the area. A 2 x 2 m wooden gazebo would be erected, again facilitating sheltered play activities.

The western corner of the courtyard would be designed as a passive recreation area. Tables and chairs would be provided for playing card games, board games, chess or reading. A central, semi-circular wooden arbour would function as a focal point with fragrant climbing plants such as Jasmine, Petria etc.

A 4 wide driveway, paved with gravel pavers would run from Golden Palm Gateway to the exit at Cubbon road. To demonstrate storm water management, 2
vegetated infiltration basins or rain gardens would be featured at the southern end of the residential area. A vegetated infiltration basin is a landscaped depression that accepts storm water runoff from impervious surfaces, and is similar aesthetically to a planter box (Figure 6.22). These basins allow pollutants to settle and filter out, and also provide the opportunity for infiltration. The two trenches, lined with recycled PVC, and filled with gravel would be designed as a subsurface biological marsh, planted with reeds, sedges and irises. Storm water run-off would be purified by natural processes and would be released gradually into subsurface. During overflow, an underground pipeline would carry the water into the Park’s main swale.

*Figure 6.22 Vegetated infiltration basin*

The Master plan is produced based on the guidelines developed using the sustainability Matrix. This relationship and Implementation of guidelines is discussed in next chapter.
Chapter 7: Design Evaluation and Conclusion

7.1 Design Evaluation

The failure of existing park resulted from totally ignoring the natural processes of landscape, lack of the careful consideration to the cultural and economic condition of the site and not considering the financial viability of the project. Hence, attempts are made to re-evaluating these dimensions of the park and improving them according to current precedents. Major focus was given for improving sustainability and the environmental and cultural 'vibrancy' of the park.

To connect the concept of sustainability to the project, sustainability matrix (Holland, 2003) was used as a planning tool to develop framework and an evaluative context. This helped to come up with specific criteria that combined increased sustainability with both functional and aesthetic goals for the Park. While coming up with a re-development plan that emphasized increased sustainability, attention was given to incorporate changes to the aesthetic complexion of the park, keeping with contemporary standards and with its’ immediate culture.

7.1.1 Design response to Economic prosperity

- Goal 1 Maximise revenue from the site

Adding housing adjacent to the KK&G sub-area helps to reduce officer’s commuting needs that indirectly contribute to the degradation of the environment. This proposed new park program not only brings more people into the Park, but also contributes economically to its operation. In addition, these elements are designed to
have minimal ecological impact on the site, thus also promoting ecological success to the Park. Additionally, the residential area adds “eyes-on-the-park”, adding to safety and also generating money so that the Park can be open to the public. The Proposed village market together with plant nursery would also simultaneously help to generate revenue, add to a colorful urban life, and support the local economy by promoting local business and craftspeople.

- Goal 2 Maximize Recycling of Resources and waste
All the sculptures in the sculpture avenue would be made from recycled urban waste, which highlight the fragility of the environment, and the need for conservation of the earth's natural resources. Local artists would design all the street furniture. Using recycled waste products

7.1.2 Design response to Social and community Health

- Goal 1 Connect Park to the surrounding area
The Proposed sidewalk new cross walks crosswalks across MG road will allow for safe pedestrian access to the park and enhance connectivity of the Park to surrounding area. The enhanced Promenade with inviting benches and street furniture like drinking water fountain, trash bins, Bicycle stands, Street lights will all contribute to make the park inviting. Addition of a one-way residential road with side parking also will make park accessible to more people and provide for the much-needed parking for the park. The four new gateways and the wall entryways again make the park more easily accessible Park. All the gateways designed using traditional architectural forms will help
to increase the legibility of the site. Together with their names, they would connect the Park to the rich cultural past of the city.

- Optimize socialization while retaining flexibility for larger social functions

The performance area is designed as a flexible space for a great variety of activities as a venue for outdoor community meetings, summer movie nights, and annual Army events and other social gatherings. The sculpture avenue lined with flowering trees and benches will provide the users with resting spots, which in turn would encourage more social interaction and contribute to community cohesion. The community garden, along with all these elements would aspire to bring in more social activity and to build in a sense of community, local spirit and pride. The sports activity area and outdoor gym in housing area also provide for active recreation space for the army officers and youth. The community center will serve as a centre from which to coordinate the many community-based activities and programs for both adults and children.

The proposed culturally rooted elements such as the village market, army band local folk art performance and a plant nursery, will turn Cariappa park into a domain of active/passive experience providing social and psychological services which are of crucial significance for the livability of modern cities.

- Goal 2 Provide Opportunity for Education

Butterfly roof structure of Sculpture Avenue share a structural and functional commonality with the roof of the performance area both designed as rainwater
harvesting structures, which will serve as an educational element. As the sculpture avenue is adjacent to the solar aquatic, it will also serve as a showcase for sewage treatment, rainwater harvesting and urban waste recycling. Children's experiential play area would become a great outdoor classroom of the neighboring schools. The swale system makes the ecological process visible and would remind the public that the city is a part of natural environment. All these elements together serve to educate and inspire the park visitors.

7.1.3 Design response to water Quantity and quality

- Goal 1 Purify wastewater on site

Solar aquatic facility and the vegetated infiltration basins will serve to purify water on site. The proposed solar aquatic system will also serve to attract the public, inviting them to observe and learn from the display and will promote it as a tourist destination.
• Goal 2 Manage and celebrate storm water on site

In India, where there is enough rain for collection, and conventional water resources are at risk of being over-used, rainwater harvesting can provide lifeline water for human consumption and irrigation. Through the rain chains that will be incorporated into the community center roof system in the proposed design, one will actually be able to see the water as it clings to the chains as it makes its way down to the ground. The Butterfly roof structure of the performance area and Sculpture Avenue, designed to collect rainwater will provide a visual appeal as people walk along. Surface water management using a system of swales will also provide a visual cue as to the hydrology of the site. All these elements will bring in awareness among citizens that rainwater is an invaluable asset that must be celebrated and cherished, and not allowed to be wasted as runoff.

• Goal 3 Maximize water infiltration

Vegetated infiltration basins and swale system, pervious pavements on all hard surfaces and parking will help to maximize water infiltration in the site.

As opportunities for reducing consumptive water use are embraced and integrated into the site design of Cariappa Park (Figure 7.1), the design community can in turn transfer this knowledge to the public, so that sustainability becomes nothing more and nothing less than common sense
7.2 Design response to sustainability—Comparison

The new design has thus attempted to employ a number of different ways to reduce the need for resources and to increase self-sufficiency. The following table compares sustainability criteria in the existing and proposed designs.

### Existing Cariappa Park Design

*Table 2*

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<td>×</td>
</tr>
<tr>
<td>Memorial area</td>
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<td>×</td>
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<td>×</td>
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<td>Rock garden</td>
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</tr>
<tr>
<td>Pathway</td>
<td>×</td>
<td>×</td>
<td>×</td>
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</tbody>
</table>

• directly supports ○ indirectly supports × no support
### Proposed Cariappa Park Design

- Directly supports  ○ indirectly supports  × no support

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<td>○</td>
</tr>
<tr>
<td>Village market (Haat)</td>
<td>●</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Parking</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sculpture avenue</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Community center</td>
<td>●</td>
<td>○</td>
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</tr>
<tr>
<td>Performance area</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>Community garden</td>
<td>●</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Experience play area</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Plant nursery</td>
<td>●</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Detention pond</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Solar aquatic</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Enhanced promenade</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Gates</td>
<td>●</td>
<td>×</td>
<td>×</td>
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<tr>
<td>Memorial area</td>
<td>●</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Pathway</td>
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</tbody>
</table>
From the comparison above, it is apparent that the proposed design surpasses its existing condition. Urban Parks fulfills many social functions and psychological needs of citizens, which make such parks a valuable municipal resource, and a key ingredient for city sustainability. (Chiesura, 2004) The new proposed design intends to bring in sustainability principles that are socially and culturally feasible and also keeping the synergy between sustainable landscape design and reduced park maintenance.

7.3 Conclusion

Cariappa park redesign is thus intended to rejuvenate the Park space and inspire its population of visitors to create a healthier and more beautiful world that is both sustainable and ecologically sound. The new design will help Cariappa park to provide many social, ecologic and economic services to its user and will serve as a valuable municipal resource and key component in city sustainability. The Park, which for the last few years has been a dead space, will surely make a specifically strong impact on those who will have witnessed its evolution. It is hoped that through exhibiting the possible options for sustainable and ecological design, visitors will be inspired to promote or incorporate these types of elements into existing or future projects within the spheres of their lives. In this way, Cariappa Park will serve as a model sustainable Park helping local planners to envision more such projects contributing to the well being of the citizens and for the sustainability of the city they live in.
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