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Review Paper

Green Infrastructure Planning and Development for Sustainable Urban Development: A Literature Review

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Abstract
The concept and application of Green Infrastructure (GI) is rapidly becoming world's conservation and planning agenda at various level of the development of nations. It is a strategic approach to build sustainable urban development by tackling the current urbanization and over population pressures and problems on urban GI resources, which are the present challenges that faces our cities and towns. As a result, GI provides social and ecological responses in the wider sense of the term to support decision makers on the development of urban planning and conservation activity. This approach has the potential to achieve sustainability and resilience goals over a range of outcomes in addition to climate adaptation. Therefore, the main objective of this review document is to examine the existing experience of GI planning and development activities throughout the world. There are a number of articles and publications which are discussed about the planning and development approach of GI at different level. This paper demonstrates a structured and common definition of GI, which is collected from various authors and best practice and guidelines for GI planning and development. The paper also examines different techniques of GI planning and development frameworks at micro and macro scales that can be used by different urban planners in the future as baseline information.

Key words: *Green Infrastructure, Planning, Sustainable urban Development, Approaches and Principle.*

Introduction

The concept of Green Infrastructure (GI) is rapidly becoming ensconced in land use planning. Studies from developed nations showed that, GI provides environmental evidence to inform development plan production, as well as serving as a practical means of delivering sustainable development (Natural England, 2012). Hence, GI planning represents a strategic approach to conservation that combines the efforts of previous conservation planning methodologies and practices into a systematic framework that can encompass larger landscapes and broader planning goals (McDonald et al., 2005). However, there is still considerable confusion and uncertainty about what GI is what value it adds and how it can be achieved and delivered on the ground (Natural England, 2012).

Sustainable urban development seems to be nowadays the main challenge facing our cities in the 21st century (Benedict and McMahon, 2002). It is comprised of many different aspects regarding the social, economic and environmental stability of society (Martyna, 2013). Greening is the distinctive concept of the most sustainable urban form of the eco-city, which emphasizes urban greening, ecological and cultural diversity, and passive solar design (Rafeq, 2006), that mainly focuses on environmental management and other key environmentally sound policies (Martyna, 2013). Generally, GI is one of the most important terms when we think about planning the contemporary city (Benedict and McMahon, 2002), that interlink the network of green space which conserves natural ecosystem values and functions and provides associated benefits to human populations (McDonald et al., 2005).

Thus, this paper is a desk-based review of a number of articles which is conducted in different part of the world and basically focused on green infrastructure planning, and development approach and strategies at micro and macro level. The aim of this paper is to examine a various literatures of diverse research areas that have various concept and ideas on GI planning, development and management issues. A review will also be made assessing the past history of the concept and how historical prototype projects are still prominent to the GI concept (Mell, 2008).This paper provide a structured and common definition for GI which is collected from various authors and best practice guidelines for GI planning and development. The paper also examines different techniques of GI planning and development frameworks at micro and macro scales that can be used by planners in the future as a guideline (McDonald et al., 2005). Therefore, this review document starts by defining Green Infrastructure (GI) in the context of various literature reviews.

What is Green Infrastructure (GI)?

Most people think of infrastructure as roads, sewers and utility lines (gray infrastructure); or as hospitals, schools and prisons (social infrastructure). But today, many people and organizations are talking about another type of infrastructure, which is known as GI (Benedict and McMahon, 2002). However, the term GI means different things to different people depending on the context in which it is used. Because of this, it has many definitions used by authors working on the concept (Kamalludin et al., 2014 and Mell, 2010). Literature shows that, in most academic and practitioner research, the definitions used by an organization or an author relate directly to the focus of their own GI research (Mell, 2008; 2010). For instance, conservationist authors may strongly emphasize the ecological

and biodiversity components (Ahern, 1995), whereas the planners may view the concept in terms of policy implementation (Benedict and McMahon, 2002and Mell, 2010), and recreational, greenway and GI specialists may focus on the benefits gained through development (CABE Space, 2005a). Even though, GI is a term which has grown in use in recent years and the definitions vary from expert to expert, most stakeholders agreed on the following, *"GI is a network of multi-functional open and green space in and around towns and cities the gardens, trees, rivers, woodland, parkland, nature reserves and urban wild space, and the access to and through them, which support wildlife and biodiversity, provide recreation, access and leisure opportunities and create a sense of place"* (MacDonald *et al.*, 2005 and Kevin Sullivan, 2010). In addition to the above definition, there are common themes which various authors use (Mell, 2010).Thus, the Countryside Agency (2006) put one definition which provides an insight into the complexity of the GI concept by noting the roles of connectivity, multi-functionality and the development of better ecological, economic and social places across a number of scales as prominent elements of the concept (Benedict and McMahon, 2002; Mell, 2010 and Alana, 2011).

*GI comprises the provision of planned networks of linked multifunctional green spaces that contribute to protecting natural habitats and biodiversity, enable response to climate change and other biosphere changes, enable more sustainable and healthy lifestyles, enhance urban livability and wellbeing, improve the accessibility of key recreational and green assets, support the urban and rural economy and assist in the better long-term planning and management of green spaces and corridors (*Countryside Agency, 2006*).*On the other hand, the following table illustrates the various definitions of GI which are provided by different authors at different times.

Table1: The Various Definitions of Green Infrastructure (GI)

Authors (references)	Definitions
Natural England (Natural England, 2010).	GI is a strategically planned and delivered network of high-quality green spaces and other environmental features. It should be designed and managed as a multifunctional resource capable of delivering a wide range of environmental and quality-of-life benefits for local communities. GI includes parks, open spaces, playing fields, woodlands, allotments and private gardens.
Ahern, J., 2007, Green infrastructure for cities: The spatial dimension.	GI is a concept that is principally structured by a hybrid hydrological/drainage network, complementing and linking relict green areas with built infrastructure that provides ecological functions. It is the principles of landscape ecology applied to urban environments
EEAC, 2009, Green Infrastructure and Ecological Connectivity	GI is the actions to build connectivity nature protection networks as well as the actions to incorporate multifunctional green spaces in urban environment
(Benedict and McMahon, 2002).The Conservation Fund's GI Leadership Program	GI is a strategic approach to land conservation, a smart conservation that addresses the ecological and social impacts of sprawl and the accelerated consumption and fragmentation of open land.
Landscape Institute, 2009. GI Position Statement.	GI is an approach to land use, underpinned by the concept of ecosystem services. Green assets such as parks, coastlines or embankments have generally been thought of in terms of their single functions the approach that recognizes their vast range of functions and their interconnectivity is called GI.
Commission for Architecture and Built Environment (CABE, 2011b).	GI is the network of natural places and systems in, around and beyond urban areas. It includes trees, parks, gardens, allotments, cemeteries, woodlands, green corridors, rivers and wetlands.
Benedict, M. and McMahon. E., 2006, GI Linking Landscapes and Communities.	An interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife.
Epsom &Ewell GI Study 2013	GI (GI) is a term used to refer to the living network of green spaces, water and other environmental features in both urban and rural areas. It is often used in an urban context to cover benefits provided by wildlife, trees, parks, gardens, road verges, allotments, cemeteries, woodlands, rivers and wetlands.
CLiGS-NARC, I2013. Greening the Grey	GI thinking and planning brings together planning, natural resource, ecological, and sustainable development concepts to provide a systems approach to infrastructure planning and development that recognizes the value of ecosystem services, and integrates those ecosystem services within the built environment.
European Union, 2013. Building a GI for Europe	GI can be broadly defined as a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings.

How Green Infrastructure Started?

The majority of the world's populations now live in cities (World Bank, 2010). This poses great challenges, but also great opportunities in terms of tackling climate change, resource depletion and environmental degradation (Tim, 2011*)*. Now urbanization is a defining feature of humanity's development trajectory: in 1800 less than 10% of people on the planet lived in urban areas, in 2000 it was 50%, by 2050 it could be 75%, and in the US it is already over 80% (Kimmel *et al*., 2013). Accordingly, policy agendas have been formulated on how to develop and maintain integrated sustainable urban development and various theoretical frameworks of urban transition to help our thinking and understanding in both developed and developing countries (Tim, 2011*)*. However, due to lack of informed valuations of environmental resources, financially as well as socially, ecological resource bases in urban landscapes are often marginalized (William, 2014). Therefore, in response to urbanization and over population pressures and opportunities (World Bank, 2010), cities will double in size by 2050, adding 400,000 square kilometers of built area and requiring an almost unimaginable amount of new utilities, roads, roofs, and markets and urban infrastructure systems (Kimmel *et al*., 2013).

Thus, to tackle the above problems, GI has become established as the central approach to landscape planning and grown in prominence since it was first discussed in the late 1990's. This activity was well known in the UK, Western Europe and North America, which have championed the process (Mell, 2008).Hence, over the last decade GI has developed as an approach to landscape planning that addresses the fragmented thinking associated with urban development. This planning agenda has brought together planners, ecologists, architects and developers who have proposed a holistic and functional understanding of the ecology of urban environments (Mell, 2011), consequently, bringing together a number of disciplines to form a coherent landscape resource based approach to environmental management (Natural England, 2009and Mell, 2011).Despite the fact that, various scholars argued that the term GI is a new term, but not a new idea. It has roots in planning and conservation efforts that started 150 years ago. According to Benedict and McMahon, the concept is developed from two important precedents. The first one is the linking of parks and other green spaces for the benefit of people, and the second is the linking of natural areas to benefit biodiversity and counter habitat fragmentation (Benedict and McMahon, 2002).Moreover, GI's are typically integrated into the process of urban greening and may follow different approaches to attack urban planning and sustaining green cities (Beauchamp, 2013).

Why Do We Need Planning for GI?

Urbanization has profound effects on the build-up of a city as well as the quality of life of residents as a whole. It is generally recognized that in an urbanization process, as the population increases, its environment will generate various environmental problems (Kamalludin, *et al*., 2014). As a result, development is overtaking farms and forests at an increasingly rapid rate and this expansion often occurs without well-designed land-use plans (Benedict and McMahon, 2002). Likewise, human modifications of the land have created fragmented development patterns that threaten native plant and wildlife communities and associated ecological functions and processes (Kevin, 2010).This leads to ecological, social and economic consequences of the consumption of open lands and loss of green space in urban natural areas, fragmentation of natural spaces and decreased ability for nature to respond to change (Kevin, 2010 and Benedict and McMahon, 2002).

Thus, sound land use planning and management will be required to protect and conserve the existing resources and maintain them for future generation (Mell, 2008). However, over the past two decades, updating land use planning practices has been given a high priority for the state and some local governments in the developed countries (Botequilha and Ahern, 2002). Similarly, landscape professionals assess GI assets and propose interventions in line with policy commitments and delivery strategies to enable GI to meet existing and future challenges. They also, propose integrated GI principles as part of a development project that help to align a planning application with community expectations and wider economic, social and environmental benefits (Landscape Institute, 2013). Therefore, to address the above troubles Benedict and McMahon, suggest that smart growth to strategically direct influence the patterns of land development and smart conservation to support the direct conservation practices, this means that the first principle of better development is determining where not to develop (Benedict and McMahon, 2002).

Landscape professionals can make key contributions to reducing construction costs, making more efficient use of land and devising new income streams by applying a holistic approach to GI project planning, design and management and ensuring high standards of delivery against objectives (Landscape Institute, 2013). Different scholars were carried out and analyzed its benefit, GI planning can help communities figure out this issue and provides a solution that ensures environmental protection and a higher quality of life within communities as well as regulatory predictability for landowners and investors (Kevin, 2010). Therefore, planning for green investments at micro or macro level can provide proportionally greater benefits due to the proximity of residents to investment sites (Mell, 2011).

Planning Approaches of Green Infrastructure

There are a number of articles and publications which discuss the planning approaches of GI at different levels. Essentially, the concept of GI planning is based on a strategic approach to ensure environmental assets of natural and cultural value are integrated with land development, growth management and built infrastructure planning at the earliest stage (Kevin, 2010).Alison (2009), stated that GI planning is a new planning approach that integrates three important functions that planning serves and considered as smart growth that sits at the nexus of social equality, economic prosperity and ecological integrity (Alison, 2009). Similarly, Timothy (2009) described that, GI represents a new approach to city planning that aims to minimize the impact that human development has on

functioning natural systems in urban areas (Timothy, 2009). Hence, it is a type of smart growth and conservation strategies, which means promotes development that is not only economically sound but also environmentally friendly and supports community living and strategically applies direct conservation practices (Alison, 2009). Furthermore, this approach enables landscapes to deliver social, economic and environmental benefits simultaneously, and then looks at how those benefits can be multiplied by being connected to a wider network of spaces (Landscape Institute, 2013 and McDonald *et al*., 2005).

According to a USEPA report in 2014, GI approaches range from site-scale practices, including permeable pavement, rain gardens, cisterns, green roofs, and rain barrels, to watershed-level approaches such as wetland preservation (Josh*et al*., 2011). As many authors argue, it has developed rapidly in the UK, Europe and North America as a result of the opportunities it has provided in meeting the ecological, economic and social challenges of spatial planning (Mell, 2010). Thus, GI has emerged as an active term of reference in project development planning. A gap exists in the GI research literature in the form of the absence of an integrated framework to assist engineering organizations in planning the start-up of new projects in the context of greening and sustainability (Beauchamp and Adamowski, 2013).

Benedict and McMahon, (2002) state that, like a transportation system, GI should be carefully planned, designed, and expanded as communities grow. GI planning should be the first step in developing land-use plans, and should be coordinated with planning roads, sewers, water lines, and other essential gray infrastructure. Thus, it is true that integrated planning and design should connect green and gray in a more effective, economic and sustainable network. Table 2 below discusses the GI approaches to implement at different levels.

Table2: GI approaches and their attributes

GI Approaches	Description/ characterization
Designed Holistically	GI should be designed to link elements into a system that functions as a whole, rather than as separate, unrelated parts.
Planned comprehensively	Our green space systems need to be planned to include ecological, social and economic benefits, functions and values.
Laid out Strategically	Green space systems need to be laid out strategically to cross multiple jurisdictions and incorporate green space elements at each level of government.
Planned and Implemented Publicly	GI systems should be planned and implemented with input from the public, including community organizations and private landowners.
Grounded in the Principles and Practices of Diverse Professions	Green space systems should be based on sound science and should build on the knowledge of professional disciplines such as landscape ecology, urban and regional planning, and landscape architecture.
Funded Up-Front	Like other infrastructure systems, our green space systems need to be funded as primary public investments rather than with money left over after all other services have been provided.

The application of a GI approach to landscape planning provides planners with a toolkit of options to aid the development of sustainable urban landscapes and to review the interactions between people, the landscape and the resource base of a given urban area (Mell, 2011).Correspondingly, it helps to achieve sustainability and resilience goals over a range of outcomes in addition to climate adaptation. The climate adaptation benefits of GI are generally related to their ability to moderate the impacts of extreme precipitation or temperature (Josh*et a*l., 2011).Moreover, GI approach to land-use planning, design and management enables us to demand and deliver more from the land in a sustainable way and it also highlights where it is important to retain single or limited land-use functions (Landscape Institute, 2013).

Green Infrastructure Network

GI is usually composed of various environment-friendly land patches and corridors covered by the vegetation or the water in a city or towns. Taken together, GI is a holistic ecological network system, consisting of a set of natural vegetation, lakes and other areas with known or potential ecological value (hubs) connected by corridors or links (Qing *et al., 2012*andTzoulas*et al.,* 2007).Thus, the basic building blocks of the GI networks are two main physical components: hubs and corridors. Hubs are argue un-fragmented areas hundreds or thousands of acres in size that contain forest, wetland, and stream systems vital to maintaining ecological health (The Conservation Fund, 2007). While, corridor or links are the connections that tie the system together and enable GI networks to work (McMahon & Benedict, 2006). In addition, corridors maintain connectivity in the landscape, and are often linear remnants of natural

land such as wooded stream valleys (The Conservation Fund, 2007). The Figure 1 below illustrates how green corridors or link can be used to connect or link areas of green space (hubs) together.

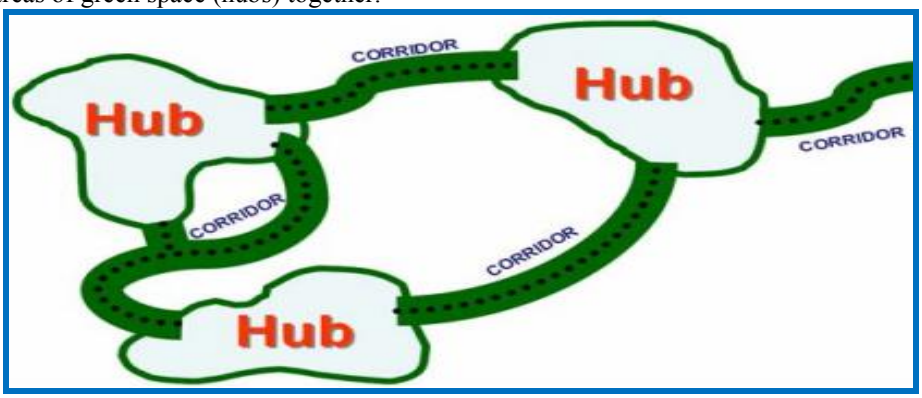

Fig 1: Green Infrastructure Network, Adapted from the Conservation Fund, 2007

The whole GI network can be used to inform conservation-related land use decisions, if the two primary parts of hubs and links were proactively identified, planned and maintained before development, especially in cities where urban growth has altered even reduced the quality and quantity of green spaces widely (Qing *et al., 2012*).According to, McMahon & Benedict (2006), report the following table describes GI network components and its associated characteristics.

Table 3: GI network components and their associated characteristics

Hubs Component	Description Of Attributes	Corridors Component	Description Of Attributes
Reserves	Large protected areas, such as national and state parks and wildlife refuges.	Landscape Linkages	Large protected natural areas that connect existing parks, preserves, or natural areas and provide sufficient space for native plants and animals.
Managed Native Landscapes	Large publicly owned lands, such as national and state forests, managed for resource extraction as well as natural and recreational values.	Conservation Corridors	Less extensive linear protected areas, such as river and stream corridors that serve as biological conduits for wildlife and may provide recreational opportunities.
Working Lands	Private farms, forests, and ranches that are managed for commodity production yet remain in a predominantly open and undeveloped state	Greenways	Protected corridors of land managed for resource conservation and/or recreational use.
Regional Parks and Preserves	Less extensive hubs of regional ecological significance.	Greenbelts	Protected natural lands or working lands that serve as a framework for development while also preserving native ecosystems and/or farms or ranchland.
Community Parks And Natural Areas	Smaller parks and other sites at the community level where natural features and ecological processes are protected and/or restored.	Eco-belts	Linear woody buffers that can ease the zone of tension between urban and rural land uses while providing ecological and social benefits for urban and rural residents.

Green Infrastructure Principles

The development of GI principles is also spatially diverse. Current research in the UK, Europe and North America also presents a range of opinions assessing the need for GI development (Mell, 2010). However, in America GI activities have been carried out at various levels to conserve and restore natural life sustaining system through successful initiatives based on common principles and strategies (Benedict and McMohan, 2002; 2006).Williamson (2003), states that America's natural life support system is an interconnected network of protected land and water that supports native species, maintains natural ecological processes, sustains sir and water resources and contributes to the health and quality of life for America's communities and people (TEP, 2005).

Benedict and McMohan (2002) suggest in Table 3 below long term GI principles, which are critical to the success of any GI initiatives. They provide a strategic approach and a framework for conservation that can advance sustainable use of land while benefiting people, wildlife and the economy. This approach includes design, planning, acquisition and decision-making guidance for agencies and organizations.

Table 4: Summary of seven principles for successful GI initiatives

GI Principles	Justification
Principle 1:GI should function as the framework for conservation and development	To plan and protect interconnected green space systems, successful initiatives can be used as the framework by sharing similar strategies.
Principle 2: Design and plan GI before development	Design and plan GI before development. Restoration of natural systems is far more expensive than protecting and preserving existing landscapes. It is essential to identify and protect critical ecological sites and linkages in advance.
Principle 3: Linkage is key	Linkage is a key point, the network of different system components is critical to maintain vital ecological processes, services and biodiversity of wildlife populations. It is also required linkages among different agencies, nongovernmental organizations, and the private sector.
Principle 4: GI functions across jurisdictions and at different scales.	GI functions across multiple jurisdictions and at different scales, which means GI systems should connect across urban, suburban, rural and wilderness landscapes and strategically incorporate green space elements and functions at corresponding scales.
Principle 5: GI is grounded in sound science and land use planning theories and practices	GI is grounded in sound science and land-use planning theories and practices, with disciplines including conservation biology and landscape ecology, urban and regional planning, and geographic analysis and information systems.
Principle 6: GI is a critical public investment	GI, as a critical public investment, should be included in the annual budget. Resources should be tapped in state and federal agencies for planning and management activities.
Principle 7: GI engages key partners and involves diverse stakeholders	GI involves diverse stakeholders, with stakeholders of the initiatives having diverse backgrounds and needs. Successful GI efforts forge alliances and interrelationships among various organizations.

Green Infrastructure Plan Development strategy

There is no single GI blueprint that will work everywhere. Instead, the approach features a basic framework of processes that should be used to develop a local GI plan (McDonald et al, 2005). Likewise, not all GI plans will be identical. However, the literature suggests that there is a basic framework for plan development that is appropriate for the GI style of planning (Youngquist, 2009). Thus, McDonald et al, (2005) claims that there are certain elements that differentiate GI plans from other types of plans and that these elements can be broken down into four primary steps: goal setting, analysis, synthesis, and implementation. In addition, time and funding constraints will likely prevent most planning efforts from fully addressing all indicators included within these stages of plan development. However, the evaluation criteria chosen for this research can help to distinguish GI plans from other types of green plans (Youngquist, 2009). The following table describes the four main steps of GI plan development which is stated by McDonald et al, (2005) and Alana Brasier (2011).

According to McDonald et al. (2005), GI theories can be considered the following key point to be applied such as linking components and processes of the ecosystem manner, identifying ecologically valuable areas as well as areas in need of restoration, and considering the distribution and relationship of landscape features and processes over time, and the interaction of these features with the human built environment (Alana, 2011). The GI plan also needs to include a list of mechanism and tools that can be used for land protection and a list of viable funding options for reaching the plan's goals.

Moreover, the European Union (2013) identifies the following three most effective approaches to build a GI through spatial planning. This enables interactions between different land uses to be investigated over a large geographical area. These are:

- Locate the best places for habitat enhancement projects to help reconnect healthy ecosystems, improve landscape permeability or improve connectivity between protected areas.
- Guide infrastructure developments away from particularly sensitive nature areas and instead towards more robust areas where they might additionally contribute to restoring or recreating GI features as part of the development proposal.
- Identify multi-functional zones where compatible land uses that support healthy ecosystems are favored over other more destructive single-focus developments.

GI has been a popular framework for smart development and conservation planning. If it is proactively planned, developed, and maintained in a systematic way, it also should be a better model for land use and spatial development in a city (Qing Chang et al, 2012). According to the GI Center Report of 2009, to establish or create new a GI plan the following points will have to be considered:

- Asset Mapping (what are the existing ecological, cultural and economic assets)
- Risk Assessment(which of the assets above are at risk)

- Opportunities (what kind of community do we want? What projects, programs, policies to ensure assets conserved?)
- Policy Implementation (adoption of asset maps, strategy maps, integrate into comprehensive plans, park plans etc.)

Table 5: Steps to develop Green Infrastructure plan

Steps	Description/ Characteristics
Steps1:Goal Setting	• This is the first step of GI plan development. In this step, issues are identified, a process for plan development is outlined and plan goals are developed. • There are three main criteria in the goal setting step of plan development: plan foundations, stakeholder involvement and conservation plans. • GI plans must include goals to protect ecological functions and processes and protect working land as well as open space for human benefit and incorporate all the area's natural elements.
Steps2: Analysis	• This analysis step focuses on the range of goals in the planning area and the process is repeated for each separate goal. • There are two general types of analysis that are used in this step. Course-scale and Fine-scale. • Course-scale analysis identifies the larger landscape values for the plan area and the relative ranking of these lands and Fine-scale evaluations look within the ranked resource areas to take a more acute and smaller-scale evaluation within the larger context of the course-scale analysis.
Steps3: Synthesis	• This is an important element of any conservation plan and spans conservation methods and depicted the exact process of determining an area's rank varies. • Another important factor in the development of a network plan is the fact that all areas should be considered and if found to be ecologically valuable, included in the network, regardless of the area's current state. • Additionally, the network analysis should identify the gaps in the network so that planners can ascertain the significant areas that need restoration.
Steps4: Implementation	• Another key element of a GI plan is a system by which protection opportunities can be prioritized. Without a system to prioritize conservation opportunities, the GI plan is simply a blueprint, not a workable framework. • This system is often described as a decision-support tool; the tool ought to result in land protection strategies that can guide implementation. • Decision-support tool needs to provide meaningful information; this information should be included in an implementation strategy section of the plan for assessing conservation efforts and action strategies.

The Role of GI in Sustainable Cities Development

GI and sustainable development have become ever popular over the past several years as awareness about the state of our planet has been widespread (Christopher, 2009). Similarly, GI is a concept that entered the sustainability discourse in the last decade among a wide range of agencies, organizations, companies, community groups, and planners (Kimmel *et al*., 2013). Different authors report that, supporting and managing physical development, modes of transportation, and social life, GI provides ecological and social services to cities in pursuit of sustainable development and supports policies and strategies relating to sustainable urban development (Adnan, 2012).

The benefits attributed to GI therefore need to take into consideration how people, policy and place are influenced by the three main components of sustainable development: social, ecological and political equity (Mell, 2010). Since, the term GI describes the network of natural and cultural landscape assets underpinning economic, socio-cultural and environmental thriving of cities and towns (Adnan, 2012).Williamson(2014),noting that GI provides an ecological, political and social basis for development and needs to be valued accordingly. Thus, this view can be compared with the principle of connectivity, without the basic resource of viable ecosystems; development would not be a feasible option. As a result, there is linear connectivity between built capitals, human & social capital, natural capital and viable ecosystems (Mell, 2010).

GI investments can also be a source for further economic growth as they can be a source of economic competitiveness at the micro as well as the macro level (Alberto, 2012). Sustainable communities are places that balance their economic assets, natural resources, and social priorities so that residents' diverse needs can be met now and in the future (EPA, 2014).Moreover, planning and decision making for vibrant and environmentally sustainable communities requires a systems perspective that integrates green and grey infrastructure (Kimmel *et al*., 2013).

GI is an integral component of sustainable communities primarily because it can help communities protect the environment and human health while providing other social and economic benefits (EPA, 2014). It is always true that green spaces, quiet streets and recreational parks are important for relaxation, health and sport, nature watching and social activities. Similarly, open areas and green parks are important building blocks for promoting quality of life in urban environments (European Union, 2010). To become more environmentally and economically sustainable, many communities use smart growth approaches a range of strategies that cities, suburbs, towns, and rural areas can use to protect the environment and public health, support economic development, create strong neighborhoods with diverse housing and transportation options, and improve residents' quality of life (EPA, 2014).

Conclusion

Green Infrastructure is basically a strategically planned and managed network of green spaces and other environmentally sound features vital to the sustainability of any urban and semi-urban area. However, it needs an early integration of good management and development plan to ensure the multi-functionality of GI. Thus, proper planning of GI development inspire the stakeholders to best practice and case studies of green infrastructure planning and delivery, it support planners and guide external partners in the effective delivery of sustainable green infrastructure.

As many scholars have stated good infrastructure planning considers the infrastructure required to support development, costs, sources of funding, timescales for delivery and gaps in funding. The benefit of GI in and around urban areas is currently widely accepted as contributing towards creating places where people or visitors want to live, recreate and work. However, in many developing nations the concept is not widely recognized as it requires great attention to plan, develop and manage the existing GI resources.

As part of the smart growth and conservation approach to more sustainable living and climate change adaptation, in addition to GI, it is increasingly recognized not just a 'nice to have, but also as a must have', since it has a number of multi-functional benefit to the community. This issue must be reflected in various aspects of local, regional and national planning policy, particularly, in developed countries.

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