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# "A CASE STUDY ON IMPLEMENTATION OF SPONGE CITY PHENOMENON IN KATRAJ AREA"

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**Abstract**: Most cities in our country are facing severe water security risks, how to change urban water safety management idea, sponge city theory provides a new solution in this area. This paper introduces the geneses of the urban water security, sponge city related theory in urban design, and how to use the sponge the content of the urban design idea, etc. From the perspective of urban designers, System of urban drainage, rainwater drainage and sponge urban construction the top policy design, and provide some useful Suggestions for the construction of the city. Points out that only in the unity of the competent department of city construction, the urban design of various professional collaboration, division of labour cooperation, to the smooth implementation of the sponge construction of city. Today India the urban growth is unprecedented. However followed by more and more cities in India have to confront frequent floods and urban ecological environment has become increasingly worse. However, followed by a growing number of cities in India at all levels suffer recurrent flooding rain and urban ecological environment is deteriorating. Proportion of urban impervious surface area expanding rapidly. With the transportation needs of the development and expansion of the urban population People are getting more and more obsessed with the hardening of the cities. It is considered that the original bare surface in concrete closed once and for all solve the problem of traffic water, health, etc. However, in this way, we put the original land to breath freely on a closed mask. From now on the rainwater can smoothly seep into the ground water. Once the storm struck forms a massive storm runs while shorten the rat pack arrival time then will cause waterlogging

**Keywords**: Urban water security, sponge city, urban population, Waterlogging.

## 1. INTRODUCTION

A Sponge City is a city that has the capacity to mainstream urban water management into the urban planning policies and designs. It should have the appropriate planning and legal frameworks and tools in place to implement, maintain and adapt the infrastructure systems to collect, store and treat (excess) rainwater. In addition, a "sponge city" will not only be able to deal with "too much water", but also reuse rain water to help to mitigate the impacts of "too little" and "too dirty" water. Primarily as a response to the increasing flood impacts, the Chinese Central Government called for widespread uptake of the Sponge City approach across China in 2013 and provided financial support to foster implementation of this approach in a selection of pilot cities. At present, the Sponge City approach is gaining ground and becoming more and more accepted by city governments. The first 'best practices' of Chinese cities are being shared and international exchange activities between research institutions and cities are providing guidance to the design and implementation of new concepts and technologies. However, there are still many challenges ahead which hamper uptake by the selected pilot cities and up-scaling to the remainder 600plus cities in China. City government at all institutional levels have to support the implementation of the Sponge City approach in new built-up areas of city districts, industrial parks and development zones. In existing urban areas retrofitting of neighbourhoods, refurbishment of existing buildings and infrastructure and rebuilding activities of old city areas should comply with the Sponge City approach. This Special Issue brings together emerging approaches, challenges and opportunities related to Sponge Cities with the ultimate aim to foster up scaling and widespread uptake. While the sponge-city concept is new, the approaches involved in it, and therefore challenges and opportunities as well, have been tried out in many different parts of the globe under the guise of terminologies such as water sensitive cities, sustainable drainage systems, low-impact development, ABC waters, etc. This issue draws from worldwide experience to draw lessons relevant to the sponge-city concept.

## 2. SPONGE CITY

Low impact development (LID) was first put forward and applied during the 1990's in USA, and previously they were called Best Management Practices (BMPs). LIDs were proposed to mitigate the negative impacts of urbanization (i.e increase in impermeable surface) which lead to more urban runoff. Since then, similar concepts have also been proposed in the United Kingdom, Australia and other developed countries which also suffer from similar problem.

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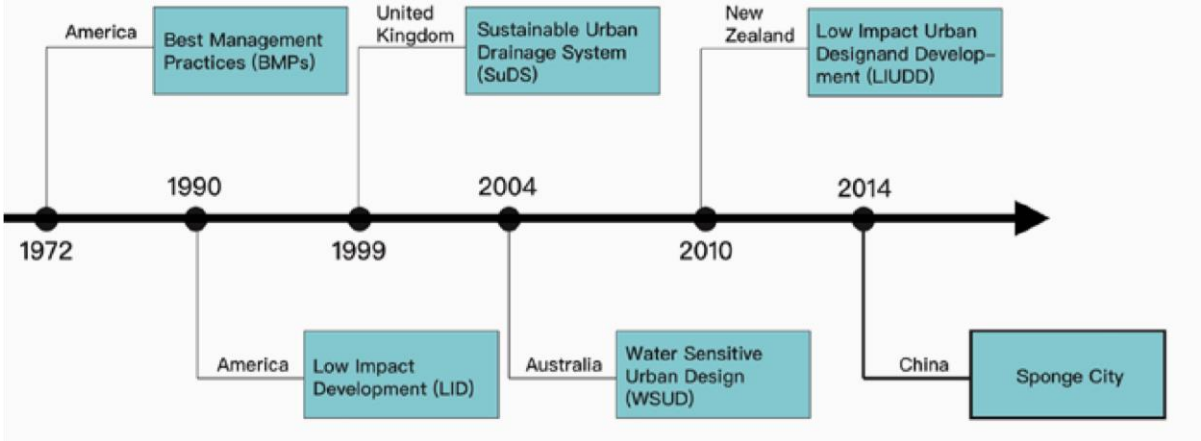


*Fig. Timeline of the development of LID at the international level.*

When looking at these different policies it becomes clear that they all have one thing in common: they all try to achieve sustainable storm water management through the use of LID measures (also called blue-green measures) to address excessive rainfall. Several LID measures include bio swales, bio retention devices, ponds, green roofs, vegetated filter strips and filter strips. LID approach also includes non-structural measures such as alternative layouts of roads and buildings to minimize imperviousness and to maximize the use of pervious pavement and vegetation, contaminant source reduction and education on alternative behaviours. With the emphasis placed on local control of storm water in these LID measures, the SCP seeks to promote water responsive cities capable of absorbing and retaining rainwater.

## 3. OBJECTIVES OF SPONGE CITY

- To study the effect of Sponge City on environment.
- To study new initiative towards recharging ground water table.
- To research on reduction in air pollution due to green building concept.
- To study the existing Katraj area and to come up with solution and implementation to overcome flood situation.

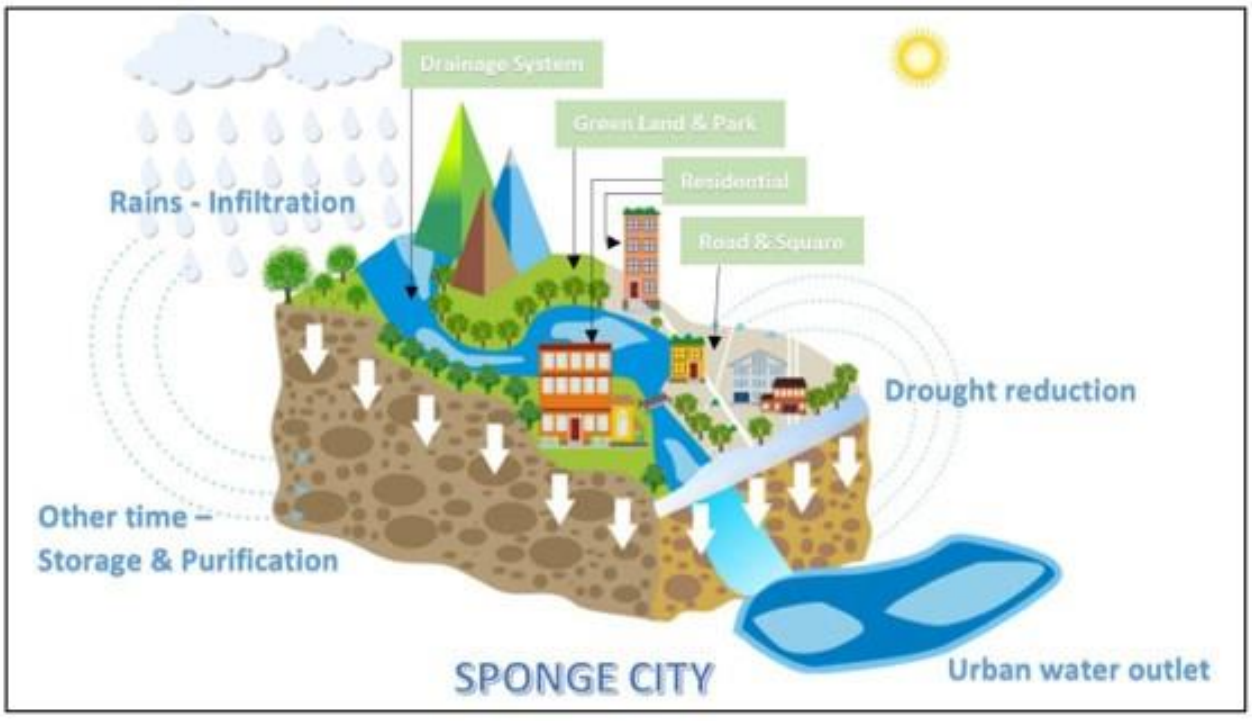


Fig. Sponge City

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## 4. SCOPE OF STUDY

Sponge City research has been attracting extensive attention both in practical and theoretical research field, as the increased threat of flood risk and environmental safety due to urbanization. Varies names of Sponge City prevalent in different countries, which leads to disconnection of literature in the same field of Sponge City. In this paper, a systematic literature mining of Sponge City is presented. A literature analysis system is created, which includes literature export from Web of Sciences and systematic analysis via Note Express and Cite Space. Based on the final document storage which contains 962 articles, general trends are identified. Literature is classified into 9 theme types. Research foci of Sponge City are detected by citation and keywords burst detection. Further, some future research directions of Sponge City are anticipated, including trans-disciplinary approaches, a comprehensive design framework, application of information technology, and case studies of Sponge City in more parts of the world. The significance of this paper lies in summarizing past research, identifying research types, foci and anticipating some future research directions. The theory of Sponge City emphasizes the basic principles of 'focusing on nature,' 'source control,' 'local adaption,' protecting nature, learning from nature, preserving urban ecological space as much as possible, restoring biodiversity, and creating a beautiful landscape environment. All of this can be realized by achieving natural accumulation, natural infiltration, and natural purification. The infiltration effects of the natural ecological background (such as topography and landforms), the purification effect of vegetation and wetlands on water quality, and the combination of natural and artificial means allow the city to absorb and release rainwater. Urban green spaces and urban water bodies—constructed wetlands, rain gardens, roof greening, recessed green spaces, grass ditches, and ecological parks—are the central "sponge bodies."

## 5. GREEN BUILDING CONCEPT

A ‘green’ building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life.

There are a number of features which can make a building ‘green’. These include:

- Efficient use of energy, water and other resources
- Use of renewable energy, such as solar energy
- Pollution and waste reduction measures, and the enabling of re-use and recycling
- Good indoor environmental air quality
- Use of materials that are non-toxic, ethical and sustainable
- Consideration of the environment in design, construction and operation
- Consideration of the quality of life of occupants in design, construction and operation
- A design that enables adaptation to a changing environment

*Fig. Green Building*

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Any building can be a green building, whether it's a home, an office, a school, a hospital, a community centre, or any other type of structure, provided it includes features listed above. However, it is worth noting that not all green buildings are – and need to be - the same. Different countries and regions have a variety of characteristics such as distinctive climatic conditions, unique cultures and traditions, diverse building types and ages, or wide-ranging environmental, economic and social priorities – all of which shape their approach to green building.

## 6. PERVIOUS CONCRETE ROAD

Pervious concrete is a structural concrete pavement with a large volume (15 to 35 percent) of interconnected voids. Like conventional concrete, it's made from a mixture of cement, coarse aggregates, and water. However, it contains little or no sand, which results in a porous open-cell structure that water passes through readily. When pervious concrete is used for paving, it can take in stormwater at a rapid rate of 3 to 5 gallons per minute per square foot of surface area, which exceeds the flow rate needed to prevent runoff in most rain events. The rainwater may be stored in a coarse gravel layer underneath the pavement or allowed to percolate into the underlying soil. Because the pavement itself acts as a retention area, it helps to prevent much of the polluted runoff that normally occurs with impervious pavements. The filtration process also helps to purify the water. As the water percolates through the open cells of the pavement, aerobic bacteria in the voids help to break down harmful pollutants and chemicals.

Here are some of the reasons what a pervious concrete pavement can:

- Reduce the amount of untreated runoff discharging into storm sewers.
- Directly recharge groundwater to maintain aquifer levels.
- Channel more water to tree roots and landscaping, so there is less need for irrigation.
- Mitigate pollutants that can contaminate watersheds and harm sensitive ecosystems.
- Eliminate hydrocarbon pollution from asphalt pavements and sealers.

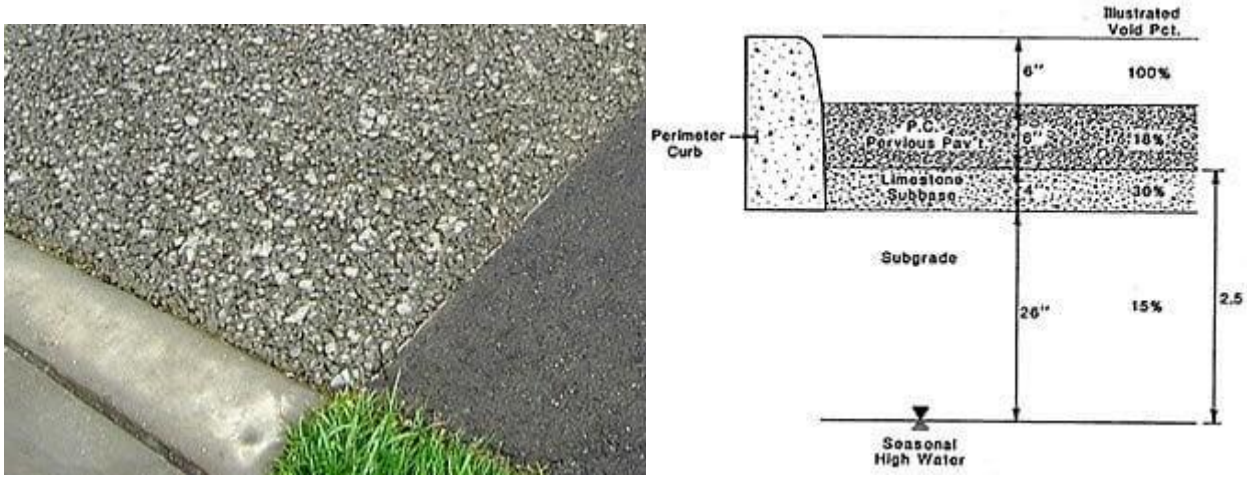


*Fig. Pervious Concrete*

## 7. UNDERGROUND WATER TUNNEL

Water tunnel (physical infrastructure), a tunnel used to transport water, typically underground. Qanat water management system. Water tunnel (hydrodynamic), an experimental facility used for testing the hydrodynamic behaviour of submerged bodies in flowing water, similar to a wind tunnel.

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*Fig. Water Tunnel*

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## 8. RESULT

The study was an attempt to appraise the planning challenges and the implication of sponge city concept in managing urban floods in Katraj area. This was done through analysing the planning aspects using the literature study and case studies. Urban planning parameters are selected for formulating strategies that include identifying the mitigation measures for urban flooding, adopting the methodologies for evaluating the values associated with urban flood management, integrating the solutions can provide significant benefits beyond flood management and developing the agreed financial and policy mechanisms and models for realizing the values associated with Nature-based Solutions for Integrated Urban Flood Management.

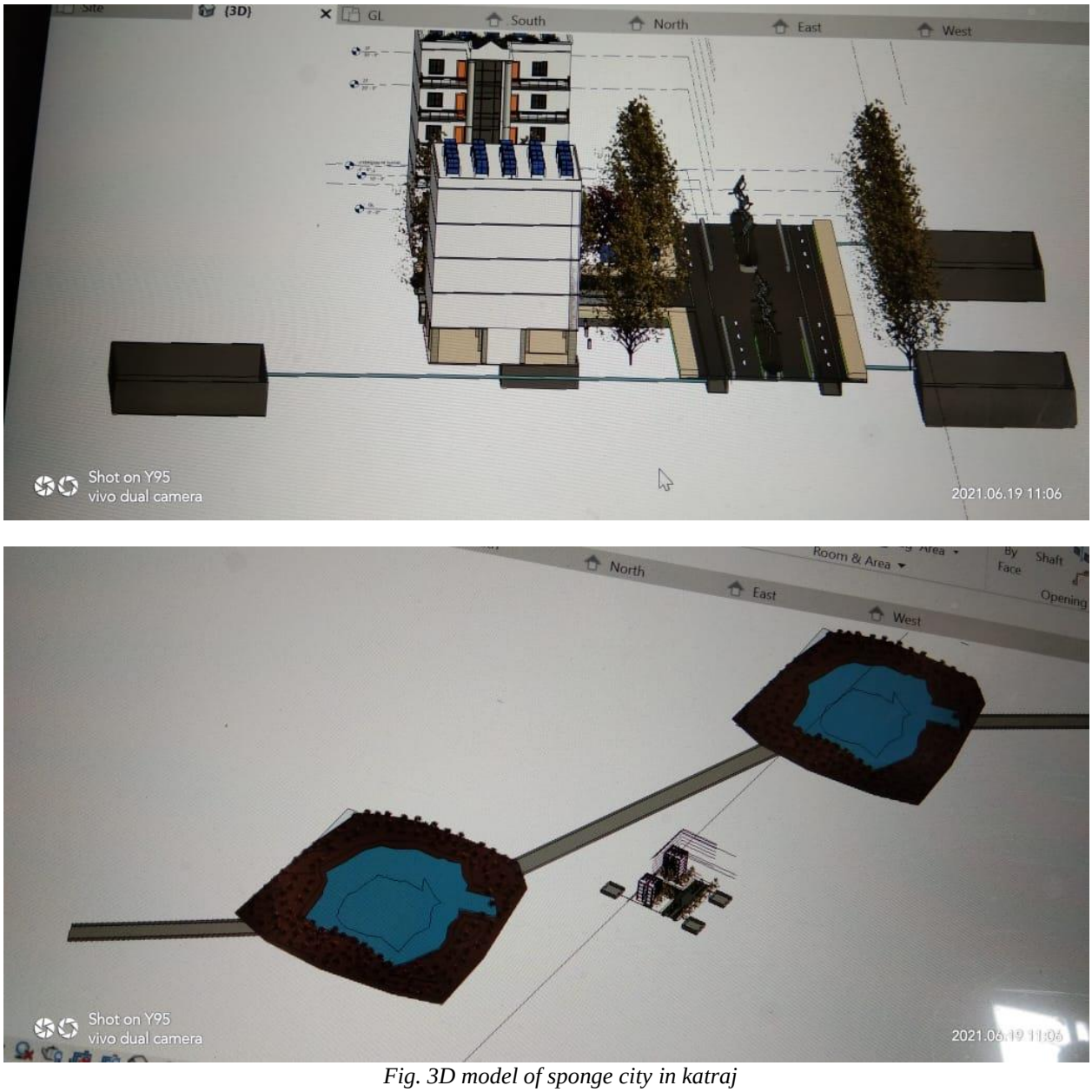


*Fig. 3D model of sponge city in katraj*

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## 9. CONCLUSION

The study we conducted about the implementation of sponge city phenomenon in Katraj area brought us to a conclusion: -

- It helps in recharging the ground water table.
- It helps in reducing air pollution and water pollution.
- It is a good initiative for increasing the rain water harvesting so that the stored water could be used in the dry seasons.
- To counter the flood situation.
- To harness the solar energy
- To reduce the heat intensity of that particular area.

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