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**Urban Resilience and Adaptation for India and Mongolia:**

**curricula, capacity, ICT and stakeholder collaboration to support green & blue infrastructure and nature-based solutions**  
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# Labour market demands concerning urban green and blue infrastructure in India

An analytical overview

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This report has been based on the materials collected during the preparation of the proposals for the Erasmus+ CBHE project URGENT in September-December 2019. It has been further updated and refined by the working group of URGENT scholars as a part of URGENT project preparation activities under its work package 1.

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## Introduction

India is one of the fastest-growing economies in the world, with a population of over 1.3 billion people. The country is undergoing rapid urbanization, and as a result, there is a growing need for green and blue infrastructure (GBI) in urban areas (UGBI for urban GBI). GBI refers to the network of green and blue spaces in cities, such as parks, green belts, wetlands, and water bodies. GBI has a range of benefits, including reducing urban heat islands, mitigating air pollution, enhancing biodiversity, providing recreational spaces, and supporting urban agriculture. This report provides an overview of the labor market needs concerning GBI in India.

This report has been based on the materials collected during the preparation of the proposals for the project URGENT in September-December 2019. The input data included the summaries of expert discussions (both stakeholder and academic), as well as structured interviews with key representatives of the world of profession. The outcomes of this preparatory study has been used for deciding on URGENT cross-cutting topics, and was further used as a reference document for suggesting new and revised disciplines for the URGENT curriculum development program in India. The report has been further updated and refined by the working group of URGENT scholars as a part of URGENT project preparation activities under its work package 1.

National Skill Development Corporation under the Ministry of Skill Development and Entrepreneurship, Government of India was set up as part of a national skill development mission to fulfil the growing need in India for skilled manpower across sectors and narrow the existing gap between the demand and supply of skills. It has published Human Resource and Skill Requirement in various Sectors (2013-2017, 2017- 2022). The objective was to contribute significantly to the overall target of skilling up of people in India, mainly by fostering private sector initiatives in skill development programmes and to provide funding.

## Challenges

**Lack of skilled labor:** One of the main challenges concerning UGBI is the lack of skilled labor to manage and maintain it. The majority of the workforce in India is either unskilled or semi-skilled, which makes it difficult to ensure the proper care and maintenance of UGBI. Moreover, the lack of skilled labor also limits the potential of UGBI to create job opportunities for the growing urban population.

**Low wages and poor working conditions:** The labor force that is engaged in UGBI is generally paid low wages, which do not reflect the skills and efforts required for the work. Moreover, the working conditions are often poor, with inadequate safety equipment, long working hours, and exposure to environmental hazards. This can lead to high turnover rates and a lack of motivation among the workforce, which ultimately affects the quality of UGBI.

**Gender bias:** Women are often underrepresented in the labor force that is engaged in UGBI, particularly in positions that require technical skills and decision-making. This is due to social norms and cultural barriers that limit women's access to education and training, which are essential for acquiring the necessary skills. Addressing this gender bias is crucial for ensuring the equitable development of UGBI and providing equal opportunities for women.

**Lack of formal training and certification:** There is a lack of formal training and certification programs for UGBI in India. This makes it difficult to ensure that the workforce has the necessary skills and knowledge to manage and maintain UGBI. Moreover, it also limits the potential for creating job opportunities in this sector, as employers may prefer to hire workers with formal training and certification.

**Limited awareness and understanding of UGBI:** The lack of awareness and understanding of the benefits and potential of UGBI among policymakers, employers, and the general public is a major challenge. This limits the investment and resources allocated to the development of UGBI, and also limits the demand for skilled labor in this sector. Increasing awareness and understanding of UGBI is crucial for creating a supportive environment for its development and for ensuring that the labor force is adequately trained and compensated.

**Seasonal employment:** The labor force engaged in UGBI is often employed on a seasonal basis, which makes it difficult to ensure job security and stable incomes. Moreover, the seasonal nature of employment also limits the potential for skill development and career growth, which ultimately affects the quality of UGBI.

**Lack of social protection:** The labor force engaged in UGBI is often employed in the informal sector, which means they are not entitled to social protection such as health insurance, pension, and other benefits. This can lead to vulnerability and poverty among the workforce, which ultimately affects the quality of UGBI.

**Some suggestions from the Human Resource and Skill Requirement in various Sectors (2013-2017, 2017- 2022) in specific sectors are**

### **Agriculture Sector Recommendations for Stakeholders**

**Building capacities of cultivators on aspects of mechanisation-oriented roles at a field level in subjects such as repair and maintenance, etc.**

- Greater market integration of farmers on both inputs (procurement of crop inputs like seeds, fertilizers, pesticides etc.) and outputs (joint marketing, crop planning and scheduling etc.)
- Underscore the economic benefits of improved farming practices

#### **Encourage on the job training and apprenticeship in relevant value chain segment**

- Upgrade agriculture universities' curriculum
- Encourage greater industry-interaction with universities and training programmes

#### **Design industry relevant training modules specially in supply chain logistics and precision farming are some of the emerging areas**

- Upgrade agriculture universities' curriculum
- Encourage greater industry-interaction with universities and training programmes
- Vocational training institutes can be setup for field level tasks like drying, cleaning and packaging.
- Entrepreneurs can setup leasing service for automated machines (for cleaning / drying of produce). Operators will be needed to operate this hi tech machinery (from NCDEX)

#### **Building Construction and Real Estate Sector Recommendations for Stakeholders**

##### **Government and Industry Bodies should incentivise and promote collaborative training**

- Government should give incentives to private players for letting the training providers use their assets for training.
- Industry Body should ensure that there is a market for collaboration and use of scarce capital resources. For e.g. there could be a network of employers who commit to train a certain percentage of their workforce and tie-up with training providers for the same making it commercially viable for the training providers.
- Government could support private companies to open up training schools / increase their training expenditure by giving concessions or subsidies.

##### **Industry should foster and nurture strong linkages with training providers**

- Industry players and training bodies should initiate steps to develop strong linkages which would serve their collective interest and provide mutual support.
- This linkage could help the industry in overcoming skill shortage and improving productivity and would help the institutes in various ways like content development, low fixed expenditure etc.
- Training modules should be designed keeping in mind latest technologies.

## Labor Market Needs for Green and Blue Infrastructure in terms of GBI management and policy areas

### **Planning and Design**

The planning and design of green infrastructure require a range of skills, including landscape architecture, urban planning, and environmental science. Urban planners and landscape architects are responsible for developing plans for GBI in urban areas. They must consider factors such as site analysis, community needs, ecological considerations, and budget constraints. There is a growing need for skilled urban planners and landscape architects in India, as cities continue to expand and develop.

### **Implementation**

The implementation of green infrastructure involves a range of skills, including construction, horticulture, and irrigation. The construction of green infrastructure requires workers with skills in excavation, grading, and paving. Horticulturists are responsible for planting and maintaining trees and other vegetation in green infrastructure. Irrigation specialists are responsible for designing and installing irrigation systems to ensure that green infrastructure is properly watered. There is a need for skilled workers in all of these areas to implement green infrastructure in urban areas.

### **Maintenance**

The maintenance of green infrastructure is essential to ensure that it continues to provide its intended benefits. Maintenance tasks include pruning trees, mowing lawns, weeding, and repairing irrigation systems. There is a need for a skilled workforce to maintain green infrastructure in urban areas. Maintenance tasks are typically carried out by landscape maintenance workers, who require skills in horticulture and irrigation.

### **Education and Outreach**

Education and outreach are critical to ensuring that the public understands the benefits of green infrastructure and how to use it properly. Education and outreach require skills in communication, community engagement, and environmental education. There is a need for skilled professionals in these areas to educate the public about the benefits of green infrastructure and how to use it properly.

### **Policy and Advocacy**

Policy and advocacy are essential to creating an enabling environment for the development of green infrastructure. Policy and advocacy require skills in public policy, government relations, and advocacy. There is a need for skilled professionals in these areas to advocate for policies that support the development of green infrastructure in urban areas.

## Labor Market Needs for Green Infrastructure in terms of the areas of expertise

**Landscape architecture and design:** Professionals with expertise in landscape architecture and design are essential for developing green infrastructure in urban areas. These professionals are skilled in designing and planning parks, gardens, and green spaces that are sustainable, functional, and aesthetically pleasing.

**Horticulture and plant science:** The development and maintenance of green infrastructure require professionals with expertise in horticulture and plant science. These professionals are responsible for selecting appropriate plants, trees, and shrubs that are suitable for the local climate and soil conditions. They also ensure that the green spaces are well-maintained and free from pests and diseases.

**Ecological restoration:** Ecological restoration is the process of repairing and restoring damaged ecosystems. Professionals with expertise in ecological restoration are essential for restoring degraded green spaces in urban areas. They are skilled in identifying the native flora and fauna of a particular ecosystem and designing restoration plans that are compatible with the local ecology.

**Sustainable urban planning:** Sustainable urban planning is critical for developing green infrastructure in urban areas. Professionals with expertise in sustainable urban planning are skilled in designing and implementing plans that balance economic, social, and environmental concerns. They are also responsible for ensuring that green infrastructure projects are integrated with other urban development projects.

**Project management:** The development and maintenance of green infrastructure projects require effective project management skills. Professionals with expertise in project management are responsible for planning, coordinating, and monitoring the various activities involved in the project. They are also responsible for managing resources, timelines, and budgets.

**Community engagement:** Community engagement is critical for the success of green infrastructure projects in urban areas. Professionals with expertise in community engagement are responsible for involving local communities in the planning and implementation of green infrastructure projects. They are also responsible for creating awareness and building support for the projects among the local communities.



## Labor Market Needs for Blue Infrastructure in terms of the areas of expertise

**Hydrology and water management:** Hydrology and water management are critical for the development and maintenance of blue infrastructure in urban areas. Professionals with expertise in hydrology and water management are responsible for managing water resources, designing and implementing water management plans, and ensuring that the water quality is maintained.

**River and lake ecology:** Professionals with expertise in river and lake ecology are essential for developing and maintaining blue infrastructure in urban areas. They are responsible for understanding the ecological processes that occur in rivers and lakes, identifying the native flora and fauna of the ecosystem, and designing restoration plans that are compatible with the local ecology.

**Flood management:** Flood management is critical for the development and maintenance of blue infrastructure in urban areas. Professionals with expertise in flood management are responsible for designing and implementing flood management plans that protect urban areas from floods and other water-related disasters.

**Coastal zone management:** Coastal zone management is critical for the development and maintenance of blue infrastructure in coastal urban areas. Professionals with expertise in coastal zone management are responsible for managing the coastal zone, designing and implementing plans that balance economic, social, and environmental concerns.

**Water Treatment:** This skill involves the ability to treat water to make it safe for human consumption or for other uses. Water treatment involves various processes such as coagulation, flocculation, sedimentation, filtration, and disinfection.

**Rainwater Harvesting:** This skill involves the ability to collect and store rainwater for later use. Rainwater harvesting is an important water conservation technique that can help reduce the demand for freshwater.

**Greywater Recycling:** This skill involves the ability to recycle and reuse greywater, which is wastewater from sources such as sinks, showers, and washing machines. Greywater recycling can help reduce the demand for freshwater and also reduce the amount of wastewater that needs to be treated.

**Watershed Management:** This skill involves the ability to manage the natural resources in a watershed to ensure the sustainable use of water resources. Watershed management involves various activities such as soil conservation, vegetation management, and water quality monitoring.

**Water Auditing:** This skill involves the ability to assess water use in a facility or community and identify opportunities for water conservation. Water auditing can help identify areas where water use can be reduced and can help optimize water use.

## Conclusions

After analyzing the current state of the labour market demands in India regarding urban green and blue infrastructure, the following conclusions can be drawn:

- There is a growing demand for skilled labor in the development and maintenance of urban green and blue infrastructure in India, as the country continues to focus on sustainable urban development and addressing environmental challenges.
- The demand for skilled labor in this sector is expected to increase in the coming years, as the government and private sector invest more resources in developing green and blue infrastructure to improve the quality of life in urban areas.
- However, there is currently a shortage of skilled labor in this sector in India, which is hindering the growth of the industry. This shortage is largely due to the lack of formal training and education programs for this type of work.
- To address this shortage, there is a need to invest in training and education programs that equip workers with the necessary skills to develop and maintain urban green and blue infrastructure. These programs should be tailored to meet the specific needs of the industry and should focus on hands-on training and practical experience.
- There is also a need to improve working conditions and wages in this sector to attract and retain skilled workers. This includes providing better equipment and tools, ensuring safe working conditions, and offering competitive salaries and benefits.
- Finally, there is a need to raise awareness among the general public about the importance of urban green and blue infrastructure and the role that skilled labor plays in developing and maintaining it. This can help to create a culture of appreciation for this type of work and encourage more young people to pursue careers in this sector.

The report further confirms the relevance of URGENT cross-cutting themes originally suggested, discussed and elaborated on the preparatory stage of the project:

- Urban forestry,
- Landscape architecture and phytodesign,
- Urban permaculture,
- Integrative smart green & blue urban planning,
- Observation,
- Information, and communication.