

# Toolkit for Green Index Development: For Government Programs



Submitted to

Department of Forest, Ecology and Environment

Government of Karnataka

By

Indian Institute of Science &

Environment Management and Policy Research Institute



# Toolkit for Green Index Development: For Government Programs

Green Index is a composite measure of the environmental performance of a program or a scheme or a project. Green Index is developed using a set of indicators and sub-indicators reflecting the environmental concerns such as: adoption of Energy Efficiency and Renewable Energy, Water Conservation and Recycling, Waste Treatment and Recycling, and air Pollution Control, Biodiversity Conservation, Carbon dioxide (CO<sub>2</sub>) Emission Reduction or Sequestration, and Adaptation to Disasters and Climate Change.

This *Toolkit* is organized into three parts.

- Part I presents the background and introduction to the Green Index concept, its need and utility.
- Part II is the *Toolkit* that provides guidelines and methods to assess Environmental Performance or Greenness of Developmental and Infrastructural programs of State Government programs at design stage, using a Green Index concept.
- Part III provides a preliminary approach to prioritize and promote Green developmental programs, to reduce environmental degradation and to conserve and regenerate environment and ultimately promote sustainable development.

## PART I - BACKGROUND AND INTRODUCTION

### 1. What is Green Index?

Green Index (GI) or Environment Performance Index (EPI) is a measure of the relative environmental performance of different regions (countries, states, districts) or developmental (and infrastructure) schemes, programs and projects of a country or a state, using criteria and a set of indicators. Green Index will enable ranking of different programs using a score or an index value, which reflects the implications of the programs on environment and sustainability. Environment in the broader context includes impact on air, water, ecosystems, biodiversity and climate.

Green Index has been varyingly called as Environment Performance Index and Environmental or Ecological Footprint Index. There are also specific indices linked to certain components of the environment such as Climate Change Performance index, Air Quality index, Green Building index and Water Quality index. Some of the countries that have developed such indices include Sweden, UK, and India. In India, index based ranking approach has been adopted by agencies such as Niti Ayog, India Today, Finance Commission, and the Centre for Good Governance. Table 1 presents a few examples of Indices developed at different scales. It also provides information on indicators considered for developing the various indices.

**However, there are very few or no examples of environmental performance ranking of developmental and infrastructural schemes, programs and projects at any country or state level.**

**Table 1:** Examples of Development, Governance and Environment ranking Indices

Category	Index	Ranking criteria / Indicators
Environment	Environment Performance Index	i) Environmental protection ii) Environment health - Air Quality, Water and Sanitation, Heavy Metals iii) Environment vitality - Biodiversity & Habitat, Forests, Fisheries, Climate and Energy, Air Pollution, Water Resources, Agriculture
	India Today	- 12 categories and overall: economy, infrastructure, agriculture, education, health, law and order, inclusive development, governance, entrepreneurship, environment, cleanliness and tourism
	Finance Commission	- Population, Demographic change, Income distance, Area, Forest cover
	Good Governance Index	- Agriculture and Allied Sectors, Environment, Human Resource Development, Commerce and Industries, Economic Governance, Public Health, Others
Climate	Global Climate Risk Index	- Number of deaths, Number of deaths per 100 000 inhabitants, Sum of losses in US\$ in purchasing power parity (PPP), Losses per unit of Gross Domestic Product
	Climate Change Performance Index	- GHG Emissions, Renewable Energy, Energy Use, Climate Policy
Overall	Human Development Index	- Life expectancy at birth, expected years of schooling, mean years of schooling, Gross national per capita income

## 2. Why Green Index (GI)?

Green Index provides information on the environmental performance of developmental and infrastructural schemes, programs and projects. Such an Index would help the Government Departments, implementing agencies, civil society organizations and communities to assess the environmental implications of the proposed or ongoing programs, schemes, and projects. Green or Environment Performance Index is aimed to:

- Promote green or environmentally sustainable development by adopting programs, schemes and projects which incorporate policies, measures and technologies to address adverse environmental impacts and concerns and promote conservation and sustainable use of resources and mitigate and adapt to climate change.

## 3. Application of Green Index (GI)

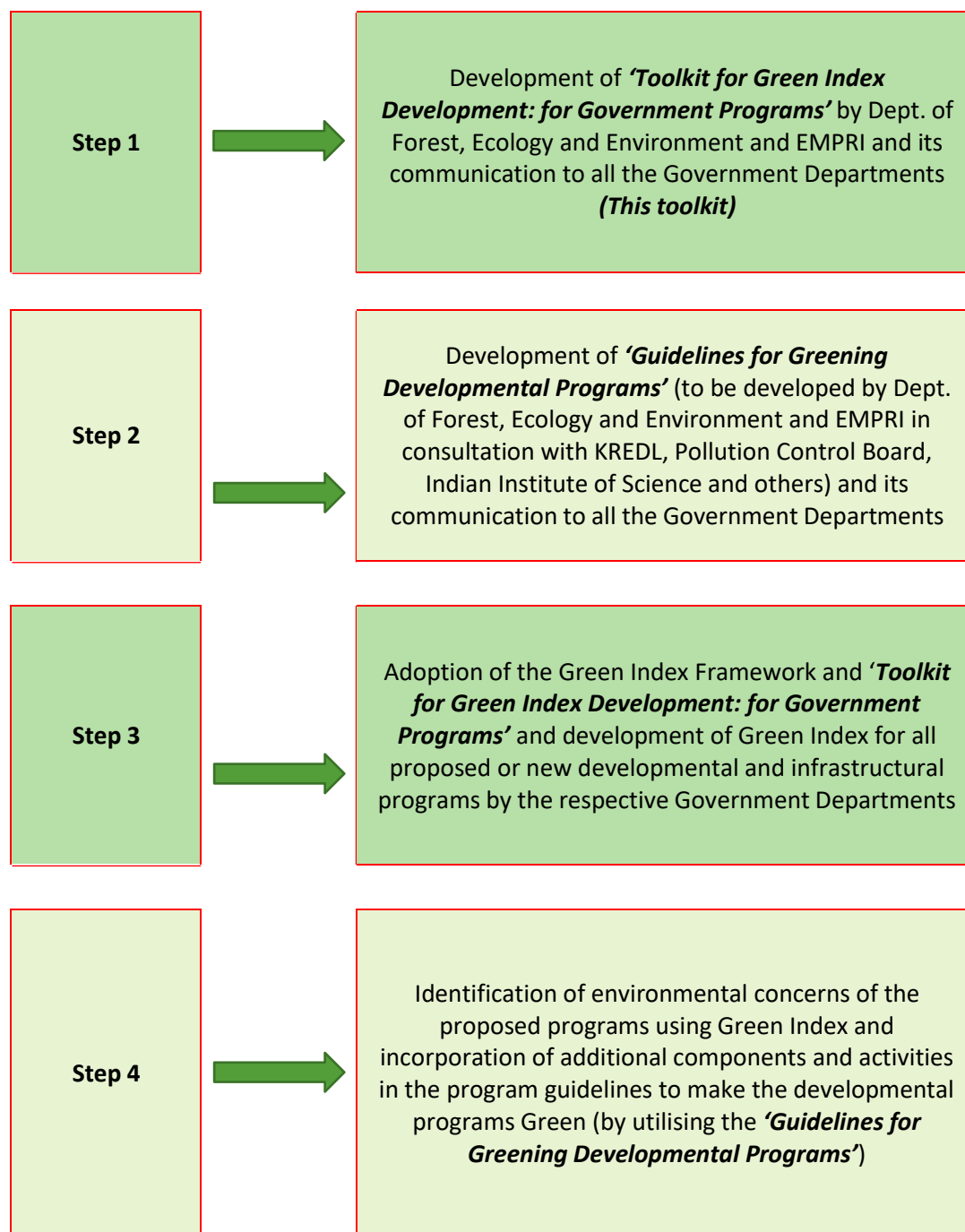
Development of Green Index creates multiple opportunities to promote Green Development at the state level. Some of the potential applications of the Green Index are as follows:

1. Enable policy makers or government departments and agencies to design programs and projects to ensure no adverse environmental impacts occur. Green Index would enable them to identify opportunities to minimize the damage to environment and promote conservation and sustainable use of resources. Green Index would assist in enhancing the greenness of developmental programs by identifying the critical environmental concerns that need to be addressed in designing the programs such as;
  - Water conservation and recycling measures are incorporated in the program guidelines
  - Energy efficiency and renewable energy technologies are incorporated in the guidelines
  - Solid or liquid waste generation is minimized and are treated, or managed by incorporating adoption of relevant pollution abatement technologies in the guidelines
  - GHG or carbon emissions are reduced by adoption of mitigation technologies.
2. Create awareness within the government departments and among different stakeholders such as NGOs, communities and mass media about environmental considerations in design and implementation of government programs or schemes.
3. Facilitate enhanced financial allocations and rewards to green and environmentally friendly programs and projects.
4. Empower the government, in a phased manner, to enforce use of renewable resources, conservation of resources, minimization of pollution, treatment of wastes, and regeneration of environment.
5. Meet the Nationally Determined Contributions (NDC) goals and targets relevant to climate change and SDGs (Sustainable Developmental Goals), and also facilitate implementation of State Action Plan on Climate Change.

Green Index adoption would enable government program or scheme developers to design programs or schemes to transform from being an environment damaging program or scheme → to a reduced environment damaging program or scheme → to a green (environmentally sound) program or scheme.

## 4. Approach to Greening

This *Toolkit* provides a simple approach and methodology to assess the environmental performance using a *Green index*, and to address environmental concerns at the program formulation or designing stage in the government. This involves four steps as given in Figure 1 and briefly described in the following sections.



**Figure 1:** Approach and steps for developing a Green Index

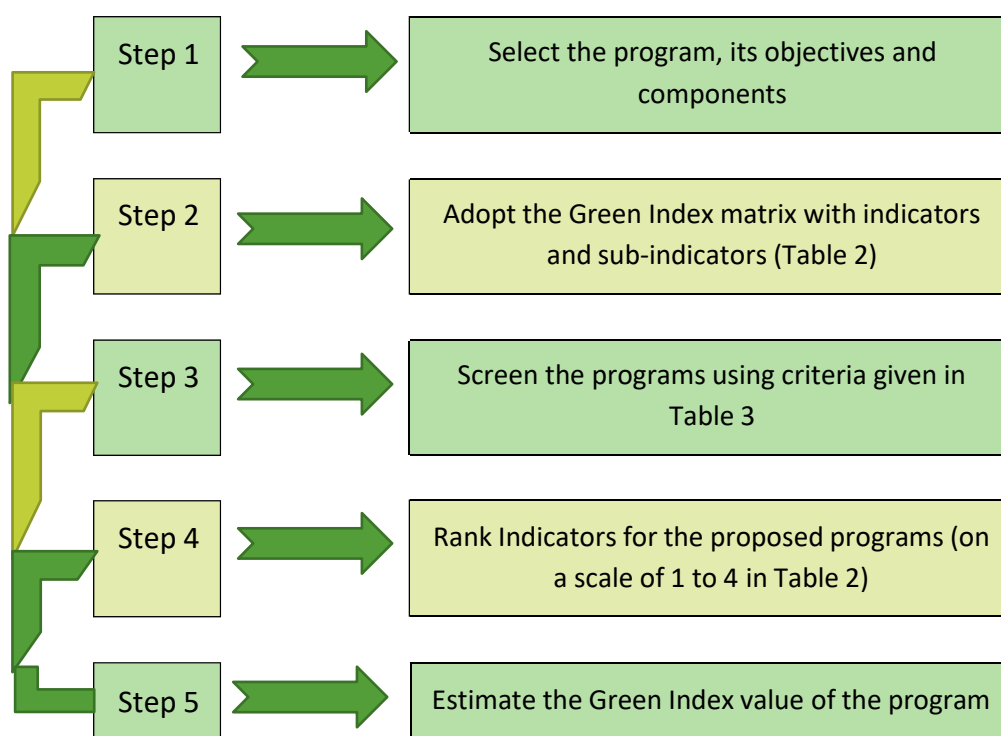
## PART II - APPLICATION OF TOOLKIT FOR GREEN INDEX DEVELOPMENT FOR GOVERNMENT PROGRAMS

Green Index could be developed at different stages of design, formulation, approval and implementation of government programs in the following manner:

1. Program or scheme development and designing stage
2. Approved and ongoing programs
3. Implementation stage of ongoing programs

*The focus of this Toolkit is to present guidelines for developing Green Index at the stage of designing, formulation and approval of new developmental programs or schemes.* Of course, this approach can also be used to develop Green Index and enhance Greenness of approved and ongoing programs. The first step is to select the new or proposed developmental and infrastructural program/scheme/project for Green Index development.

Figure 2 presents the steps involved in Green Index development for proposed government programs.



**Figure 2:** Steps for Green Index development

A description of the steps involved in Green Index development is presented below:

**Step 1: Select the program and its components:** Select the new or proposed program and procure the program objectives, components and guidelines or procedures for implementation.

**Step 2: Adopt the Green Index matrix:** This matrix would enable Green Index development utilizing the criteria and six indicators and sub-indicators (Table 2), related to; 1) Energy Conservation (and Renewable Energy), 2) Water Conservation and Recycling, 3) Waste Treatment and Recycling, and

Pollution Control, 4) Biodiversity Conservation, 5) CO<sub>2</sub> Emission Reduction and Sequestration, and 6) Adaptation to Disasters and Climate Change. Annex 1 presents the rationale for selection of these six indicators. The aim is to select a minimal set of indicators.

**Table 2:** Indicators and sub-indicators and indicator scoring for development of Green Index for the proposed programs

		Indicator Score			
Green Indicators	Green Sub-indicators	1	2	3	4
1. Energy Conservation (and Renewable Energy)	1. Mandatory provision or requirement for adopting Energy Efficiency standards or measures or appliances				
	2. Mandatory provision or requirement for adopting Renewable Energy technologies or measures				
2. Water Conservation and Recycling	1. Mandatory provision or requirement for water conservation or water harvesting or water recycling measures				
3. Waste Treatment and Recycling and Pollution Control	1. Mandatory provision for wastewater treatment				
	2. Mandatory provision for solid waste treatment and recycling measures				
	3. Mandatory provision for air pollution control				
4. Biodiversity Conservation	1. Mandatory provision for regulating tree felling and conservation of biodiversity (trees/fishes/wildlife/others)				
	2. Mandatory provision for promoting tree planting and conservation measures				
5. CO <sub>2</sub> Emission Reduction and Carbon Sequestration	1. Mandatory provision for CO <sub>2</sub> or GHG emission reduction measures or tree planting for carbon sequestration				
6. Adaptation to Disasters and Climate Change	1. Mandatory provision for adaptation activities to minimize damage or cope with any climate change or weather related impacts and disasters				

**Step 3: Screen the programs:** Screening of the programs is achieved by providing an index value to each of the indicators and sub-indicators and using a colour scheme of Green (indicator value of 4), Light Green (3), Orange (2), and Red (1). Detailed explanation for scoring of indicators and colour scheme is provided in Table 3.

**Step 4: Ranking of Indicators for the proposed program:** This step involves scoring of the indicators and sub-indicators on a scale of 1-4 using the criteria provided in Table 3 for the selected program. If an indicator or sub-indicator has no relevance for the proposed program and its components, assign a score of '0 - Zero'.

**Step 5: Estimate the Green Index value:** This step involves estimation of the Green Index value for the program based on the scores given for the indicators and sub-indicators in Table 2.

- **Indicator Count:** Count the number of sub-indicators relevant to the program, which have been assigned a score of 1 to 4 and obtain the '*Indicator Count*'. Do not include sub-indicators that are not relevant and have been assigned a score of '0 - Zero'.
- **Aggregate Index Score:** Sum the scores of sub-indicators for which a score of 1 to 4 has been assigned and obtain the '*Aggregate Index Score*' value.
- **Green Index:** Divide the '*Aggregate Index Score*' value by the '*Indicator Count*' to obtain the Green Index for the proposed program.

**Table 3:** Scoring criteria for Indicators and Sub-Indicators using colour codes

Green Indicators	Green Sub-Indicators	Green	Light Green	Orange	Red
		Score = 4	Score = 3	Score = 2	Score = 1
1. Energy Efficiency (EE) and Renewable Energy (RE)	Is there a mandatory provision or requirement for adopting Energy Efficiency standards or measures or appliances?	Mandatory provision or requirement for adopting Energy Efficiency standards or measures exists in the program	No mandatory provision or requirement but includes some EE measures or equipment or appliances	Marginal or limited inclusion of Energy Efficiency technologies or measures which are incidental to the program	Energy Efficiency standards or measures required but not included
	Is there mandatory provision or requirement for adopting Renewable Energy technologies or measures?	Mandatory provision or requirement for adopting Renewable Energy technologies or measures exists in the program	No mandatory provision or requirement but includes some RE technologies or measures	Marginal or limited inclusion of Renewable Energy technologies or measures which are incidental to the program	Renewable Energy technologies or measures required but not included
2. Water Conservation and Recycling	Is there mandatory provision requirement for adoption of water conservation or water harvesting or water recycling measures?	Mandatory provision or regulation for adoption of water conservation or harvesting or recycling measures exists in the program	No mandatory provision or requirement but includes some water conservation or harvesting or recycling measures	Marginal or limited inclusion of water conservation or harvesting and recycling measures which are incidental to the program	Water conservation, water harvesting and water harvesting measures required but not included
3. Waste Treatment and Recycling and Pollution Control	Is there mandatory provision or requirement for wastewater or polluted water treatment?	Mandatory provision or regulation for treatment of wastewater or polluted water exists in the program	No mandatory provision or requirement but includes some measures for treatment of waste or polluted water	Marginal or limited inclusion of measures for treatment of wastewater which are incidental to the program	Wastewater treatment measures required but not included
	Is there mandatory provision or requirement for adoption of solid waste treatment and recycling measures?	Mandatory provision or regulation for adoption of solid waste treatment and recycling measures exists in the program	No mandatory provision or requirement but includes some measures for solid waste treatment and recycling	Marginal or limited inclusion of measures for solid waste treatment and recycling which are incidental to the program	Solid waste management and recycling measures required but not included
	Is there mandatory provision or requirement for adoption of air pollution control measures?	Mandatory provision or requirement for adoption of air pollution control measures exists in the program	No mandatory provision or requirement but includes some measures for air pollution control	Marginal or limited inclusion of measures for pollution control which are incidental to the program	Air pollution control measures required but not included



Green Indicators	Green Sub-Indicators	Green	Light Green	Orange	Red
		Score = 4	Score = 3	Score = 2	Score = 1
4. Biodiversity Conservation	Is there mandatory provision or requirement for regulating tree felling and conservation of biodiversity (trees /fishes /wildlife / others)	Mandatory provision or requirement for regulating tree felling and conservation of biodiversity (trees /fishes / wildlife /others) exists in the program	No mandatory provision or guidelines but includes measures for regulating tree felling or conservation of biodiversity (trees /fishes / wildlife /others)	Marginal or limited inclusion of measures for regulating tree felling or conservation of biodiversity (trees /fishes / wildlife /others), which are incidental to the program	Regulations on tree felling and conservation of biodiversity (trees / fishes /wildlife /others) required but not included
	Is there mandatory provision or requirement for promoting tree planting and conservation measures?	Mandatory provision or requirement for promoting tree planting and conservation measures exists in the program	No mandatory provision or requirement but includes some measures for promoting tree planting	Marginal or limited inclusion of measures for promoting tree planting which are incidental to the program	Promotion of tree planting and conservation required but not included
5. CO <sub>2</sub> Emission Reduction and Carbon Sequestration	Is there mandatory requirement for CO <sub>2</sub> and other GHG emission reduction measures and tree planting for carbon sequestration	Mandatory provision or requirement for reducing GHG emissions or promoting tree planting measures exists in the program	No mandatory provision or requirement but includes some GHG reduction or tree planting measures	Marginal or limited measures for GHG emission reduction or tree planting for carbon sequestration which are incidental to the program	GHG emission reduction or tree planting for carbon sequestration required but not included
6. Adaptation to Disasters and Climate Change	Is there mandatory requirement to include actions to minimize damage or cope with loss from climate change or weather related disasters (floods, droughts, cyclones, hurricanes)?	Mandatory provision or requirement for adaptation to climate change and disaster management exists in the program	No mandatory provision or requirement but includes measures for adaptation to disasters and climate change	Marginal or limited measures for adaptation to disasters and climate change which are incidental to the program	Adaptation to disaster and climate change required but not included

## Demonstration of Green Index Development for Off-grid Solar PV Program of the Energy Department

### *Scoring or Ranking of Indicators*

Indicator	Sub-Indicators	Score
1. Energy Conservation (and Renewable Energy)	1. Mandatory provision or requirement for adopting Energy Efficiency standards or measures or appliances	1
	2. Mandatory provision or requirement for adopting Renewable Energy technologies or measures	4
2. Water Conservation and Recycling	1. Mandatory provision or requirement for water conservation or water harvesting or water recycling measures	0
3. Waste Treatment and Recycling and Pollution Control	1. Mandatory provision for wastewater treatment	0
	2. Mandatory provision for solid waste treatment and recycling measures	0
	3. Mandatory provision for air pollution control	0
4. Biodiversity Conservation	1. Mandatory provision for regulating tree felling and conservation of biodiversity (trees/fishes/wildlife/others)	0
	2. Mandatory provision for promoting tree planting measures	0
5. CO <sub>2</sub> Emission Reduction and Carbon Sequestration	1. Mandatory provision for CO <sub>2</sub> or GHG emission reduction measures or tree planting for carbon sequestration	3
6. Adaptation to Disasters and Climate Change	1. Mandatory provision for adaptation to minimize damage or cope with any climate or weather related impacts and disasters	0

### *Indicator Count*

For the Off-grid Solar PV program, 3 of the 10 sub-indicators are relevant and have a score of 1 to 4. Therefore, the Indicator Count for the program is 3.

### *Aggregate Index Score*

3 of the 10 sub-indicators have a score of 1 to 4 and the sum of these 3 sub-indicators is 8.

Energy Conservation (and Renewable Energy) [1+4] + CO<sub>2</sub> Emission Reduction and Carbon Sequestration [3] = 8

$$\text{Green Index} = \frac{\text{Aggregate Indicator Score}}{\text{Indicator Count}} = \frac{8}{3} = 2.6 \text{ approximately} = 3$$

That means the “the off-grid solar PV” program is *Light Green*, with a potential to become *Green*.

## Demonstration of Green Index Development for Social Forestry Program of the Forest Department

### *Scoring or Ranking of Indicators*

Indicator	Sub-Indicators	Score
1. Energy Conservation (and Renewable Energy)	1. Mandatory provision or requirement for adopting Energy Efficiency standards or measures or appliances	0
	2. Mandatory provision or requirement for adopting Renewable Energy technologies or measures	1
2. Water Conservation and Recycling	1. Mandatory provision or requirement for water conservation or water harvesting or water recycling measures	3
3. Waste Treatment and Recycling and Pollution Control	1. Mandatory provision for wastewater treatment	0
	2. Mandatory provision for solid waste treatment and recycling measures	1
	3. Mandatory provision for air pollution control	0
4. Biodiversity Conservation	1. Mandatory provision for regulating tree felling and conservation of biodiversity (trees/fishes/wildlife/others)	
	2. Mandatory provision for promoting tree planting measures	4
5. CO <sub>2</sub> Emission Reduction and Carbon Sequestration	1. Mandatory provision for CO <sub>2</sub> or GHG emission reduction measures or tree planting for carbon sequestration	3
6. Adaptation to Disasters and Climate Change	1. Mandatory provision for adaptation to minimize damage or cope with any climate or weather related impacts and disasters	0

### *Indicator Count*

For the Social Forestry program, 5 of the 10 sub-indicators have a score of 1 to 4. Therefore, the Indicator Count for the program is 5.

### *Aggregate Index Score*

5 of the 10 sub-indicators have a score of 1 to 4 and the sum of these 5 indicators is 12.

Energy Conservation (and Renewable Energy) [1] + Water Conservation and Recycling [3] + Waste Treatment and Recycling and Pollution Control [1] + Biodiversity Conservation [4] + CO<sub>2</sub> Emission Reduction and Carbon Sequestration [3] = 12

$$\text{Green Index} = \frac{\text{Aggregate Indicator Score}}{\text{Indicator Count}} = \frac{12}{5} = 2.4 \text{ approximately} = 2$$

**That means the 'Social Forestry' program is Orange with a potential to become Light Green.**

## PART III - APPROACH TO ENHANCING GREENNESS OF 'PROPOSED PROGRAMS'

The main goal of Green Index concept is to make development green and sustainable. This could be achieved by incorporating guidelines and measures to address the identified environmental concerns in all the developmental and infrastructural programs / schemes / projects. The '*Guideline for Greening of Developmental Programs*' (yet to be developed) provides an approach for enhancing the greenness of the proposed programs, using the indicators and sub-indicators that have been scored using the '*Toolkit for Green Index Development: for Government Programs*'. The guidelines provide detailed procedures to enhance the greenness of the proposed program. Here a summary of the steps involved are presented.

1. **Identify the drivers of Green Index:** Identify all the indicators and sub-indicators which have an index score value of 1 (Red), 2 (Orange), and 3 (Light Green). These scores and colour scheme indicate opportunities for enhancing the Greenness of the proposed program in a gradual manner as given below:
  - Directly transition from Red to Green
  - Transition from Red to Orange or Orange to Light Green – since some programs may not have cost-effective and feasible technologies or measures to directly transition to Green.
  - Transition from Red to Orange or Orange to Light Green is the first step and further transition to Green gradually during the project period.
  
2. **Enhance the Greenness of the proposed programs:** Using the '*Guideline for Greening Developmental Programs*', enhance the Greenness of the programs by adopting the following procedure:
  - Identify the opportunities, technologies, interventions and regulatory standards to be incorporated, into the proposed program to enable transition towards Green Index or development.
  - Assess the cost of the technology or intervention or regulatory standard per unit or for the whole program. Some interventions such as energy efficient systems may indeed save money.
  - Incorporate the identified green technology or regulatory standards into the components of the proposed program or to the program guidelines or Government Order or Work Plan or Detailed Project Report.
    - Some programs may require mandatory provision for adopting, for example, energy efficiency standards or installation of renewable energy systems or water conservation measures, or waste recycling or compensatory tree planting and CO<sub>2</sub> emission reduction.
  - Create budgetary provision or incentives for adoption of the proposed green technologies, interventions and regulatory standards.

## Annexures

### Annex 1: Indicators and rationale for inclusion in development of Green Index

Indicators	Rationale
1 Energy Conservation and Renewable Energy	<ul style="list-style-type: none"> <li>• Most activities require energy</li> <li>• Energy efficiency opportunity exists for all activities and may lead to cost savings</li> <li>• Need to shift to RE as opportunities exist for shifting to RE and may be cost effective</li> <li>• Adoption of low efficient systems and use of fossil fuel-based energy leads to air pollution, land degradation and GHG / CO<sub>2</sub> emissions</li> </ul>
2 Water Conservation and Recycling	<ul style="list-style-type: none"> <li>• Most programs or activities require use of water</li> <li>• Water crisis and depleting ground water are major environmental concerns</li> <li>• Technologies exist for water conservation, harvesting and recycling</li> </ul>
3 Waste Treatment and Recycling and Pollution Control	<ul style="list-style-type: none"> <li>• Most processes and activities using natural resources, energy and materials lead to waste generation or pollution</li> <li>• Waste minimization, waste recycling and reduction of air pollution are critical environment and health concerns</li> </ul>
4 CO <sub>2</sub> Emission Reduction and Carbon Sequestration	<ul style="list-style-type: none"> <li>• CO<sub>2</sub> or GHG emissions is a national and global environmental concern</li> <li>• Paris Agreement and NDC require reduction of GHG emissions, estimation and reporting of GHG emissions and mitigation actions</li> <li>• Need to avoid tree felling and promote tree planting and soil conservation leading to carbon sequestration</li> </ul>
5 Biodiversity Conservation	<ul style="list-style-type: none"> <li>• Biodiversity conservation opportunities exist and must be adopted for sustained flow of ecosystem services</li> </ul>
6 Adaptation to Disasters and Climate Change	<ul style="list-style-type: none"> <li>• Impact of climate change on infrastructure, agriculture, forest, water, health, and disasters needs to be addressed in the long-term</li> <li>• Opportunities and technologies exist for climate proofing or adaptation to climate risks and disasters</li> </ul>