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Environmental Sustainability Index for Indian States 2009

Environmental Sustainability Index (ESI) is a comparative analysis of environmental achievements, challenges and priorities among Indian states. It is designed to sensitize, inform and empower citizens and policy makers.

It aggregates quantitative data on states' initial endowment and resource use trajectory, magnitude of pollution and its impact on human health & ecosystem vitality, policy & societal response to maintain and improve present environmental conditions into a composite index that provides the overall picture of state-level sustainability.

More on ESI and how the states have fared in different aspects of sustainability can be accessed at the interactive website www.greenindiastandards.com

ESI measures the potential of states to maintain their environment in the coming decades given the various environmental resources that a state is endowed with. Dimensions of sustainability both as historical conditions and present efforts are mapped through 40 indicators in 28 states of India; and ESI is constructed as a composite index from these 40 key environmental indicators. Although there are no clear normative benchmarks or thresholds for 'good' performance on many of the indicators, scores on each indicator can be ranked from 'best' to 'worst'. The index is constructed on this relative variation within the dataset thus providing a comparative benchmark for Indian states with their peers.

Based on the aggregate ESI, states are categorized into five groups: most sustainable (top 20 percentile), more sustainable (60-80 percentile), medium sustainable (40-60 percentile), less sustainable (20-40 percentile) and least sustainable (bottom 20 percentile). Higher ESI for a state indicates the state has the benefit of better environmental quality and/or policy thus creating the potential to maintain its environment in the future. Lower ESI for a state is an indication of challenges in sustainable development due to higher pollution and degradation, more stress on the ecosystems and/or less responsive policies and institutions.

While ESI results are largely consistent with the common perception regarding environmental conditions in the states of India; ESI also reveals some unexpected patterns of state level sustainability. Most states with abundant natural resources, Himalayan states and Kerala, for example, have scored high. However, other states with high endowment such as Orissa, Jharkhand, Chhattisgarh, Madhya Pradesh and Goa fall in the medium and less sustainable categories. Likewise, larger states that have experienced intensive industrialization and/or agricultural development like Gujarat, Punjab and Uttar Pradesh have scored less in ESI. However, states like Tamil Nadu and West Bengal have maintained environmental conditions in spite of the relatively high intensity of economic activity and demographic pressure in these states. Such revelations emphasize that a composite index offers a macro snapshot which is a result of the aggregation of its underlying elements. Therefore, analysis of the components and sub-indices gives a more complete and detailed picture for state level sustainability.

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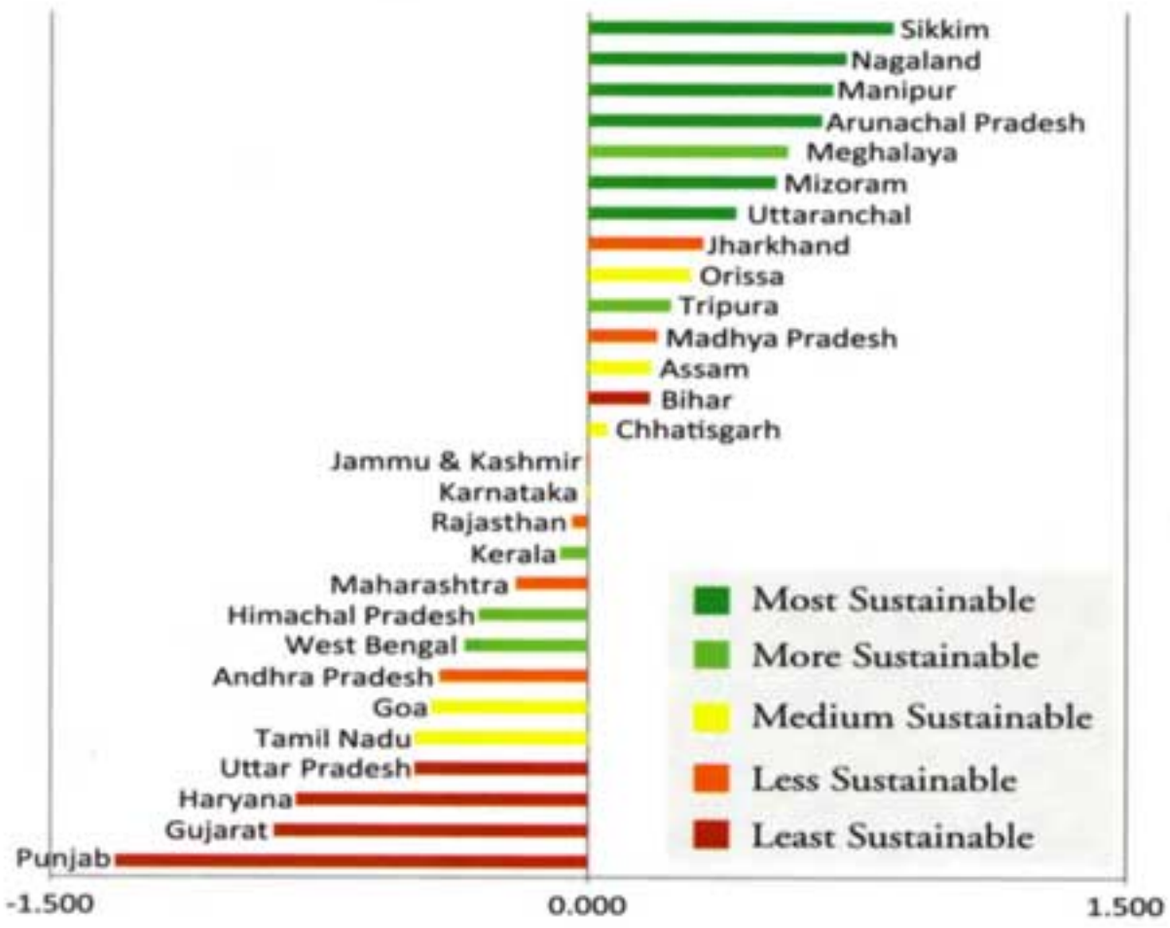
ESI is developed based on the Driving Force-Pressure-State-Impact-Response framework. Thus the chain of causal links starting with '*driving forces*' (Anthropogenic activities) through '*pressures*' (pollution& waste) to '*states*' (air quality, water quality) and '*impacts*' on human health, eventually leading to political '*responses*' (conservation, emission reduction) is reflected in the ESI. Since a state's long term sustainability is a combination of the stock (historical endowment) and flow (environmental services and rate of resource extraction leading to depreciation of the stock); disaggregating states' overall ESI into these components reveals some interesting patterns of sustainability.

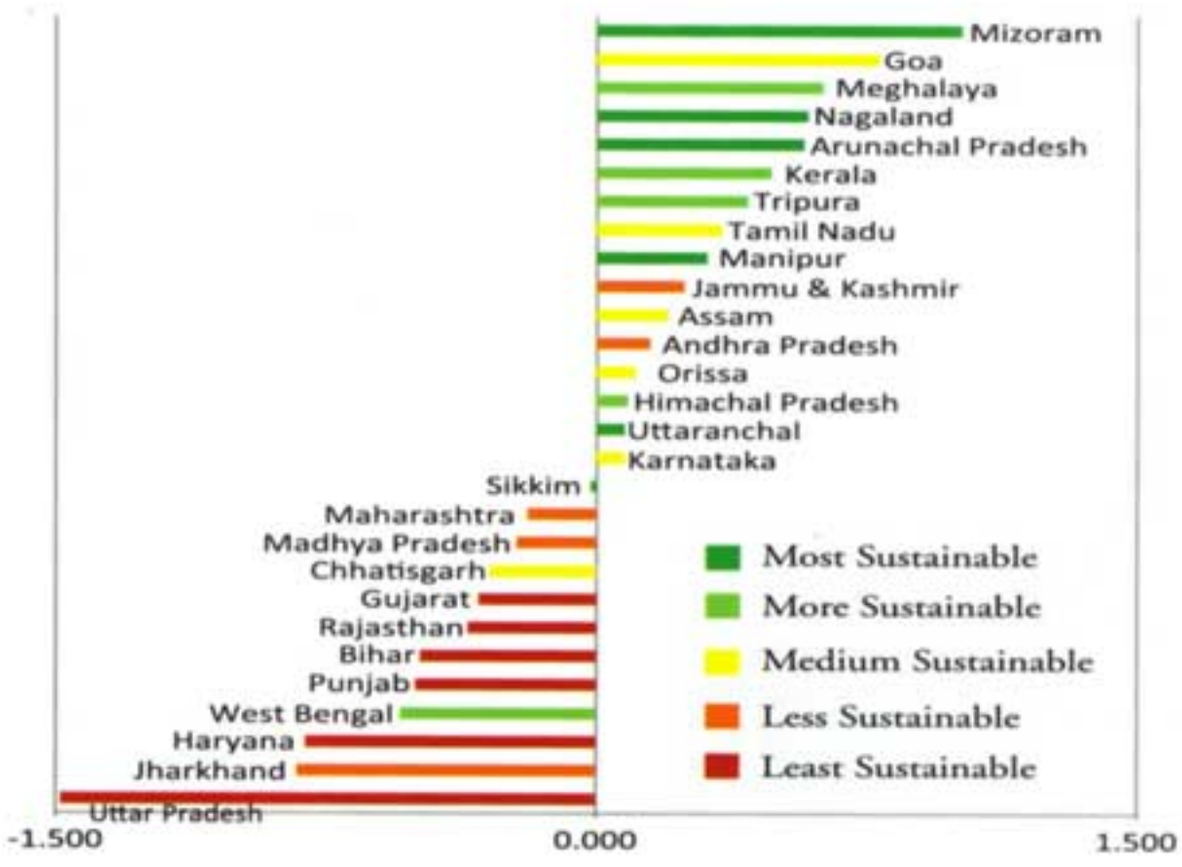
Reducing Pressure on environment

States on the right of y-axis are doing better than states on the left. For states on the right side, the longer the bars, the less pressure is on its environment. For states on the left side, longer bars mean more pressure on environment. All values are in standardized scores.



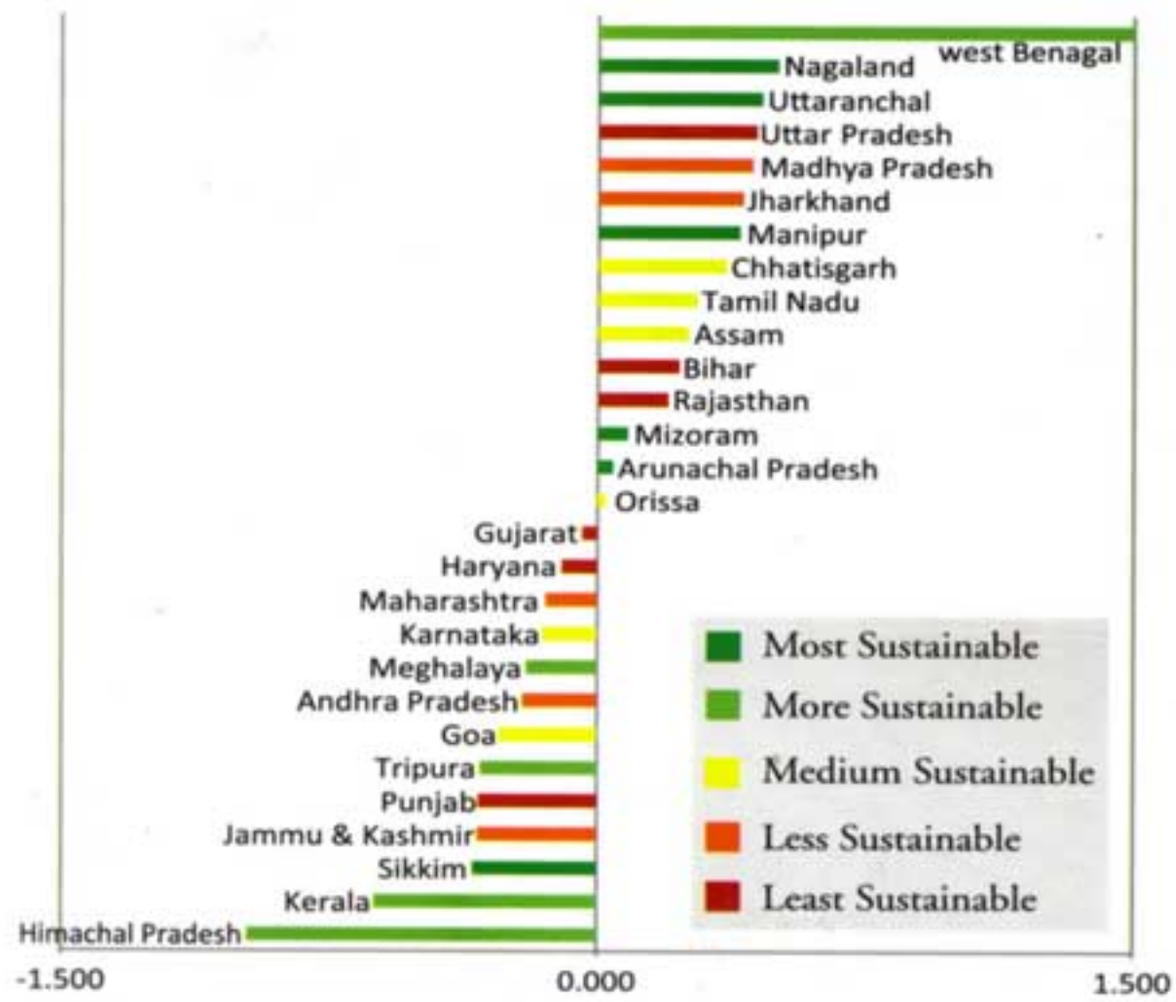
Impact on Human Health & Ecosystem

States on the right of y-axis are doing better than states on the left. For states on the right side, the longer the bars, the lesser the impact on human health. For states on the left side, longer bars indicate more negative impacts due to pollution and degradation. All values are in standardized scores.



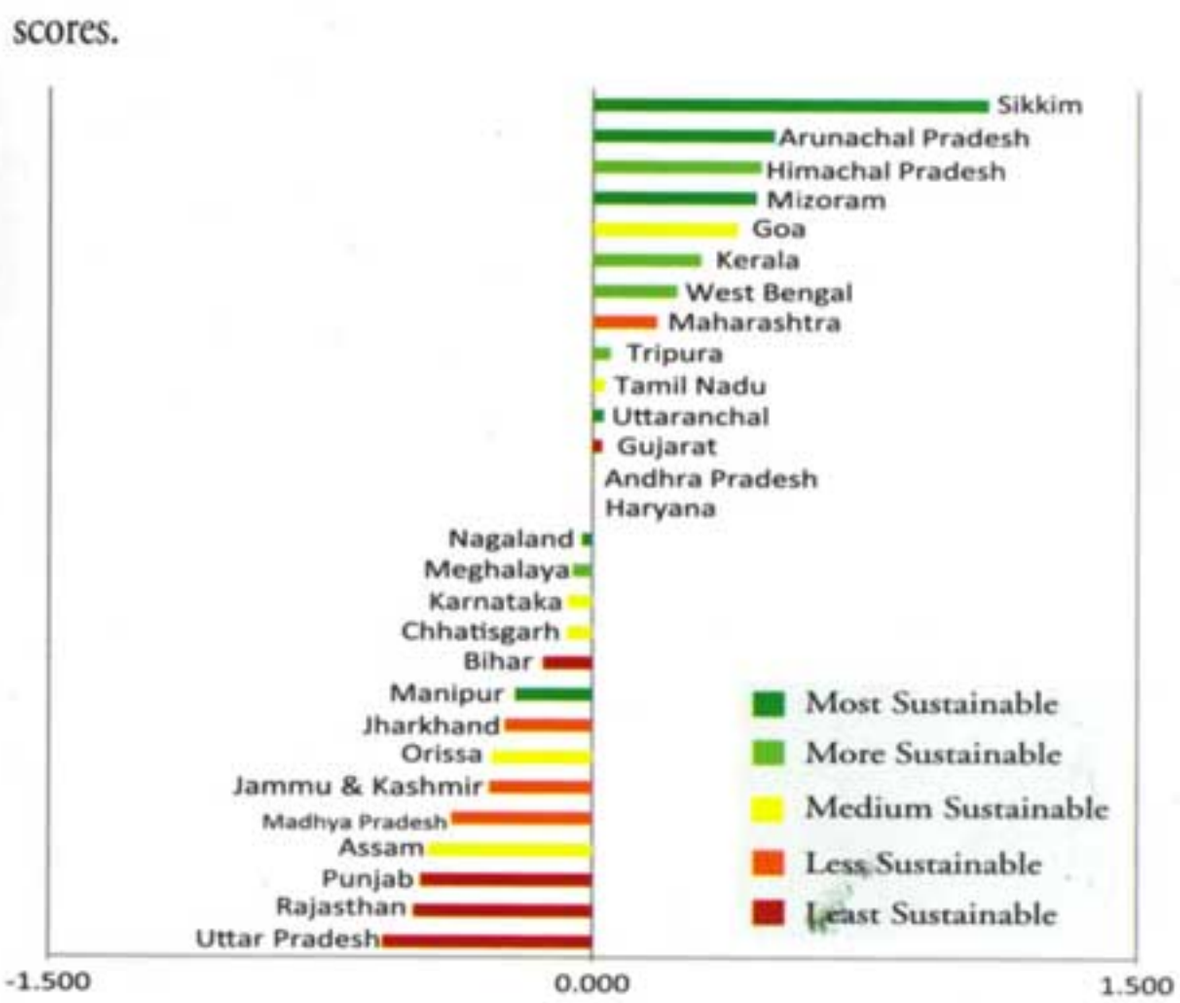
Quality/State of Environment

States on the right of y-axis are doing better than states on the left. For states on the right side, the longer the bars, the better the quality of their environment. For states on the left side, longer bars indicate worse environmental quality. All values are in standard scores.



States' Responses to maintain their environment

States on the right of y-axis are doing better than states on the left. For states on the right side, the longer the bar, the more responsive is the society to maintain its environment. For states on the left side, longer bar indicates lesser responsiveness. All values are in standardized scores.



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How ESI is constructed

Selecting the indicators based on the Driving Force-Pressure-State-Impact-Response framework& Collecting data for each indicator across 28 states

Segregating the indicators into 9 policy areas such as Air, Water, Land use, Forest, Waste, Energy, Health, Population and Budget; each of which forms a sub-index

Aggregating 9 sub-indices from underlying indicators &aggregating ESI as equally weighted composite index from the 9 sub-indices

ESI

How Indicators are selected and mapped into sub-indices is shown below.

	Driving Force	Pressure	State	Impact	Response
Air		• Motor vehicle density	• Concentration of SO2, NO2, SPM and RSPM		
Water		• Groundwater extraction • Water usage in irrigation	• BOD • Coliform • Replenishable ground water • Drinking water		
Land use and Agriculture		• Grazing land • Fertilizer consumption • Pesticide consumption		• Land affected by salinity, acidity and waterlogging • Soil erosion	
Forest and Biodiversity		• Change in forest area • Encroachment	• % land area under forest cover		• Protected area • Wetland • Compensatory reforestation • Joint Forest Management
Waste		• Municipal solid waste • Hazardous waste			• Gap in sewage treatment
Energy					• Usage of Non-LPG cooking fuel • Energy per unit of SGDP • Renewable energy installed
Health and Natural Disaster				• Incidence of respiratory diseases and water borne diseases • Flood affected area • Drought prone area • Loss due to disasters	
Population Pressure	• Population density • Population growth • Fertility rate				
Environmental Budget					• Budget for Renewable energy • Environmental budget as % of SGDP • Actual expenditure vs. outlay

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State level ESI is primarily a diagnostic tool for informing and empowering the government and policy makers, concerned citizens, researchers and activists.

ESI is developed with the objectives of:

- Promoting information and evidence based policy making
- Prioritization in policy and budget allocation within the state
- Measuring and monitoring sustainable development at the state level

ESI is designed to inform the policy process by advocating an empirical, data driven approach to environment policy. It highlights environmental concerns at the sub-national level, targeting states as the agencies that can change the policy and environmental outcomes. India's federal structure allows the states considerable jurisdiction and autonomy to formulate policies and implement strategies at the state level. Moreover, each state's environmental challenges are different from others and so is their resources and capability to address such issues. Environmental priorities and pressures vary widely across India's vast geographic terrain and the ESI provides one way of understanding these differences. A state's long- term sustainability is a function of its present environmental conditions, resource use patterns, vulnerability and resilience to environmental shocks, and institutional capabilities to preserve the ecosystem. ESI accumulates information on all the above aspects and compresses them into a simple and actionable format. By revealing patterns of sustainability in terms of the sub-indices, it also acts as a pointer to areas that require further analysis and possible action.

ESI is a measure of relative sustainability based on the pattern and degree of variation within the dataset, not a proximity-to-target approach where a state's performance is measured and compared in absolute terms. Being a relative measure, it does not tell how states fared this year as compared to previous years; rather it identifies peer groups, leaders and laggards. While the comparison will tend to create peer pressure with each state wanting to perform better than the other; there is also a scope of mutual learning from best practices and the peer groups can analyze the relative situations and design policies accordingly.

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