Environmental Sustainability Index: Tamil Nadu

Increasing importance has been given to the integration of environment and economic development in policy-planning process. However, particularly in case of India, data deficiency clearly affects the policy making process. Lack of focused information about various sustainability issues, at state and national level, is not available to various stakeholders like policy makers, private sector, Non Governmental Organizations (NGOs), preventing any further sustainability analysis. Environmental Sustainability Index (ESI), developed by Centre for Development Finance attempts to address these issues of environmental sustainability. ESI, formulated primarily as a diagnostic tool for informing and empowering policy makers, citizens, researchers and activists, seeks to fulfil three main objectives. First, to provide information to ensure evidence-based policy making; second, to facilitate prioritisation of budget allocation between various resource sectors and lastly, to measure and monitor sustainable development at the state level over time.

This research project is an effort to map the current sustainability levels of the Indian states, while simultaneously projecting their ability to protect the environment in the future. Dimensions of sustainability are captured through forty-one indicators, culled from a wide range of themes such as air, water, land, forests, and impacts of pollution on ecosystem and human health and policy responses by various stakeholders. Based on the aggregate score, states are categorised into five groups: 'most' sustainable (top 20 percentile), 'more' sustainable (60-80 percentile), 'moderately' sustainable (40-60 percentile), 'less' sustainable (20-40 percentile) and 'least' sustainable (bottom 20 percentile).

Each state's environmental resources, capabilities and hence challenges differ from others. Hence the tool compares the states across six peer groups; created on the basis of GDP per capita and contribution to India s GDP. Sub index analysis of peer groups reveals a pattern; similar environmental issues are being faced by states with comparable growth trajectories. Consequently, a deeper analysis of successful sectoral policies is initiated to enhance knowledge about policy initiatives and outcomes at state level. In this context, this case let series aims to highlight initiatives (in terms of policy and implementation measures) taken by various state governments to tackle a plaguing environmental issue in their peer group.

This case let focuses on ***Tamil Nadu***, categorized under "*yellow*" state which signifies that it scores in the 41-60 percentile category. Tamil Nadu has been in the forefront in terms of performance of the State Electricity Board s, rural electrification, power generation, amount of energy sold and consumers serviced. But, the state suffers a severe power deficit even though it continues to lead the way in renewable energy production. This could be due to its complicated policies and lack of long-term strategy for the renewable energy sector. The following sections provide a snapshot of ESI score and highlight some of the key policies and programs adopted by the State.

ESI Snapshot

ESI Group	Yellow
Other states in same ESI group	Karnataka, Kerala, Goa, Andhra Pradesh, Maharashtra
% contribution to overall India's GDP	7.43
SGDP per capita / annum	37090
% population living below poverty line	6.61
Population density per square km area	501
Total forest and tree cover as % of total geographic area	21.25

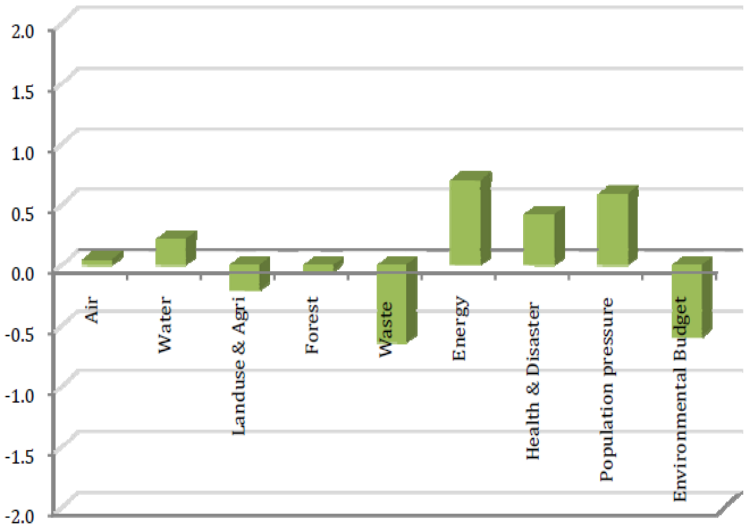

Fig 1: ESI as per 9 sub indices

The spider chart shows the sustainability of states in terms of Driving Force-Pressure-State-Impact-Response. All values are standardized scores. Values farther from the centre indicate better performance. A state's higher positive score in 5 different components add up; and higher green area indicates better performance by the state in all components.

Columns that lie above the X axis depict a better than average performance (as compared to all 28 states). Columns that lie below the X axis depict a less than average performance (as compared to all 28 states). The height of a column indicates the degree to which a state has performed better or worse than others in that particular sub index. All values are in standardized scores. All sub indices are adjusted to ensure that higher values indicate better performance in that aspect of sustainability.

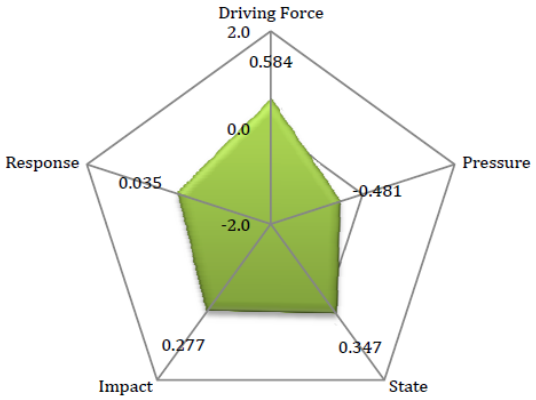

Fig 2: ESI as per DPSIR framework

Introduction

Tamil Nadu is the sixth most populous state in India, and the third highest ranked state in terms of the Human Development Index. A coastal state located in the southern-most part of the Indian peninsula, Tamil Nadu comprises approximately 4 percent of the country's total land area, 6 percent of the total population and 7 percent of the country's overall GDP[1]. Amongst the most developed states in the country, Tamil Nadu possesses two key features - high industrialization rates and the highest levels of urbanization (i.e. 43.86 percent[2]). It accounts for 11-12 percent of the country's industrial output, and ranks third in terms of the per capita state product from the manufacturing industry[3]. Although Tamil Nadu is ranked highest in the level of urbanization and features a population growth of 0.9 percent per annum[4], over 60 percent of the population in this state is involved in agriculture, making it a prime contributor to the state's economy. Corollary to this, resource extraction and waste generation rates are high with the total effluent generated measuring six lakh litres per day, of which 85 percent is created by large industries. A high rate of natural resource extraction has resulted in a large gap between the demand for ground and surface water (54,395 million cubic metres) and its supply (46,540 million cubic metres). Supplementing the rapid pace of economic development, the state is facing daunting issues related to the management of municipal and hospital waste along with water quality problems due to industrial effluents. A speedy growth of industrial clusters has resulted in the generation of hazardous wastes and high energy requirements. Infrastructure facilities, as well as high quality power at reliable rates, form the crux of economic growth and competitiveness and, hence, are highlighted in the state level policy development.

Energy: Policies and Incentives

Tamil Nadu's per-capita gross annual electricity consumption is high at 976 kWh as compared to the country average of 631 kWh. Until the last quarter of 2010, Tamil Nadu was a power deficit state with a deficit of 843 MW[5]. The state generates energy mainly through thermal sources (approximately 47 percent) while 34 percent of the energy is generated from renewable energy sources (excluding hydro)[6].

Tamil Nadu leads other states for generating power from renewable energy sources. The state's total installed capacity of power from renewable energy sources (including small hydro) comprises about 37% of the total installed capacity in India. Across the country, an average of 7.5% of the total grid is comprised of the renewable energy grid which is a stark contrast from Tamil Nadu where 27 percent of the total grid is fuelled by renewable sources. Extensive availability and favourable government policy ensure that wind energy is successfully

[1] http://en.wikipedia.org/wiki/Tamil_Nadu (Accessed on September 4,2010)
[2] Census 2001
[3] Planning Commission,GoI. (2005). *Tamil Nadu Development Report.* New Delhi: Academic Foundation.
[4] Tamil Nadu State Planning Commission. (2008). *Eleventh Five Year Plan 2007-12.* Chennai: Tamil Nadu State Planning Commission.
[5] Central Electricty Authority. (April-July 2010). *Quarterly Report (Power Supply Position,.* New Delhi.

[6] Central Electricity Authority. (June 2010). *Installed Capacoty of Power Utilities in the State,* New Delhi.

Odanthurai: Renewable energy solutions project by a local government body

While the state government was helping private companies acquire land and set up wind power projects in Coimbatore, Mr. Shanmugam, the Panchayat President of Odanthurai thought of a similar initiative that could be carried out under the ownership of the panchayat. After generating Rs. 35 lakhs as marginal money to make the wind farm feasible, the panchayat was in need of an additional Rs 1 crore. Getting approval from the banks posited a novel issue since the district administration was unsure of whether a panchayat was eligible for a bank loan. Commissioned in 2006, the project was initiated under the Remunerative Enterprises Scheme and became the first such project to be undertaken by a local body in India. The wind farm became a profit centre for the panchayat as it generated 7.5 lakh units of electricity annually in contrast to the 4.5 lakh units required by the panchayat. An annual income of Rs. 19 lakh, through the sale of the remaining 3 lakh units to the Tamil Nadu Electricity Board, saved annual electricity charges worth Rs. 8 lakh. Keeping the momentum going, the gram panchayat installed 65 solar streetlights in two hamlets and a 9KW biomass gasifier to pump drinking water. Although the panchayat continues to face three hours of power disruption every day, this does not affect the drinking water pumping operations and street lighting since these run on renewable energy. This commendable project by a local government body was nominated for the World Clean Energy Awards in 2007.

Source: http://www.cleanenergyawards.com/top-navigation/nominees-projects/nominee-detail/project/49/?cHash=9a8f9e521c (Accessed on July 29, 2011)

harnessed. Most of the wind power projects are privately owned while the state government purchases the power generated, thus, allowing the wheeling and banking of captive power at concessional rates.

Institutional Setup

The Tamil Nadu Energy Development Agency (TEDA) was established in 1985 with the objective of bridging the increasing energy demand and supply gap along with planning for renewable energy sources in anticipation of future demand. The state planning commission places emphasis on a reform-oriented approach, which focuses on measurable outputs rather than just financial performance. Tamil Nadu was one of the first states to comprehend the non-extension of grid power resulting in the establishment of decentralised power systems, which facilitated the development of remote areas. Currently all the 30 districts in the state have a District Level Renewable Energy Advisory Committee to carry out promotional activities at the district level. During 2002-07, the state government spent approximately 70 percent of the Tenth Plan outlay to meet the decentralized energy requirements through renewable energy. Rather than emphasizing the utility of renewable sources in industries, the state is dependent on rural and urban local bodies for rural electrification under the Integrated Rural Energy Programme. This approach has resulted in the state surpassing its 2006 national target, of generating 10 percent of grid capacity from renewable energy sources, by 24 percent.

Renewable Energy Financing

Although the state ranks first in wind power generation, its dependence on nature leads to a wide fluctuation in output. Thus, the state is shifting its focus to other renewable energy sources like solar energy and biogas. In the area of baggasse and biomass based power generations, Tamil Nadu leads the way amongst other states, with an installed capacity of 182 MW as against the national total of 450 MW. This development has been possible mainly due to private investments which have taken advantage of the policy initiatives of the state government.[7] In order to make capital-intensive renewable energy systems financially viable, the state has set up a non-banking finance company viz. the TamilNadu Power Finance and Infrastructure Development Corporation Ltd (TNPFC) responsible for mobilizing funds through various deposit schemes. Spearheading the policy shift in 2002, solar water heating systems were made mandatory in new buildings and in government hotels and hospitals. Initially, incentives in the form of a state subsidy were provided for the installation of solar water heating systems, but this has since been restricted to the provisioning of installation costs in government institutions. Similar subsidies are provided to set up of toilet-linked biogas plants in institutions and women's sanitary complexes in panchayat offices. This initiative, which provided Rs. 63.40 lakh in 2003-04, eventually lead to the establishment of 82 such units which include 39 integrated women's sanitation complexes where gas generated is used to pump and supply water for the respective complexes. Continuing with such initiatives, the Eleventh State Plan considers this sector to be of utmost priority to encourage bank lending. Inviting private players for the provisioning of renewable energy, the state aims to integrate livelihood opportunities and rural electrification

Conclusion

Renewable energy sources are slowly gaining a strong hold in the power generation scenario. An assessment of available natural resources is a prerequisite for deciding which types of renewable energy source to focus on. The development of hydroelectric power projects is skewed in hilly states, whereas wind energy projects are limited to the states of Gujarat, Tamil Nadu, Madhya Pradesh and Maharashtra. Both the state and central governments invest in providing huge capital requirements for renewable energy projects. States like Gujarat and Tamil Nadu are exceptions as these receive 98 percent of private investments due to favourable state policies. Tamil Nadu Power Finance and Infrastructure Development Corporation Ltd, a non banking financial company, is classified as a hire purchase finance company responsible for fund mobilisation through various attractive deposit schemes.[8] The state owned company provides financial assistance for power projects and funds to the Tamil Nadu Electricity Board. The state also introduced policies for the purchase of electricity from biomass (Rs 2.48 per unit at 5 percent escalation for nine years since the year 2000-01 during off-season power generation) and wind energy (2.7 percent) projects.

[7] www.tn.gov.in/spc/annualplan/apch11_2.pdf (Accessed on August 26,2010)
[8] http://www.tninfrafinance.com/ (Accessed on September 4,2010)

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