

## **Green Accounting for India's States & Union Territories Project**

### **("GAISP")**

Like most developing nations, India, in its attempt to improve the living standards of its people, faces many trade-offs in various arenas. Unfortunately many of the mechanisms for decision-making (including political institutions) which have been developed to help decide between competing choices, do not grapple with intergenerational choices – i.e. trade-offs between the needs for present and future generations. We think that it is urgently necessary to develop a mechanism to do this because many of our choices could severely affect the welfare of our children.

In view of the above, we propose to build a framework of national accounts that presents genuine net additions to national wealth. This system of environmentally-adjusted national income accounts will measure the depletion of natural resources and the costs of pollution, but it will also reward additions to the stock of human capital.

The "Green Accounting for Indian States & Union Territories Project" ("GAISP") aims to set up economic models for State-wise annual estimates of "genuine savings" i.e. true "value addition" at a State and National level. The publication of the results will enable policy makers and the public to engage in a debate on the sustainability of growth as well as make inter-state comparisons. It is hoped that a policy consequence of Green Accounting may be gradual increases in budgetary allocations towards improvements in education, public health, and environmental conservation. All of these are key elements needed to secure India's long-term future.

**“GAISP” is a project in the public interest commissioned by “GIST”, the Green Indian States Trust, Chennai.**

## **1. Summary**

After a decade of reform, India is entering an era of rapid economic expansion. Inevitably, this growth will be accompanied by higher private consumption and growing investment in physical infrastructure that will place mounting pressure on the country's environment and natural resources. National policy makers recognise that these “costs” must be contained in order to ensure sustainability, and have enacted some legislation to support good environmental governance. There is, however, a dearth of focused sustainability analysis and information at the State level, which is where government policies have to be translated into action. As a result, the processes of public debate, government planning, budgetary allocation, and the measurement of economic results are in effect being conducted without a sustainability framework. The aim of this project is to fill this information gap, by preparing adjusted measures of State & Union Territory savings and growth that apply and build upon global best practice for ‘green accounting’.

In particular, this project aims to re-calibrate the existing annual State Domestic Product (“SDP”) accounts to incorporate changes in each state's stock of natural capital (minerals, arable land, forests & freshwater) and investment in human capital (education, health, and pollution control). This information will be a useful frame of reference for future dialogues on public policy and it is expected to sharpen the focus on preserving environmental capital and growing human capital.

This project is planned in two stages. ‘Phase 1’ aims to prepare ‘green accounts’ for India's states and union territories following a ‘top-down’ approach, using national databases and model assumptions which are manifestly impartial across India's states. The project team for ‘Phase 1’ is in place and we have on board some outstanding candidates who would ensure the quality of our output. ‘Phase 1’ will also set in place a process of annual extraction and publication of these accounts to produce public awareness and debate. The findings will be disseminated with the help of sponsored public interest advertising campaigns, managed by one of India's leading Advertising agencies. The objective is to heighten public awareness of and foster wider debate on sustainability issues which are at present largely ignored as they may appear too remote and intangible when discussed at a national level.

‘Phase 2’ takes the process forward with interested State Governments, by designing and implementing state-specific methodologies for capturing education and health investment, pollution costs, and the loss of natural resources – i.e. the key components of ‘green’ adjustment to SDP accounts. For this phase, ‘district’-level data capture and analysis will be undertaken to support planning and implementation of sustainability measures by interested State Governments.

## 2. Introduction

India has spent the past decade trying to build a growth dynamic that was sadly missing in the earlier quasi-socialist regime. The cumulative impact of the reform process finally appears to be generating growth. However, we feel that it is necessary to monitor and channel the forces of growth and investment in order to ensure that they truly improve the quality of life for future generations. In particular, the creation of human capital and the destruction of natural capital both need to be explicitly measured because they have a significant impact on the long-term sustainability of growth.

Education and health are key components of human capital, and our adjusted measure of state wealth will include estimates of investment in these two areas. Public investment in education has been low in India (about 4% of GDP in 2002) and much of this has traditionally been skewed towards tertiary education. However, the primary school enrollment rate is now at about 95% due to private spending and the work of NGOs (and some improvement in targeting by government as well). Unfortunately, according to ADB data, only 65% of girls and 70% of boys who enter the first grade are able to reach the fifth grade. The equivalent rates in China are 94% for girls and 93% for boys. India's traditional skew towards tertiary education has supported the country's recent success in the hi-tech services sector. However, this phenomenon will not spread through the rest of the economy unless primary and secondary schooling is also strengthened, as it provides a productive foundation as well as a means of identifying the highest potential from amidst a gigantic human resource pool.

Public spending on health is even lower than on education (about 0.9 % of GDP in 2002). The threat to public health is compounded by the poor state of civic amenities such as water supply, drainage and sanitation. Privatization of education and health are observable trends in India, and the authors believe that to be the right direction. Nonetheless, we feel it is important to quantify the scale and effectiveness of both public and private efforts. In our view, this would allow proper targeting of public spending and improvement in the framework for attracting private funding.

India's record in conserving natural capital over the last fifty years is mixed, and reflects a combination of factors and circumstances. On one hand, there has been an effort towards creating protected areas around the most precious accumulations of bio-diversity (India has 521 protected areas, predominantly forested, covering 4.6 % of land mass), and progress in enacting extensive protective legislation. On the other hand, there is widespread violation of regulations by encroachers, illegal miners, property developers, poachers and loggers. Legal action by mining and logging interests to overturn protective legislation is not uncommon, although this have been countered quite effectively by environmental NGO's and citizens interest groups.

The pace of conversion of forest land to other uses is the most visible depletive trend impacting natural capital, but there are many other forms of depletion – sometimes helped by populist or insensitive government policy. For example, subsidies have often led to the use of inappropriate agricultural technology and crop choice that have led to falling water tables, rising salinity, and impoverishment of cropland. Similarly, mineral wealth has been exploited directly or indirectly by government without adequately considering import alternatives that would have come at less environmental cost. Failures range from the use of out-dated technology to policy frameworks that have not been changed from the days of 'import substitution' as a key policy objective.

Despite the above problems, two positive influences are present which can take India along a path of sustainable development. Firstly, India is a vibrant constitutional democracy with the attendant democratic institutions, especially an independent judiciary and a free press. We feel that public interest does prevail if long-term costs and benefits are clearly demonstrated. Secondly, the growing exposure to the rest of the world (helped by widespread use of the English language) and the educational work of NGOs has increasingly sensitized sections of the urban public about environmental degradation and to the value of education as a means to better employment. At a very fundamental level, it could be said that a better informed and hence more effectively empowered Indian public is the main goal of this project.

It is instructive to compare and contrast our project with what may appear at first sight to be a global precursor, the Environmental Sustainability Index ('ESI'). The ESI was a pilot study on the relative environmental sustainability of national economies, launched at the World Economic Forum's annual meeting in January 2000 at Davos. ESI data used 21 indicators across five sustainability components:

- state of environmental systems (including air & water quality)
- level of stresses & risks (eg: rates of pollution)
- human vulnerability (eg: population without access to safe drinking water)
- social/institutional capacity (including expertise and knowledge)
- stewardship (a country's sense of responsibility towards global commons)

It should be noted that the ESI is an index and not a quantitative measure of growth, whereas our project's focus is to adjust traditional measures of growth & to re-cast them as measures of sustainable growth. ESI data are a blend of relevant statistical information, but they cannot answer the question "Is this growth sustainable?", whereas a genuine savings approach such as we propose can and does provide a quantitative answer to that question. Having said that, the surge of international interest that followed immediately the publication of the first ESI rankings, including interest from participant governments seeking to understand if not improve their rankings, gives us some insight into the possible reaction of India's State Governments to being evaluated by an independent survey for a 'true' measure of their competitive performance versus their peers in the Union of India.

### **3. Project Objectives & Scope**

It follows from the discussion above that the key purpose of this project is to promote a wider public and official awareness of the importance of assessing economic growth and investment on a holistic basis by taking into account the depletion of natural capital and creation of human capital. Thus, the study aims to create a broad measure of economic performance which factors in the economic value of biodiversity protection, forest conservation, mineral resource depletion, pollution control, education and public health in order to present adjusted annual macroeconomic statistics for each individual province.

Specifically, environmental performance measurement would be brought into the public policy domain through an organized project to prepare an unbiased 'competitive' ranking of states/union territories. Thus, state government performance would be measured not only in terms of traditional GDP growth (reflected in so-called State Domestic Product published annually) but rather in terms of their impact on aggregate State wealth (measured as the change in aggregate human, natural, and physical capital). It would replace traditional measures of savings with "genuine savings" after factoring in the costs of natural capital destruction and the value of human capital created through investments in education, health improvement and disease control.

A sponsored media campaign will accompany the publication of these rankings. This campaign will leverage the natural tendency of India's states and their people to compete amongst themselves, and so we expect these annual rankings to become widely publicised, engaging policy-makers, NGO's, state and national politicians, and the public at large in a very pertinent and timely debate.

#### **4. Green Accounting Methodology**

Green Accounting is a developing science, and not every component of natural capital or human capital can be valued in a manner which is accurate, consistent and widely accepted as a norm by expert academic opinion. Furthermore, some components may be capable of measurement but are unlikely to come within the purview of State policy-making over the next decade, thus limiting the usefulness of inclusion in our project. The use of subjective judgment and simplifying assumptions is therefore necessary, and we outline these below.

In "Phase 1", our intention is to measure the sustainability of growth across all of India's States and significant Union Territories using a "top-down" approach. The use of standard models and standard projections will not only ensure a common and consistent methodology, it will also enable us to bridge time gaps between the publication of various slices of official data by the States and the Government of India. Annexures 1, 2, and 3 illustrate what we mean by a "top-down" approach for the valuation of forests and other biomass. Annexure 1 defines the common categories of biomass, Annexure 2 sets out the first layer of 'top-down' statistics by state and union territory, and Annexure 3 discusses the specific problem of finding the right data source to follow this approach.

'Strong sustainability' is based on the concept that natural capital is a complement to manufactured capital, rather than a substitute. Note however that we propose to base our study on an assumption of 'weak sustainability', or the idea that one form of capital is equivalent to another, and growth is sustainable only if the net change in natural, human, & physical capital is positive, resulting in "true savings" year on year. We recognize the limitations of this approach as we drill down from 'State' to 'district' level (a 'district' is a subdivision of a State, and has a limited degree of autonomy.) For example, sharp depletions of forest cover in particular regions can cause calamitous changes in micro-climate, geology, and local bio-diversity (such instances are not unheard of in India) which cannot really be replaced by any other form of capital. We defer the choice of evaluating policy alternatives on the basis of 'strong sustainability' to the State-specific studies envisaged in 'Phase 2'.

As regards natural capital, our aim is to select those categories which are (a) material in an overall context, (b) measured by existing statistical databases, or soon to be captured by NRSA databases, and (c) realistically manageable as components of national or state government policy over the next decade or so. Following these three criteria, therefore, we include in our evaluation forests, agricultural cropland, pasture lands and cattle, known mineral deposits, and surface freshwater resources, but we shall exclude subsoil water, undiscovered mineral deposits, and livestock other than cattle.

Data quality is an issue which needs to be addressed with both candour and vigour. As the public and the press in India is increasingly sensitized to the negative consequences of unchecked deforestation, and as NGOs and the courts time and again remind legislators and bureaucrats of the need to do their duty towards conserving these national assets, official data on natural resources is increasingly prone to “virtuous transformation”. This is a phenomenon whereby positive skew is applied by official calculation agents at every stage of a multi-stage, bottom-up, national data collection process. To this are added definitional changes, interpretations, and large-scale re-classifications. The net result is that official statistics regarding this highly emotive arena tend to appear positive or even rosy, often showing “good news” (increasing forest cover, increasing tiger populations, etc.) whereas the ground reality may be quite different (see Annexure 3). Some of our choices in following a “top-down” approach are guided by the need to select unbiased and unfiltered databases, and we accept the apparent sacrifice of precision in doing so in the interest of genuine accuracy.

#### 4.1 Forests and other Biomass

This is probably the most challenging and significant area of evaluation for our project, and the quality and robustness of our results will be a measure of the success of our project. At the outset, we state that we intend to evaluate both ‘direct use’ values of forests (timber, tourism, etc) as well as ‘indirect use’ values (the value of flood and drought control, watershed maintenance, & carbon sequestration). Other values of forests – the so-called option values (i.e. willingness to pay for conservation for the option of future use) and non-use or ‘existence’ values (i.e. willingness to pay for conservation for its own sake) will not be addressed as we believe these may introduce a bias towards natural capital.

The importance of the above intention should be highlighted, as it represents a departure from World Bank (SEEA) norms. We noted that the World Bank’s new SEEA Manual (green accounting) as well as its precursors, and most significant papers on the subject ( eg: Estimating National Wealth, 1998, Kunte, Hamilton et al , and Genuine Savings Rates in Developing Countries, 1998, Hamilton et al) all make certain simplifying assumptions in their empirical estimates. In particular, they value natural capital only as a resource input into production. This means, for example, that forests are valued only as stumpage, i.e., the value of timber net of extraction costs. The reason for this simplification is that the World Bank has to standardize data for their sample of over 100 countries, and they would accept fully that there are benefits of forests that they are not taking into account, which will vary according to location.

The following comments are initial thoughts on the modelling and methodology we expect to follow for Phase 1, however, it should be stated that refinements and changes may be necessary based on the quality and ready availability of appropriate data.

**Timber:** ‘Forestry and logging’ is a component industry of State macro-economic statistics, and this enables us to estimate the value of timber extraction. It also enables us to model the volume of forest biomass lost to logging which is a deduction from natural capital. Timber extraction is modelled for the accessible peripheries of forested regions, with the central areas of forests being valued as stores of carbon.

**Fuelwood and NTFP :** Fuelwood and non-timber forest produce (NTFP) comprise a very significant part of the household incomes of forest-dwelling or forest-edge communities (Pearce, 2003), a fact which is not necessarily captured by the economic value per hectare of NTFP. It is easy to overlook the stabilizing social role of NTFP as a sustaining value stream for local communities, and therefore as a means of poverty alleviation. A study on communities in Madhya Pradesh, Orissa & Gujarat (Bahuguna, 2000) estimates these

components to be 49% of household income. Our project will estimate NTFP losses inherent in deforestation at an appropriate multiple of forest-dweller household income annuity streams, present valued, on the basis that forest destruction burdens State governments with the social responsibility to provide alternative livelihood, infrastructure, and supervision for displaced forest communities.

**Forest & Wildlife 'Eco-Tourism' Value:** India's 521 National Parks and Sanctuaries are potential future magnets for eco-tourism, if attendant infrastructure is properly developed, without destroying the forests and wildlife which are on display. So we shall estimate the annual rents that could be derived from the rapid growth of this sector both in terms of volume and per-capita visitor contribution.

**Biodiversity and Genetic information:** Almost all new pharmaceutical drugs and remedies are discovered in forests first, and then replicated by industrial processes. The pharmaceutical value of "hot spot" land areas are estimated by various authors, such as Rausser and Small, 1998, which includes the following estimates for pharmaceutical companies 'willingness to pay' for biodiversity hot-spots in India :-

Western Ghats	USD 2,026- per hectare
Eastern Himalayas	USD 332- per hectare

**Watershed, Flood Prevention, Drought Control Value:** Probably the most important of all aspects of natural capital in India is the value of forests as watersheds for lakes and rivers, helping to store rainwater and release it gradually over the dry months, thus regulating flows. The cost of devastation wrought by a cycle of floods and droughts is well documented (eg: CSE, 3<sup>rd</sup> Citizen's Report on the Environment). Arable land, standing crops, cattle, farms, houses, and human lives are lost in floods with regularity, and widespread deforestation is represented as a key cause. It is important to filter out the natural level of forest loss due to geophysical disturbances and climatic extremes, and establish (or otherwise) causality above this 'baseline'. State-wise data on flood and drought related losses are published by the Central Water Commission (CWC) as well as the Rashtriya Barh Ayog (RBA, the National Commission on Floods) .

**Carbon Sequestration :** Forests act as high-density carbon stores, and conversion of forests to agricultural lands and pasture loses much of that value. Conservative estimates of that loss of value based on a carbon credit value of \$ 10 per tonne C (Zhang, 2000) have been made (Pearce, 2003) and may be extended to all forest area which is capable of being lost to other uses – including protected areas, forest fringes up to a standard distance, and all isolated stands of forest including private forests, thickets in cultivated areas, & sacred groves etc. NRSA data analysis will help determine inputs to this valuation.

## 4.2 Agricultural Cropland

Following the World Bank's approach, land values are estimated from annual crop value. Annual rents from cropland, set at appropriate percentages of crop value (after factoring in a return on irrigation), projected using appropriate growth rates of area and yield and discounted at the standard discount rate being used for all rentals-based appropriate rate. The methodology preferred by us is as outlined in Kunte, Hamilton, Dixon, & Clemens (World Bank, 1998). An open issue is the use of international prices for foodgrains, in this paper & in World Bank's SEEA, an approach which is essential for equitable analysis across countries, but one which may overstate or understate relative resource rents for a study such as ours which values most forms of capital (physical – from SDP accounts; human – from domestic earnings data) on the basis of domestic prices in India.

For India, state-wise agricultural land-use statistics are readily available from the Ministry of Agriculture, Gov't of India, and state-wise distribution of crops as well as productivity data is available from the Ministry of Agriculture. Bhalla & Tyagi, 1989, is an example of a study which examines cropping practises and productivity down to a 'district' level (there are 280 districts across India's 25 states), and our project will build a database which can be de-consolidated down to the 'district' level for use in "Phase 2".

### **4.3 Pastures and Other Grazing Lands**

Data from the Ministry of Agriculture provides occasional updates of this category across the states; our valuation will model its ability to sustain rural bovine populations, and will present value commercial returns from cattle.

### **4.4 Sub-Soil Assets**

Mining rents (annual gross value of minerals extracted) are a deduction from natural capital, and standard pricing will be applied to available data on tonnage (mineral volumes extracted) and this will be deducted from stated income in SDP accounts.

### **4.5 Human Capital - Education**

Evaluating the knowledge, experience, and skills resident in population is at the heart of our modelling of human capital. As with most national accounts, India's GDP and SDP accounts capture as 'investment' only that element which is spent on fixed assets, such as new university campuses. Current expenditures (eg: teachers salaries, subsidies for books, scholarships) are treated a consumption, which is clearly incorrect. The effect of including human capital investment can be quite significant. A telling example (Hamilton & Clemens, 1998) demonstrates in the case of Chile how its 3% of GNP spent on education, re-expressed under 'green accounting' rules, helped keep genuine savings rates positive in the late eighties, and notionally countered nearly half the natural capital depletion in 1993 & 1994.

We observe that estimates of human capital creation are often derived on the basis that growth in the non-manufactured component of GDP is attributable to human capital. For Phase 1, we prefer not to follow this approach, as it would contaminate this important measure with a number of unspecified economic variables, and bring into question the public policy relevance and value of our framework.

Instead, our model for the value of education will be based on a state-wise statistical study of relative income levels across selected age groups, with assumptions about their implied educational backgrounds. For example, a study of the annual incomes of 24 year old men in Karnataka state across the following five professions (a) farm hand (b) village shop assistant (c) clerk at district post office (d) accountant at private corporation (e) programmer at a Bangalore based Information Technology house could reflect the income impact of primary education (b-a), secondary education (c-b), tertiary education (d-c) and vocational training (e-d). These earnings differentials would be computed over the expected working lives of our 'model' population, and present-valued appropriately. To these present-values of the different components of education we would apply annual school-leaving rates, annual graduation rates, and annual passing-out rates for vocational training.

The multiple of these quantities would give us an estimate of educational capital creation across each category of education, which would be a statistic of considerable public policy significance for budgetary allocations to education.

## 4.6 Human Capital - Health and Demographics

In common with education, much of the investment in health is classified as 'consumption'. Capturing investment in health is further complicated by the fact that it is affected by factors that are not explicitly classified as part of the healthcare sector (for example, pollution control, provision of public toilets and so on). This is a major flaw because healthcare has important externalities that affect sustainability. Most importantly, improving health and education (especially for women) have a strong influence over population growth. There is growing evidence that birth rates have already declined sharply in many parts of India due to human capital investments and, in turn, this has important implications for the rate of natural resources depletion required for sustaining a given standard of living. At the time of writing, we are exploring alternative models to be used for 'Phase 1', recognizing also the need to tie in an appropriate model for pollution abatement costs as a component of the adjustments which will be applied to SDP accounts.

## 5. Planning - Timeframe and Resources

### Phase 1 :

The first phase of the project is to design SDP-adjustment algorithms which can be used for estimating economic values for the depletion of natural capital, for accumulated pollution, and for human capital accretion across India's States & significant Union Territories. A degree of simplification is adopted which balances the need for impartiality & methodological consistency, on the one hand, with the need to ensure that the state- and sector-specific green adjustments are credible enough, on the other hand, to spark a public policy debate with State governments.

'Phase 1' is estimated to take a small team 2 years. We envisage a four-person team : an environmental economist as Project Leader , a research assistant with quantitative modelling skills, an expert on GIS with experience in using NRSA databases, and an expert on the compilation & use of SDP accounts. Ongoing project management will be provided by the co-authors of this report as Project Directors (see Annexure 4 for Curriculum Vitae) working closely with the Project Leader.

As part of the marketing strategy for Phase 1, a 'public-interest campaign' is also planned to announce the results of 'Phase 1'. This will be done by one of India's leading advertising agencies, FCB-ULKA, who are Project Advisers for marketing.

IET, London have committed funds to cover a project feasibility study, writing of the Project Scope Report, and Project Planning, and are coordinating our wider fund-raising effort.

The methodology and algorithms developed for "Phase 1" will be patented in India, on behalf of the project's Sponsors collectively. Future earnings from the patented methodology and proceeds of sale of the 'Phase 1' Project Report will be disposed of at the discretion of the project's Sponsors, based on their respective sponsorship agreements. It is expected that "Phase 2" participants will pay a negotiated fee to project Sponsors for the use of patents.

Phase 2: A second phase of this project is to design and implement, subject to the interest and support of respective local Governments, State-specific measurement methodologies to capture the economic value of changes in natural capital and human capital. This would need to be implemented down to the operative (i.e. district) level to be relevant for State Government planning and implementation. 'Phase 2' is envisaged as a series of separate projects, each independently funded and managed, but with quality control and project management oversight provided by a nominated panel of consultants including the proponents of 'Phase 1'.