

CISED



REPORT 2004 & 2005

Centre for Interdisciplinary Studies in Environment and Development

A Centre of Excellence promoted by
Institute for Social and Economic Change, Bangalore

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Foreword

During the first two years after CISED was founded in 2001, our focus was largely on creating an institutional space and putting together a group for conducting interdisciplinary research, training, and dialogue on issues at the interface of environment and development. Recruiting core faculty and bringing in visiting faculty, initiating a number of collaborative projects, fostering a debate on interdisciplinarity, and putting in place basic organisational systems and policies occupied much of our time. Our task was facilitated enormously by the support provided by our host institution, the Institute for Social and Economic Change, and also by the Ashoka Trust for Research in Ecology and the Environment.

The last two years have seen a shift in focus from creating the space to grappling with the challenges of actually doing interdisciplinary research in environment-development issues and engaging in these issues with society in various ways. Collaborating with hydrologists to study the impact of forest degradation in the Western Ghats, observing community-based natural resource management in conditions ranging from the semi-arid hills of Rajasthan to the temperate mountains of Bhutan and the floodplains of Bangladesh, interviewing farmers using 'illegal' Bt cotton technology in Gujarat, and scraping together hard-to-get figures on the engineering and economics of reprocessing spent nuclear fuel have all been fascinating and challenging experiences for our researchers. During the same period, we have increased our contributions to the ISEC PhD programme and have also begun hosting visiting students and scholars from various universities abroad, including from Pakistan, USA, and Spain.

Our efforts to create a dialogue with society also expanded during this period. Apart from an increased number of research outputs, CISED researchers have reached out to the public through newspaper articles and public lectures. Further, we have launched our own Technical Report series, which will make our research available in much more detail and more quickly than is possible through academic journal publications. CISED faculty have also engaged in debates around the draft National Electricity Policy, the draft National Environment Policy and the revision of national watershed development programmes and guidelines.

Institutionally, several transitions occurred over the past two years. Nandini Sundar, Professor of Sociology at the Delhi School of Economics, joined the Board of Trustees. Kalpana Sharma, Chief of Mumbai Bureau and Deputy Editor - The Hindu, and Rohini Nilekani, Founder and Chairperson - Arghyam Trust, have recently joined the Advisory Committee. We welcome all of them to the CISED community. Professor M Govinda Rao stepped down from the Board after serving as a Founder Trustee for four years. We would like to take this opportunity to express our gratitude for the valuable support and guidance he provided in the founding of CISED.

An important activity in 2005 was our strategic planning exercise. We are now in a phase of consolidating and judiciously expanding our activities in ways that will ensure a larger and more sustained impact in terms of CISED's mission. On the research front, several key initiatives are being taken. We have decided to broaden our work in the energy sector from nuclear energy into a programme on sustainable energy generation. A first step has been taken in the form of initiating policy research in the electricity sector in Karnataka jointly with the Indian Institute of Science and Prayas. The water sector work is also being expanded substantially. A major collaborative 3-state study on the long-term impacts of watershed development has been launched, and a multi-institutional study on water allocation within the Krishna river basin is about to commence. On the training front, we are launching a series of 2-week programmes to expose senior NGO personnel and others to recent research in natural resource management. We are also expanding our Visiting Fellow programme and hoping to regularise our exchange of students and faculty with universities abroad, beginning with signing a memorandum with the University of Delaware. Strengthening outreach and making our internal collection of grey literature more accessible for visitors are key institutional objectives for the next few years. We have been fortunate in attracting financial support from funders for these activities.

Four years is a short period in the life of an organization. Considering the challenges involved in what we have set out to do, we still think of ourselves as toddlers and will probably keep stumbling occasionally. Although the impacts of our work are not always tangible in terms of immediate changes on the ground, to quote one of the participants at a workshop we recently organized, "even making practitioners pause and reflect a bit is an achievement". Ultimately, it is the interest shown in our work by an ever-expanding network of like-minded persons and institutions that keeps us energized and we look forward to their support and feedback on this report as well.

Sharachchandra Lélé
Coordinator

December 31, 2005

Research Programmes

CISED broadly categorises environmental issues into Natural Resource Management (NRM) issues and Energy-Pollution issues. Although NRM issues have perhaps attracted more academic attention in south Asia, we believe that as a rapidly developing region we are also going to face sharply increasing hardships due to pollution that results from energy and resource use. Hence, CISED wishes to work on both these broad areas, though at present the bulk of its work has been on NRM issues.

The following sections provide a brief synopsis of the work completed during 2004 and 2005 and on-going research at CISED in these two broad areas.

Natural Resource Management

Our research on NRM issues in the past two years has largely focused on the interlinked questions of forests-water-agriculture in a rural context. One set of studies has examined the effectiveness of organized responses to natural resource degradation in various contexts. A review of community-based NRM (CBNRM) across south Asia sought to understand the visions, shapes, and outcomes of NGO-driven initiatives. Another complementary study, based on secondary literature, reviewed the experience with state-led programmes for decentralized governance of natural resources in India. A more recently initiated effort aims to understand the long-term social and environmental impacts of watershed development programmes that have been implemented in semi-arid regions of 3 contiguous states in peninsular India.

Another set of studies focused on various aspects of changes occurring in the agrarian situation itself due to the introduction of new technologies as well as conflicts around water resources. Two of them looked at the currently topical issues of the adoption of genetically modified cotton cultivation and the high incidence of suicides among farmers.

A third set of studies has focused on trying to understand how changes in land cover in the Western Ghats introduced by different actors might—largely unwittingly—change the hydrological pattern and sediment load in streams emerging from these catchments, and how these changes in land-cover and watershed services affect communities immediately downstream. This effort will now be expanded into a larger study of integrated water resource management in the Krishna basin.

Understanding Community-Based Natural Resource Management (CBNRM) in South Asia

[Ajit Menon, Praveen Singh, Esha Shah, Sharachandra Lélé, in collaboration with K. J. Joy and Suhas Paranjpe of SOPPECOM]

This study examined NGO-driven community-based natural resource management (CBNRM) in South Asia. The focus on NGO-driven CBNRM was deliberate given the fact that it is this form of CBNRM that has been increasingly 'mainstreamed' and hence in need of critical scrutiny. Existing literature has highlighted the limits of CBNRM in the context of neo-liberal development, the dangers of an over-simplified and essentialized notion of the community, and the constraints of envisaging CBNRM in project mode. Our contention was that despite these numerous critiques, the idea of CBNRM remained important, and that a systematic review of different innovative CBNRM experiments was largely missing. Moreover, we were interested in examining how CBNRM as a process worked in practice and how practitioners had grappled with the possible 'limits' of CBNRM.

Our study focused mostly on NGO experiments that were either deemed innovative in nature and/or those that served

as model interventions. We sought to understand:

- what are the different types of CBNRM initiatives (mostly NGO-driven) in terms of how they envisage and prioritise between concerns of livelihood enhancement, sustainability, equity, and democratic decentralisation;
- what are the approaches that different CBNRM implementers have pursued in order to address these concerns; and what factors have affected these choices (e.g., projectisation, who initiates, and donor ideology);
- what has been the impact of these initiatives in terms of livelihood enhancement, sustainability, equity and democratic decentralisation and what are some of the possible explanatory factors in terms of particular outcomes;
- how are these approaches bounded and affected by wider development discourses and policies, as well as by micro-level imperatives of community formation;
- to what extent are practitioners cognisant of these limits and what have they been able to do about it.

We undertook both an extensive secondary literature review of CBNRM and a field based study of six cases. Whereas the secondary literature review, mostly of grey unpublished literature, allowed us to examine a breadth of different types of CBNRM experiments, the case studies gave us an opportunity to see how CBNRM had worked in practice in different contexts.

What emerged from the secondary literature review was that there is an enormous diversity of NGO-driven CBNRM initiatives that have different visions in terms of livelihood enhancement, sustainability, equity, and democratic decentralisation, that have different strategies of intervention, and also have resulted in different outcomes. Our findings suggest that while most NGO-driven CBNRM experiments offer interesting insights into strengthening and diversifying livelihoods, they have been less successful in addressing concerns of distributive equity, ecological sustainability, and democratic decentralisation. Given the small size of our sample, largely because substantial 'critical' literature is not available, it is difficult to generalize beyond the sample.

The six cases for a field based study were selected on the bases of (1) the nature of the implementing agency, (2) the nature of the experiment, (3) the agro-climatic zone, and (4) the scale of the initiative. The idea was to cover a variety of conditions or initiatives in the region to the extent possible, and then adopt a case study approach for the analysis. The six cases studied were:

1. Hivre Bazaar village in Maharashtra under Adarsh Gaon Yojana
2. Tarun Bharat Sangh's work in water harvesting in Rajasthan
3. Utthan's watershed work in Gujarat, India
4. Doodhatoli Lok Vikas Sansthan's work in Uttaranchal, India
5. Gono Chetana's work in the riverine chars in northern Bangladesh
6. Lingmuteychu watershed under EPINARM programme in Bhutan

The case studies offered additional insights into the manner in which project implementers envisage and practice CBNRM. While the visions and strategies of the different implementers varied significantly, what was common to them all was the fact that initiatives were significantly bounded by the manner in which the community was problematised. In each of the cases, project implementers focused primarily on win-win types of interventions either at the community or household level and in some cases special attention was given to strengthening the community as a collective unit. The focus on win-win interventions and not on more redistributive initiatives was both due to limited visions of the project implementers and strategic choices. Although all the initiatives involved significant local participation in terms of decision-making and specific

interventions, efforts were minimal in terms of democratising the decision making process in the community and addressing intra or inter-village historically entrenched inequalities. Attention given to and ability to address sustainability issues was mixed. While in some cases state policies constrained CBNRM initiatives, in others they enabled such initiatives.

What has, therefore, emerged from our study is that while NGO-driven CBNRM experiments offer some interesting insights into decentralised natural resource management in terms of innovative ways to meet livelihoods and address sustainability concerns, they are often hampered by wider constraints at the macro-level, by the complexities of micro-politics, and often also by the limited visions of implementers. There is also a danger of some of the interesting CBNRM initiatives getting swamped by a plethora of state-driven CBNRM programmes. This raises doubts about the potential of NGO-driven CBNRM as a vision of an alternative development and the need to study other initiatives, perhaps those of social and political movements as well as devolution programmes of the state.

The draft project report was sent to a number of experts across south Asia. A workshop was organised on 13-14 December 2005 to discuss the findings of the report. The workshop was attended by NGO practitioners, academics, activists, and others from all over south Asia. While the need for a study of this type was stressed by almost everyone, some participants emphasised the need to study the many social and political movements around natural resources.

Decentralising Governance of Natural Resources in India: A Review

[Sharachandra Lélé]

This paper provides a broad overview of the past and ongoing efforts at decentralising the governance of natural resources (DGNR) in India. The focus is on 'governance', which includes both day-to-day management as well as broader decision-making regarding resource ownership, access and use, and associated legal, administrative, and fiscal arrangements. The analysis is based on the assumption that more decentralisation than what prevails today is better, but it emphasises the need for multi-layered governance as well.

Post-independence efforts at DGNR in India can be broadly categorised into 3 groups. *State-initiated partnerships* include joint forest management, participatory canal and irrigation tank management, and participatory watershed development programmes. In parallel, there are *state-initiated efforts at full devolution* of governance, viz, the setting up of Panchayati Raj institutions in general and the special efforts in tribal areas. The third category is *community- and NGO-initiated efforts*, with or without state recognition.

The motivations for and the design and implementation of these programmes vary significantly. In particular, decentralised

governance is not the goal of partnership programmes. However, the experience shows that these programmes fail to meet even their limited objectives (let alone the rhetoric of community participation and empowerment that they adopt) in a sustained and equitable manner precisely because of lopsided institutional design and inadequate devolution of powers. The community-initiated efforts show that when the state has limited its role to that of legal support and laying down the ground rules for sustainable use, resource management is much more effective. Unfortunately, even historically state-recognised community management systems are falling prey to the bureaucratic push for increased state control through the so-called partnership programmes, and the devolution efforts have essentially not taken off the ground.

This review provides insights into several ongoing debates about the shape of DGNR. It shows that successful decentralisation does not mean complete handing over of resource ownership but a judicious structuring of relatively autonomous local organisations within transparent and reasonable regulatory processes. It also suggests that because governance issues include questions of resource access and allocation across diverse users, the local organisation should be a broad-based democratic one, not confined to particular user groups. At the same time, to prevent elite capture, the direct economic benefits from resource utilisation need to be kept out of the local organisation's purview. On the question of top-down versus bottom-up implementation of DGNR, this review suggests the need for a graduated, enabling approach with focused implementation in a few areas. At the same time, it warns against throwing money at DGNR - the changes required are primarily in rights, responsibilities, and mindsets, and the role of funding has to be kept secondary.

Mainstreaming DGNR into national democratic processes in India faces several challenges from within and without. Internally, political and bureaucratic support is sorely lacking. Externally, the economic environment and development policies being pursued militate against both decentralised governance and sustainable natural resource use. And the deeply embedded hierarchical social structures in most parts of India continue to pose a formidable challenge to decentralised democracy. Efforts will be required on many fronts and levels to make significant progress on decentralising NR governance in the country.

Long-term impacts of Watershed Development: A study in 3 Indian states

[Shrinivas Badiger, Sharachandra Lélé, A. K. Kiran Kumar, in collaboration with researchers from SOPPECOM and GIDR]

The concept of "integrated and participatory watershed development and management" has today emerged as the cornerstone of rural development in the dry and semi-arid regions of India. The country has made very significant

investments in this approach: an estimated Rs.2400 crores have been spent annually since the mid-1990s on watershed development, and similar commitments have been made for the next 25 years.

The results of the first round of widespread implementation appear, however, to be rather mixed. Moreover, the long-term and large-scale impacts of even the better implemented programmes remain unclear, as virtually all studies or evaluations are conducted immediately after the interventions have been completed. At the same time, findings from rigorous research do not seem to be reaching policy makers.

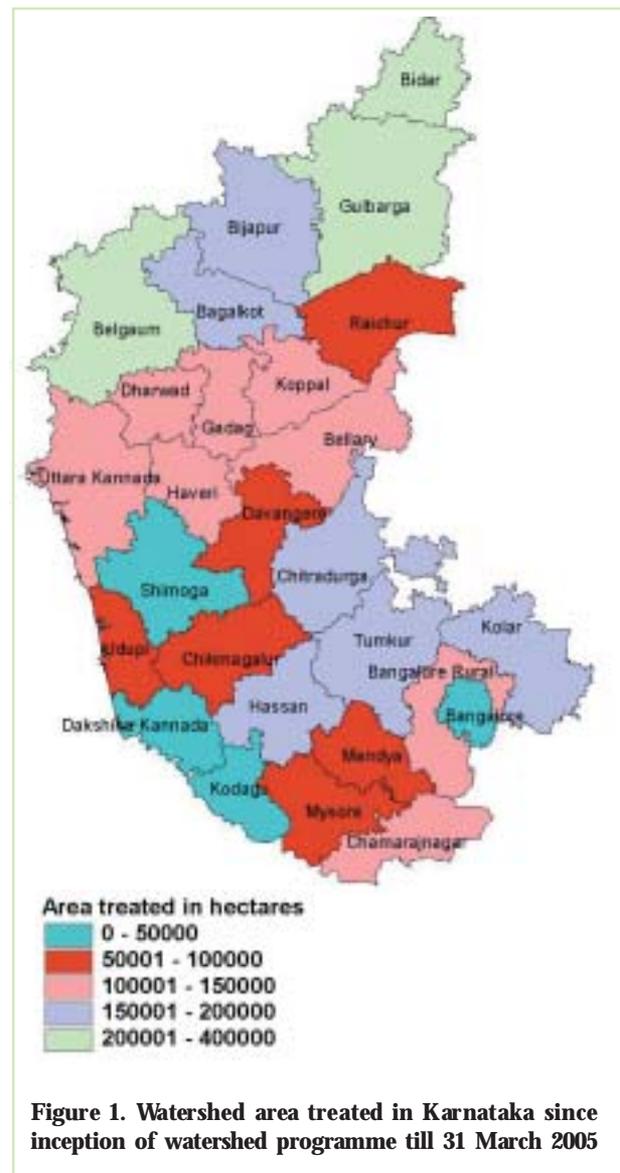


Figure 1. Watershed area treated in Karnataka since inception of watershed programme till 31 March 2005

CISED, SOPPECOM, and GIDR have therefore constituted a Forum for Watershed Research and Policy Dialogue. The Forum will initially focus on the dry and semi-arid tract of

Madhya Pradesh, Maharashtra, and Karnataka, where it will seek to:

- build a comprehensive public domain and GIS-linked database on all completed and ongoing watershed development efforts in the three project states;
- develop coherent and comprehensive frameworks, indicators, and methods for assessing watershed development success;
- conduct post-facto assessment of the impact of watershed development projects completed several years ago in this tract;
- initiate long-term monitoring with practitioners in select sites, and
- foster a continuous dialogue with policy makers and practitioners.

The GIS database will be completed in January 2006, and a large-sample rapid assessment will be completed by April 2006. This will be followed by detailed studies in a few sites in each state.

Development and Diffusion of the Genetically Modified Bt Cotton Technology in Gujarat

[*Esha Shah*]

The debate on the social and environmental appropriateness of genetically engineered organisms has entered a crucial phase in the context of the events around the introduction, diffusion, and performance of Bt cotton seeds in India. Thousands of farmers from Gujarat, Andhra Pradesh, and Karnataka have cultivated the so-called “pirated” or “illegal” seeds supplied originally by the Navbharat seed company at least three years before the patent protected Bt seeds of Monsanto Mhyco Biotech were approved by the Indian government.

The sheer existence and popularity of “illegal” Bt cotton seeds posits a paradoxical problem: While the proponents and opponents are fiercely debating the potential risks of genetically modified crop technology for society and environment, farmers have quietly appropriated and massively diffused the genetically engineered knowledge on cotton seeds. This study examines this paradox by asking a question: Why have thousands of farmers in Gujarat adopted locally produced Bt cotton seeds?

This study offers two arguments. First, Bt seed technology is representative of a technological culture with a specific value framework which is endorsed commonly by both multinational companies and the cotton growing farmers of Gujarat. The improvement and massive diffusion of Bt cotton seeds by farmers themselves in Gujarat implies that the technology finds a smooth insertion within the social and agrarian space shaped by the technological paradigm of the green revolution. As a solution to the problems generated by the green revolution technological paradigm, GM technology

sustains and reinforces the hegemony of global and local elites. Second, the involvement of local actors in generation and diffusion of GM technological knowledge does not ensure automatic democratization of use and management of resources. The adoption of Bt technology shows that local elites have political agency that joins hands with global elites in perpetuating the hegemony of the green revolution technological paradigm.

What is ultimately proposed is that the framework of back-end risk assessment, potential threat of monopolisation of knowledge, and the dynamics of regulatory framework may not be sufficient to evaluate appropriateness or social desirability of genetically engineered crop technology as they do not address front-end issues such as social context of technological choice. The appropriateness or social desirability of genetic engineering of crop technology should be understood with respect to wider issues concerning democratisation of technological culture (which would also entail democratisation of social and agrarian relations) and not in the narrow frame of risk or knowledge control.

Technological Vulnerability and Farmers’ Suicide

[*Esha Shah*]

Farmers’ suicides in agriculturally prosperous Indian states of Karnataka, Andhra Pradesh, Maharashtra, and Punjab have received wide attention since 1998. Farmers’ suicides have been generally attributed to an agrarian crisis. Liberalisation policies and the resultant withdrawal of the state, fluctuation of prices in international and domestic market due to globalisation, increasing indebtedness, and recurring droughts have all been considered responsible for creating the agrarian crisis. Based on fieldwork in Shimoga district of Karnataka, this study discusses technology’s agency in crystallising the agrarian crisis. It sheds light on how life experiences such as suicide are located in or related to a certain form of technological culture that produces both environmental and social vulnerability. How does technology provide a framework that shapes life experiences, perceptions, and practices, and how this framework shapes human agency are the questions probed in this research. The research ultimately questions values, beliefs, and assumptions employed in scripting technological designs.

Questioning Modernity’s Tradition: Designs of Tank Irrigation Technology of South India in a Historical Perspective

[*Esha Shah*]

The pro-traditionalist arguments in India have acquired an important anti-hegemonic discursive space challenging and critiquing modernity. This space, however, is defined by a certain notion of tradition that necessarily remains an interpretation. Often this interpretation is not based on an empirically rigorous inquiry of history of traditional societies and their environmental context and knowledge systems. This study

questions the interpretation of tradition – in fact, modernity's tradition. Applying the insights generated in science and technology studies and based on empirical evidences collected from the folk literature and secondary historical sources, it evaluates the social scripting of traditional tank irrigation technology in the pre-colonial historical context, challenges a romantic interpretation of traditional knowledge systems, and shows that the tank irrigation technology has survived for a thousand years because its designs were “scripted”, several centuries ago, with the help of forced and coerced labor which was ideologically controlled by the elites. The study also presents evidence to suggest that traditional irrigation technology was not environmentally suitable in pre-colonial times as is projected by the popular belief among the pro-traditionalists. From the same modernist concern about social justice and ecological adaptability, it paints a picture of tradition that is contradictory to the image that is popular among the pro-traditionalists.

Bridging the GAP in Kanpur Ganga: Failure of Monitoring Agencies Causes Pollution Disaster in Village

[Praveen Singh]

The study looks at the conflict between the Jajmau villages (in Kanpur) and the UP Jal Nigam (UPJN) which is responsible for the operation and maintenance of Ganga Action Plan (GAP) installations; between the Leather Industries (LI) on the one side, and the UP JN and the UP Pollution Control Board on the other side; and indirectly between the villages and the LIs. After tracing the environmental disaster brewing in the villages for the past two decades, it discusses how the implementation of GAP has failed to ameliorate the situation. Instead it has further increased the vulnerability of the people of these villages through the influx of toxic chemicals in the eco-system. Despite efforts by civil society organizations and protests by the villagers to draw attention to the problem, state agencies have failed to resolve the conflict.

A Review of the Right to Water

[Priya Sangameswaran]

Since the last decade of the 20th century, there has been an extension of ‘rights talk’ to newer realms such as the environment. This study reviews one specific right, viz. the ‘right to water’, which is increasingly being discussed by international human rights organizations, donor agencies, national governments, and civil society initiatives. The main aim of the review is to bring about greater conceptual clarity about what exactly the right to water entails and then consider possible synergies between different actors to actually implement such a right.

The first part of the review unpacks different dimensions of the right to water, and considers which of these aspects are emphasized in the discourse at the international level. The second part discusses the extent to which state legislation and policies support different elements of the right to water. While the geographical focus of this part of the review is the state of Maharashtra (since water is a state subject in India), how the contours of Maharashtra's policies and legislation are shaped by India-level laws and policies (both related to water and otherwise) is also discussed. The third part briefly discusses some social movements and civil society initiatives dealing with particular aspects of the right to water. At the India-level, the case studies are the anti-Coke struggles (at Plachimada in Kerala) and struggles against privatization of surface water (the case of the river Sheonath in Chhatisgarh). At the Maharashtra-level, the South Maharashtra movement dealing with the question of equity in water in the context of canal irrigation is briefly reviewed.

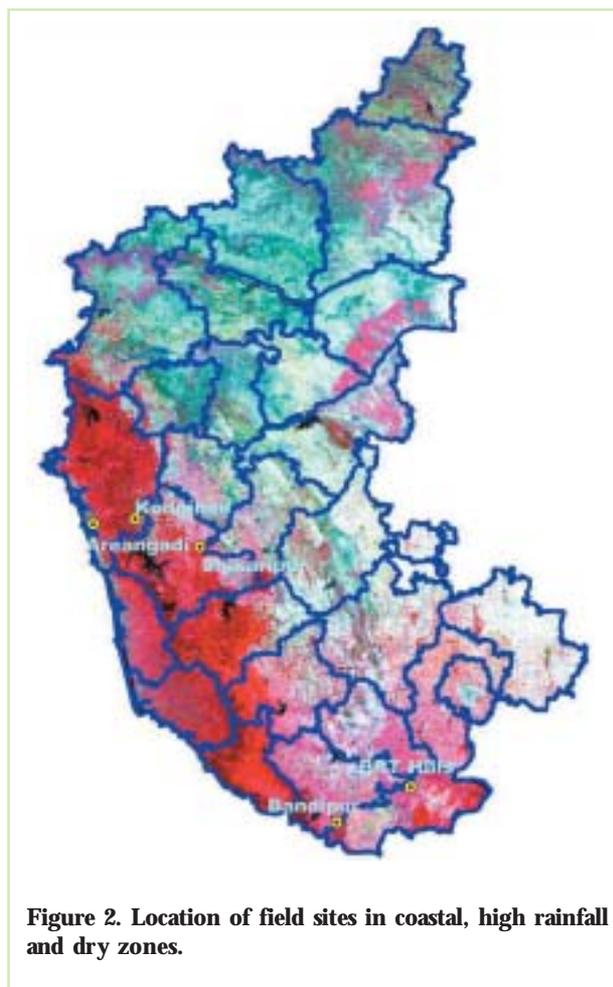
Different dimensions of the right to water include the precise nature of the rights/entitlements, the unit to which the right should be assigned, what kind of needs should be considered within the ambit of the right, the quantity and quality requirements for each of these, questions of accessibility and affordability, the implications of the right for the state, responsibilities of the right-holders, ownership of water resources, the kind of system put in place for water delivery, pricing of water, and the relation of the right to water with other rights such as right to housing or right to development. The review brings out the inter-connections between these different aspects, and emphasizes how engagement with all of them is necessary for the right to water to work in a meaningful fashion. In practice, however, discussions of the ‘right to water’, whether in the human rights discourse, or in government policies, or in the discourse of social movements, have tended to focus on particular aspects at the expense of others. For instance, the human rights discourse often focuses on legal aspects, without taking into account the social and cultural context of the practice of the right at local levels, or of power relations in other realms at the international level (such as in GATS negotiations) which could impact the right.

The India-level review indicates that even while there is a constitutional basis for a right to water, the scope of central policies to shape the working of right to water at the state level is not effectively realized, either because the central policies are themselves limited or because their non-statutory nature means that state governments do not necessarily undertake the required legislation. The Maharashtra-level review indicates, among other things, how the discourse of rights can be usurped and distorted by government legislation.

Land-Use Change, Watershed Services, and Socio-Economic Impact in the Western Ghats Region

[Sharachchandra Lélé, Ajit Menon, Shrinivas Badiger, Iswar Patil, Kiran Kumar, Rajeev Kumar, Sowjanya Peddi, Lakshmi Kant, in collaboration with National Institute of Hydrology, ATREE and UNESCO, and with the cooperation of the Karnataka Forest Department]

In 2002, we had launched a major collaborative, multi-disciplinary research project to understand the impacts of land-use change on watershed services and the socio-economic consequences of these changes on local communities in the Western Ghats region of Karnataka. We focused here on the changes in forest cover from relatively intact to heavily used forests and to forest plantations. The watershed service impacts examined are impacts on the quantity and timing of surface flows, sedimentation, and to some extent groundwater levels. The socio-economic impacts of these changes that we focused on were the changes in agricultural production and incomes, forest product availability and resulting hardships, domestic water availability and resulting hardships, and employment patterns across different socio-economic groups.



Five sites spanning different social and biophysical conditions were selected, ranging from the coastal and hilly high rainfall zones of Uttara Kannada district (labelled Areangadi and Kodigebail respectively in Figure 2) through the transition zone of Shimoga district (Shikaripur) to the dry and semi-arid zones in erstwhile Mysore district (Bandipur and BR Hills respectively). Within each site, a number of catchments representing different types of forest cover were studied. Two of these five sites were studied intensively over a 2-3 year period, while the other three sites were studied to a limited extent due to resource constraints. In the intensively studied sites, an attempt was made to link the changes in hydrology “upstream” to the impacts on agriculture “downstream” by studying the agro-hydrological systems that range from stream diversion and soil moisture control to minor irrigation tanks and groundwater pumping on hamlets/villages immediately downstream of the monitored catchments.

Preliminary results for some of the components of the study are as follows. In the high rainfall Kodigebail site:

- Annual runoff was computed as a percentage of annual rainfall (see Table 1) for the studied catchments. The results indicate that the % runoff is lowest in densely forested catchments (~ 20-25%), followed by acacia plantation catchments (~ 21-33%) and highest in degraded forest catchments (~ 37-42%) across a two year period. It remains to be seen whether this lower runoff is because of higher evapotranspiration from the dense forest or because of higher percolation losses.
- Four valleys were identified in which baseflow (post-monsoon streamflow) stops at different points during the dry season. The pattern of soil moisture recession in these valleys over the dry season is generally consistent with the differences in baseflow (Figure 3) where the farmers did not manipulate the flow or irrigate their lands.
- The average productivity of arecanut plantations in these four valleys (as estimated so far from oral recall) is found to be higher in valleys that have longer duration baseflow (and hence more soil moisture).

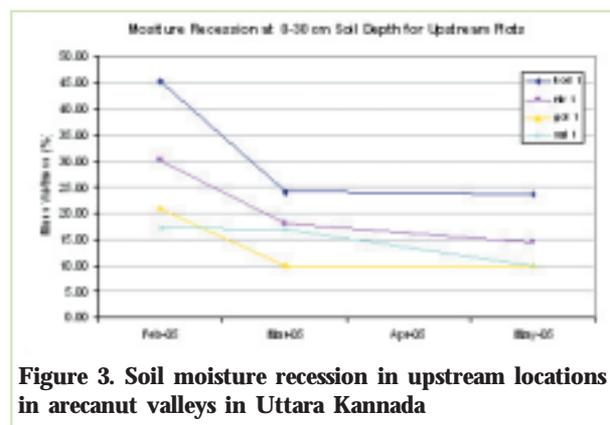


Table 1 Total annual rainfall and discharge in catchments in Kodgibail

Land use pattern/cover	For 2003				For 2004			
	Rainfall (mm)	Discharge (%)	Specific discharge (mm/ha)	Specific peak discharge (mm/ha)	Rainfall (mm)	Discharge (%)	Specific discharge (mm/ha)	Specific peak discharge (mm/ha)
Acacia plantation (A1)	2253	24.3	78.1	7.1	2846	29.7	121.0	18.3
Acacia plantation (A2)	2253	21.2	79.5	5.4	2846	31.1	147.6	29.1
Acacia plantation (A3)	2253	29.4	28.8		2846	33.7	41.8	9.3
Degraded Forest Mavinahalli	2253	37.7	94.3	10.7	2846	38.3	121.0	15.9
Degraded Forest (Dg 2)	2253	39.8	19.9		2846	42.4	26.8	3.3
Degraded Forest Vajgar	2252	37.1	83.6	4.2	2727	38.8	105.8	26.0
Dense Forest Hulimane	2253	21.8	81.9	10.6	2846	20.0	94.7	36.0
Dense Forest Vajgar	2252	22.4	56.1	2.8	2727	25.6	77.5	17.1

Source: Preliminary results provided by National Institute of Hydrology

- In terms of impacts on domestic water consumption and effort in collecting it, we found that state and private interventions in many sites have ameliorated or buffered the immediate impacts of changing availability. However, in a study spanning the Kodgibail and Arengadi sites, we found that changes in the duration of the dry period (a proxy for changes in water availability) affect both consumption levels and household labour-time spent in water collection. The impacts are differentially felt and manifested depending upon the kinds of domestic water assets (open wells, bore wells, pumps, etc.) that the household controls, but also depending upon the physical location of the household within the valley and other hydrogeological features peculiar to individual valleys. Households with limited access to water have lower water consumption to begin with, so the impact on them is in terms of more expenditure of labour-time.

In the Bandipur site we observed that,

- Saturation-excess overland flow is detected in the Mysore catchments, but systematic differences between the intact and heavily used forest catchments are yet to be understood.

- Much of the social use of streamflow is mediated by the technology of minor irrigation tanks, and the filling or not filling of the tank at a certain point in the rainy season determines the cropping pattern in the tank's command area (Figure 4).

- For one such tank, a historical analysis of the rainfall and tank storage data for the period 1984-2004 (Figure 5a and 5b) showed that the probability of a 12-monthly rainfall event occurring such that it equals or exceeds the rainfall required for tank filling by December is once in 2.5 years (40%) and for tank filling by June it is once in 3.0 years (35%). Whether these probabilities are affected by land-cover is yet to be understood.

Tank filling by June leads to a kharif crop of irrigated paddy instead of rainfed jowar. Data from a sample of 34 farmers in the tank command indicate that the gross returns are almost tripled if the farmers are able to grow irrigated paddy instead of rainfed jowar in the kharif season.

The difference in the rabi/summer season would be even more stark, because if paddy is not cultivated (due to inadequate inflows), most of the command remains fallow.

We are also conducting a study of the level and nature of forest product use by different communities in these sites to understand the tradeoffs that might exist between benefits from (and beneficiaries of) forest products and watershed services.

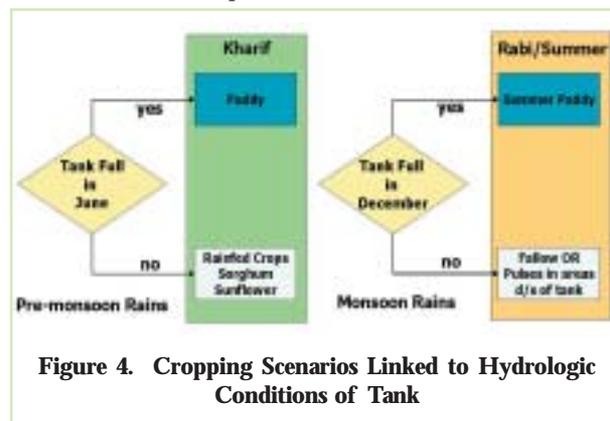


Figure 4. Cropping Scenarios Linked to Hydrologic Conditions of Tank

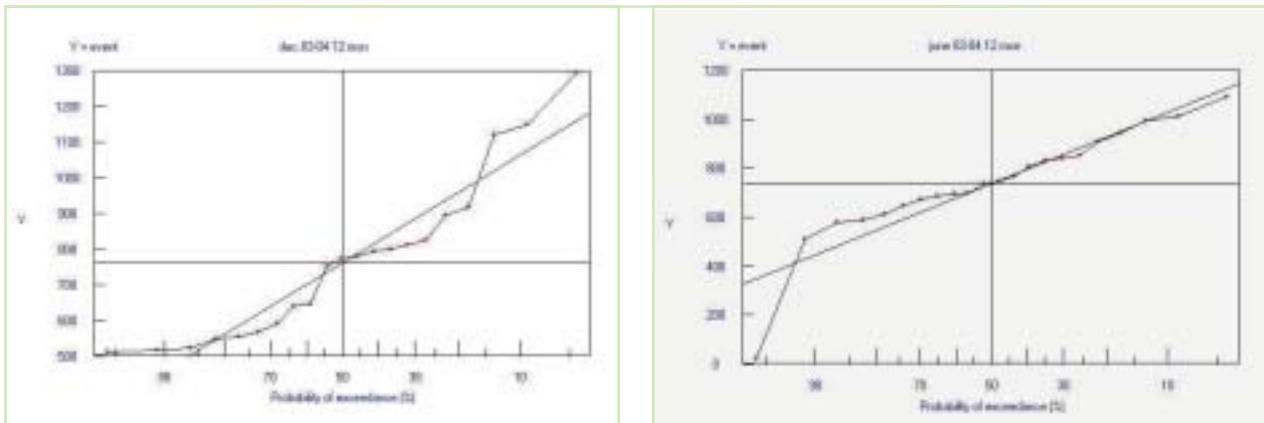


Figure 5. Probability of Tank Filling in Bargi Tank during (a) December and (b) June

Influence of Forest Cover Change on Watershed Functions in the Western Ghats: A Coarse-Scale Analysis

[Sharachandra Lélé, Jayasree Vaidyanathan, Santosh Hegde, in collaboration with researchers from ATREE and National Institute of Hydrology]

Complementing the field study of the relationship between land-cover and watershed services, we have attempted a unique approach to examining this relationship in the densely forested and high rainfall region of the Western Ghats of peninsular

India at a wider scale. This approach involves a statistical analysis of cross-sectional and time-series data for a sample of catchments in this region for which streamflow data are being collected by state agencies for several years. With streamflow data from Karnataka's Water Resources Development Organisation, rainfall data from the Directorate of Economics & Statistics, land-cover data from the interpretation of satellite imagery and ancillary data from various other sources, we have so far put together a dataset for 20 catchments within the Karnataka region of the Western Ghats.

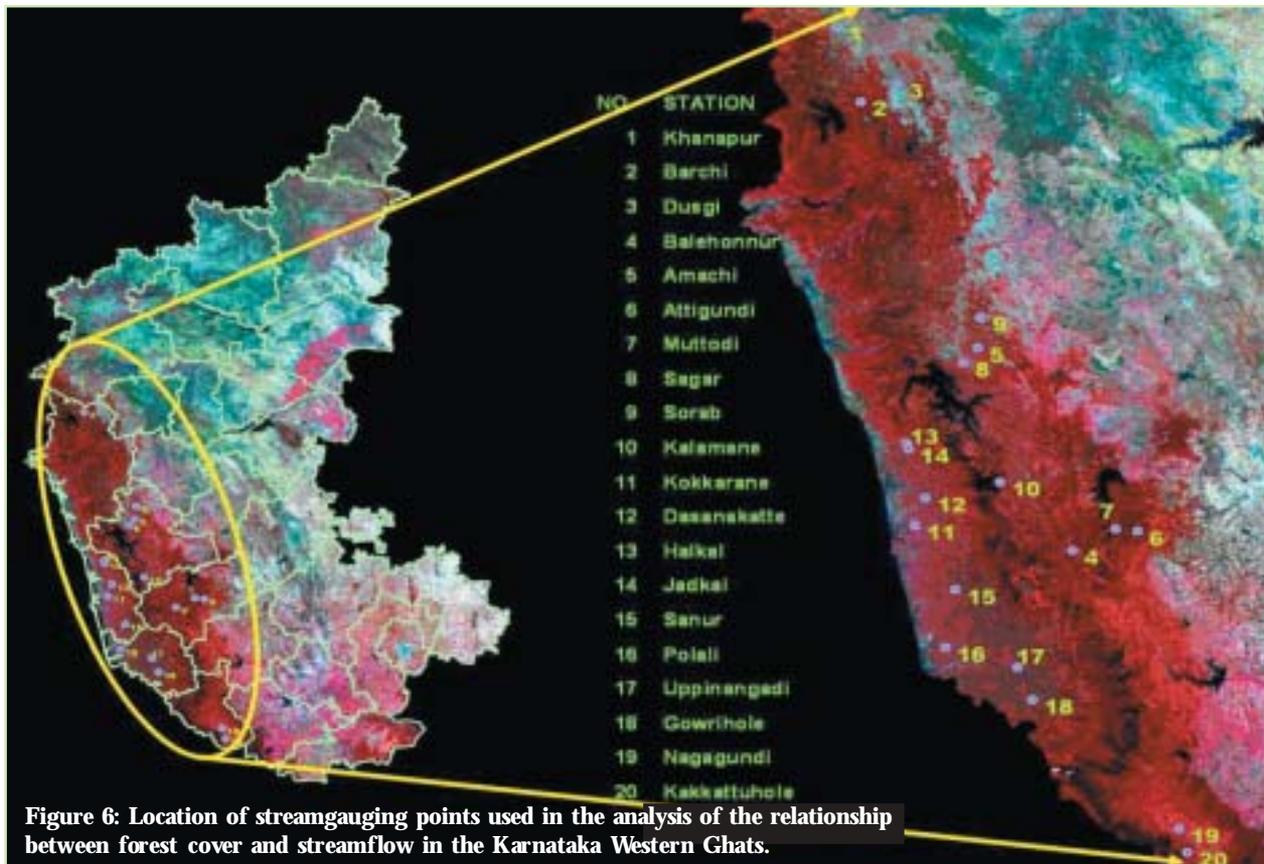


Figure 6: Location of streamgauging points used in the analysis of the relationship between forest cover and streamflow in the Karnataka Western Ghats.

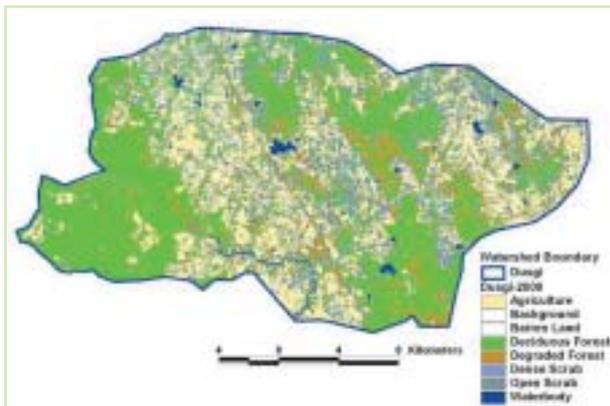


Figure 7: Land cover in Dusgi catchment, representing a dry deciduous region

The preliminary results of our cross-sectional analysis across these 20 catchments indicate that, across the range of forest types occurring in the sample (ranging from evergreen to dry deciduous), the primary drivers of streamflow are rainfall and catchment morphology. Within catchments with similar levels

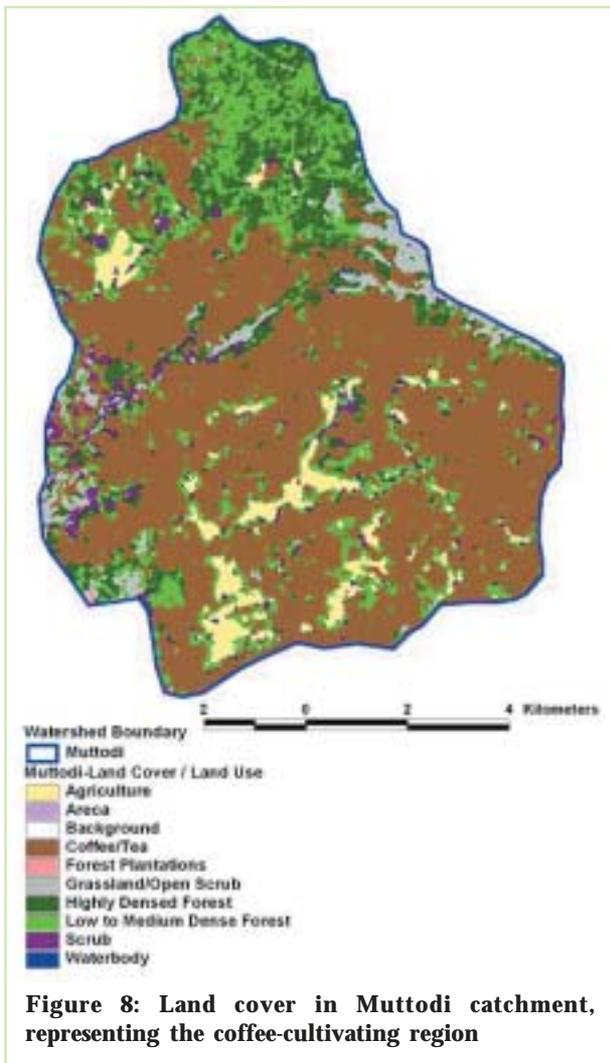


Figure 8: Land cover in Muttodi catchment, representing the coffee-cultivating region

of rainfall, the effects of differences in land cover seem to be rather limited and complicated by the different non-forest land cover types prevailing in various proportions. In attempting a time-series analysis, we found that there were actually few catchments where significant changes in forest cover had occurred over the period 1973 to 2000 (the period for which satellite imagery is available). Even in such catchments, the major determinant of inter-annual variations in streamflow and baseflow is the quantity and distribution of rainfall. Significant effects of changes in land cover have as yet not been discerned. More detailed analysis, with potentially a larger number of catchments and the use of physical (rather than purely statistical) models is planned.

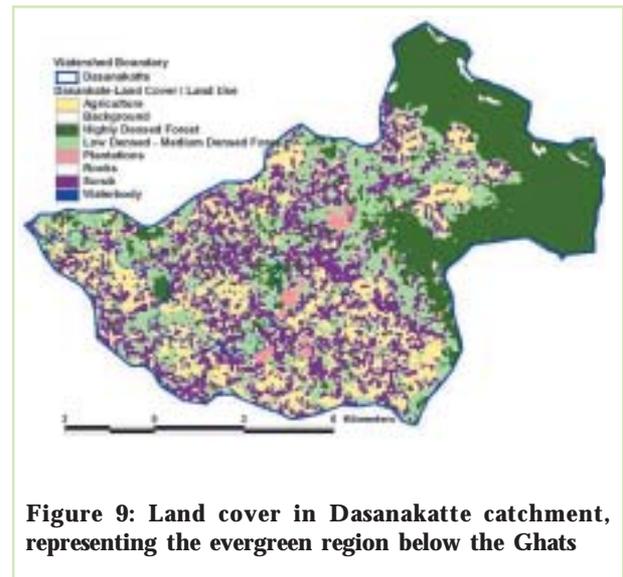


Figure 9: Land cover in Dasanakatte catchment, representing the evergreen region below the Ghats

In passing, we have identified vital gaps in the network of rain gauges in the Western Ghats. In particular, we find that the crestline region of the Ghats, which receives the maximum rainfall and around which there is high spatial variation in rainfall, has an inadequate density of rain gauges, often resulting in lower estimates of the total rain falling into the study catchments.

Energy and Pollution

The generation and use of energy is often a crucial part of the development process. However, the current paradigm governing this set of activities is far from environmentally sound and gives rise to large scale pollution. CISED has chosen to focus currently on issues related to energy generation with the goal of advancing environmentally sustainable ways of doing so, both by critiquing the current paradigm and advancing alternatives.

India's electricity sector is growing rapidly and the power generation capacity is expected to more than double over the next 15 years. Nuclear power, in particular, is to grow seven fold according to the Department of Atomic Energy's plans. Identifying the likely environmental and economic consequences of such an expansion of nuclear energy based power generation and positing ecologically more benign alternatives is a primary focus of CISED's research.

We have already published a study of the costs of electricity generation from heavywater reactors and are now examining the costs of generating electricity at the proposed fast breeder reactor, which poses special safety hazards, and the attendant fuel cycle facilities. One important component among these facilities, namely the reprocessing plants used to extract plutonium from spent (irradiated) nuclear fuel, have been examined and the costs of constructing and operating them have been estimated.

A second area of ongoing research has been an analysis of the public health damage from the uranium mines and mills in the Jaduguda region. CISED invited Dr. Surendra Gadekar, one of the key members of an independent group that conducted a health survey in the villages near Jaduguda and observed statistically significant excesses of some illnesses, as a visiting faculty member to write up these results. To address whether this ill-health could be causally associated with nuclear facilities, we propose to estimate radiation doses to the local population estimate from the radioactive wastes produced by the uranium mines and mill.

Another recently initiated area of work concerns the radical changes that have been implemented in the organization of the electricity sector. These changes include the unbundling of traditionally integrated electricity utilities into separate entities that deal with generation, transmission, and distribution; the introduction of multiple organizations, including private companies, in the generation and distribution of electricity; and the creation of independent regulatory bodies with quasi legal powers. Various individuals and groups have raised concerns about the implications of these changes for social goals like environmental sustainability, democratic governance, and equity. At the same time, the ongoing process has opened up new opportunities for intervention by members of civil society to shape the electricity sector through their inputs to the regulatory commissions. CISED is in the early stages of trying to research the changes implemented in the Karnataka electricity sector. Based on these studies, we plan to intervene in the regulatory arena to safeguard or advance some of the earlier mentioned social goals.

Nuclear Energy Costs

[M. V. Ramana, in collaboration with Amulya Reddy and Antonette D'Sa, International Energy Initiative]

Ever since its inception, the Department of Atomic Energy (DAE) has made several confident predictions about the future of atomic energy in India. None of these have been met. The current nuclear capacity is only 3310 MW, barely 3% of the total generation capacity. Despite its inability to live up to its promises, the DAE has always received high levels of financial support from the government.

The promise offered by the DAE is not only that nuclear power would form an important component of the electricity supply, but that it would be cheap. Even this claim does not stand up to analysis. The costs of generating electricity at the Kaiga atomic power station and the Raichur Thermal Power Station (RTPS) VII – both plants of similar size and vintage – have been compared using the standard discounted cash flow methodology. The coal for RTPS VII was assumed to come from mines that were 1400 km away. The comparison showed that nuclear power would be competitive only with

unrealistic assumptions; for a wide range of realistic parameters, nuclear power is significantly more expensive.

An Estimate of India's Uranium Enrichment Capacity

[M. V. Ramana]

India has had a relatively secretive uranium enrichment programme since the 1980s. There is little information about the programme, in particular its size. We estimate the uranium enrichment capacity based on the assumption that the enrichment programme has succeeded in producing sufficient enriched uranium for the core of the prototype reactor for the nuclear powered submarine that India has been developing.

The best estimate of current (2004) capacity from this analysis is 4800 kgSWU/y. However, since there are significant uncertainties it is more reasonable to quote a range of enrichment capacities, namely 3900 – 10,400 kgSWU/y. The amount of enriched product produced would depend on the enrichment level.

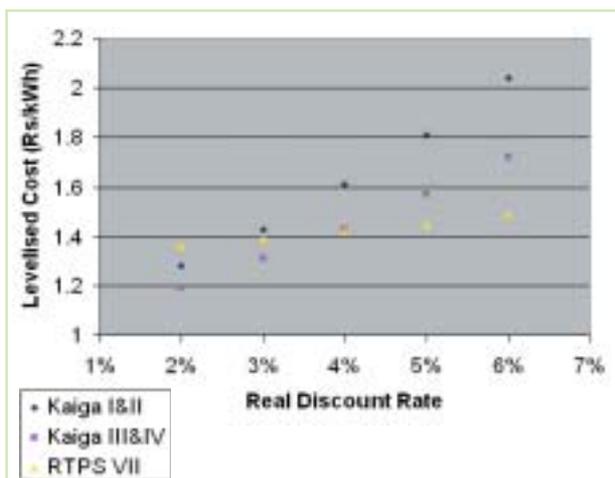


Figure 10: Levelised cost (the raw generation cost which does not include other components of electricity tariff like interest payments and transmission and distribution charges) of Kaiga I&II (operating reactors), Kaiga III&IV (reactors under construction; projected costs), and RTPS VII (operating thermal plant) as a function of real discount rate (a measure of the value of capital after taking out the effects of inflation).

While there are large uncertainties in the data and consequently the estimates, this exercise is nonetheless useful to get a sense of scale, and to make rough estimates of how much weapons grade uranium could be produced at this facility should India use it for that purpose. It also shows that the facility is too small to be able to produce adequate quantities of enriched uranium for use in power reactors for electricity generation, i.e., it is unlikely to have any non-military utility.

Economics of Reprocessing of Spent Fuel

[M. V. Ramana, in collaboration with Suchitra J. Y.]

The Department of Atomic Energy (DAE) appears to be committed to constructing fast breeder reactors, which produce more fissile material than they consume, even though many other countries have suspended such programmes because of safety reasons and poor economics. These breeder reactors are to use plutonium as fuel and the DAE has adopted reprocessing as a way of dealing with spent nuclear fuel.

The relative merits of reprocessing and direct disposal of spent nuclear fuel have been widely debated in Europe and the USA. An important aspect of the debate has been the economics of reprocessing. So far there have been no studies of the subject in the Indian context. This study assesses the economics of reprocessing and the cost of producing plutonium for the fast breeder reactor program.

Our results suggest that the cost of reprocessing each kilogram of spent fuel would cost upwards of Rs. 20,000 even with assumptions that are favourable to reprocessing, and could be as high as Rs. 30,000/kg under other assumptions. These costs are lower than the corresponding figures for reprocessing plants in Europe, the USA, and Japan. As in their case, however, it is unlikely to be an economically viable method of waste disposal.

India's Nuclear Enclave and the Practice of Secrecy

[M. V. Ramana]

The study examines the ways in which the nuclear enclave in India has practiced secrecy. It starts off by pointing out that secrecy is practiced somewhat selectively by the nuclear complex and that there are different nuances in the way it is practised in different arenas within the nuclear complex itself. The study then describes some of the factors that enable its practice and effectiveness. Finally, it focuses on three thematic areas: the intent of the program and its infrastructural components, costs associated with different aspects of the program, and the broad area of safety and impacts on public and occupational health and the environment. Due to the secrecy prevailing in all these areas, the possibility of meaningful and democratic discussion of nuclear policy, in particular the relative merits and demerits of nuclear energy, is rendered baseless and therefore practically impossible. This should, however, be balanced with noting that, by and large, the implications of even the limited amount of information available from the nuclear complex on issues of economics, safety, environmental impacts, or occupational and public health effects have not been analyzed thoroughly.

Creating Dialogue

CISED is committed to critical engagement with various actors around environment-development issues. In addition to regularly participating in public fora through lectures and seminars, CISED faculty have contributed to debates on various policy issues through direct and indirect engagement with policy makers and governmental agencies, and have initiated dialogues with civil society groups on various topics. These efforts are briefly summarised below

Contributing to Policy Discussions

Review of Watershed Development Programmes

[*Shrinivas Badiger, Sharachchandra Lélé*]

The Ministry of Rural Development of the Government of India has appointed a Technical Committee to comprehensively review DPAP, DDP, and IWDP, which are watershed development programmes supported by the Ministry. The committee, headed by Mr. S. Parthasarathy, is to reassess the existing agro-climatic categorization, formulate new guidelines for prioritization and recommend viable strategies for

organisations, including a member of the planning commission. The forum made a presentation about the major concerns with the existing programmes and policies and suggested a comprehensive set of changes. These suggestions were discussed at length by the committee members and others present, and a detailed note was subsequently submitted to the committee.

Review of the Use of Remote Sensing Technologies

[*Sharachchandra Lélé, with inputs from Santosh Hegde and Muthatha Ramanathan (visiting student)*]



meaningful implementation of these programmes. The Forum for Watershed Development Research and Policy Dialogue, which has been launched by Society for Promoting Participative Ecosystem Management, Pune (SOPPECOM), Gujarat Institute of Development Research, Ahmedabad (GIDR) and CISED, organized a consultative meeting with this committee in Pune on 25 July 2005. The meeting was attended by several research scholars, policy makers, and practitioners from various government and non-governmental

The Karnataka Forest Department (KFD) controls more than 20% of the state's landscape and manages a resource that provides multiple ecological benefits to different sections of society. Over the past two decades, KFD has tried to deploy the recently developed technologies of Remote Sensing (RS), Geographic Information Systems (GIS) and Global Positioning Systems (GPS) in its forest management activities.

CISED participated in an exercise of comprehensively reviewing KFD's experience with these technologies. The report of the review team points out that the past focus on assessing forest cover has provided limited benefits to the front-line staff and the general public. The more pressing need is a clearer understanding of the physical location and legal status of specific parcels of land that are governed by a spatially fragmented, historically complex, and increasingly contested system of forest rights. We recommended that the GIS facility in KFD should now focus on building up a digital collection of large scale maps like village maps and forest survey maps and simultaneously build up a computerised parcel-level forest land information system. This can later be linked up with the maps in a GIS format, and used by frontline staff in

combination with GPS measurements to make their activities speedier and more accurate.

Debate on Draft National Environment Policy 2004

[*Sharachchandra Lélé, Ajit Menon*]

The draft NEP 2004 released by the Indian Ministry of Environment & Forests generated much debate. Two faculty members from CISED participated in this debate by writing a critique of this draft. Acknowledging that the draft policy document introduces several important concepts such as polluter pays, precautionary principle and public trust, we have argued, however, that the draft is fundamentally flawed in both its vision of environmentally sound development and its analysis of socio-environmental problems. Consequently, instead of mainstreaming environmental concerns into all developmental activities and sectors (its stated goal), the draft 'mainstreams' the current notion of unbridled economic growth into even the limited environmental regulation we have.

The full version of this critique was published in SEMINAR and a shorter version appeared in Down to Earth and was then reproduced in a couple of newspapers. We were then invited, along with several others, by the Ministry to participate in a special consultation on the draft policy, which was chaired by a member of the National Advisory Council.

Input into National Electricity Policy

[*M. V. Ramana*]

The draft of the National Electricity Policy released for public comments called for increasing the installed capacity of nuclear power to 20,000 MW by 2020. In a written comment to the Joint Secretary of the Ministry of Power, we pointed out that this recommendation for a generation target of this nature is not compatible with the principle of competition emphasized by the Electricity Act, 2003. The installed capacity of nuclear power should be determined through fair and free competition, without the provision of subsidies. Drawing on our studies of the economics of electricity generated at nuclear reactors, we pointed out how even with such subsidies nuclear power is typically more expensive when compared to coal power, even at thermal stations far away from coal mines. Also laid out were the many reasons why nuclear power is not an economically competitive way of generating electricity with questionable environmental costs. We therefore recommended that the national electricity policy not mention any specific targets for nuclear power generation.

The final version of the National Electricity Policy dropped any mention of a specific target for nuclear power generation.

Comments on Environmental Impact Assessments of proposed Uranium Mining Project in Jharkand and Uranium Ore Processing Plant in Andhra Pradesh

[*M. V. Ramana*]

The Uranium Corporation of India has been proposing to construct new uranium mines in Jharkand and Andhra Pradesh and associated processing facilities. As part of these proposals, it filed Environmental Impact Assessments and there were public hearings to discuss these reports. Our examination of these reports found serious flaws in them. These included technical errors, omissions of widely documented harmful environmental and public health impacts of uranium mining and milling, and not making an adequate case for the necessity of the project in the first place. We submitted written comments to both public hearings pointing out that these could not be a basis for a serious evaluation of the project, let alone offering it environmental clearance.

Reaching out to Civil Society groups

Consultative Workshop on Strategies to Realise a Non-Nuclear India

The Department of Atomic Energy plans for an ambitious expansion of nuclear energy in India. This will not be cheap and have significant impacts on environment and local community. In January 2005, CISED, in collaboration with CANE (Citizens for Alternatives to Nuclear Energy), organised a one day consultative workshop on strategies to counter these developments. Activists from all over the state of Karnataka participated and discussed, inter alia, their experiences with opposing the construction of the Kaiga reactors, mobilization strategies, and the outlook for alternatives to nuclear power.

Workshop on Reconciling Conservation and Livelihoods in Practice

Conventionally, biodiversity conservationists have been at odds with local communities that are dependent upon natural resources for their livelihoods. Over the past decade, several attempts have been made to integrate biodiversity conservation thinking with livelihood enhancement programmes. In December 2005, a group of organisations- Ashoka Trust for Research in Ecology and the Environment, CISED, Samrakshana Trust, Kalpavriksh and Foundation for Ecological Security-held a workshop that brought together the experiences of several practitioners across India. The experiences were analysed in terms of their economic, institutional, tenorial and policy dimensions. Several followup activities are being planned.

Research Outputs

Papers Published

1. Ramana, M. V. (2004). 'An Estimate of India's Uranium Enrichment Capacity', *Science and Global Security*, Vol.12: pp.115-124.
2. Menon, A. (2004). 'Colonial Constructions of 'Agrarian Fields' and 'Forests' in the Kolli Hills', *The Indian Economic and Social History Review*, Vol.41 (3): pp.315-337.
3. Ramana, M. V. (2004). 'Scientists, Nuclear Weapons, and the Peace Movement', *Economic and Political Weekly*, Vol. 38 (46-47): pp.5013-5016.
4. Lélé, S. (2004). 'Beyond State-Community and Bogus 'Joint'ness: Crafting Institutional Solutions for Resource Management', in Max Spoor, ed. *Globalisation, Poverty and Conflict: A Critical 'Development' Reader*, Dordrecht and Boston, Kluwer Academic Publishers, pp.283-303.
5. Saberwal, V. and S. Lélé (2004). 'Locating Local Elites In Negotiating Access to Forests: Havik Brahmins and the Colonial State 1860-1920', *Studies in History*, Vol. 20(2): pp.273-303.
6. Bawa, K. S., W John Kress, N. M. Nadkarni, and S. Lélé, (2004). 'Beyond Paradise—Meeting the Challenges in Tropical Biology in the 21st Century', *Biotropica*, Vol. 36(4): pp.437-446.
7. Menon, A. (2005). 'NEP 2004: Market Fundamentalism', *Economic and Political Weekly*, Vol. 40 (2).
8. Menon, A. (2005). 'Where are the Forests? Legal Pluralism and Land Use Change in the Kolli Hills', *Indian Socio-Legal Journal*, Vol. XXXI (Special): pp.12-26.
9. Lélé, S. and A. Menon (2005). 'Draft NEP 2004: A Flawed Vision', *Seminar*, 547: pp.55-62.
10. Ramana, M. V. (2005). 'Economics of Nuclear Power from Heavy Water Reactors', with Antonette D'Sa and A. Reddy, *Economic and Political Weekly*, Vol. 40 (17): pp.1763-1773.
11. Lélé, S. and R. Norgaard. (2005). 'Practicing Interdisciplinarity', *BioScience*, Vol. 55 (11): pp.967-975.
12. Ramana, M. V. and Zia Mian (2005). 'Feeding the Nuclear Fire', *Economic and Political Weekly*, Vol. 40 (35): pp.3808-3812.
13. Shah, E. (2005). 'Local and Global Elites Join Hands: Development and Diffusion of Genetically Modified Bt Cotton Technology in Gujarat', *Economic and Political Weekly*, Vol.40 (43): pp.4629-4640.
14. Ramana, M. V. (2005). 'Nuclear Power: Expensive and Unsafe', *Electrical India*, Vol.45 (11): pp.141-146.
15. Lélé, S. and L. Venkatachalam. (2005). 'Assessing The Socio-Economic Impact Of Changes In Forest Cover On Watershed Services' in Krishnaswamy, J., S. Lélé and R. Jayakumar, eds., *Hydrology and Watershed Services of the Western Ghats (India): Effects of Land Cover Change*, Tata McGraw-Hill, Bangalore.
16. Kiran Kumar A.K., A. Menon and I. Patil (2005), 'Methodological Challenges In Socio-Hydrological Research On Land Use Change And Watershed Services', in Krishnaswamy, J., S. Lélé and R. Jayakumar, eds., *Hydrology and Watershed Services of the Western Ghats (India): Effects of Land Cover Change*, Tata McGraw-Hill, Bangalore.

Edited Books

1. Krishnaswamy, J., S. Lélé and R. Jayakumar, eds., *Hydrology and Watershed Services of the Western Ghats (India): Effects of Land Cover Change*, Tata McGraw-Hill, Bangalore.

Technical Reports

1. Joy, K. J., S. Paranjape, A.K. Kiran Kumar, R. Lélé and R. Adagale. (2004). 'Water Development Review: Issues and Prospects'.
2. Lélé, S., A. K. Kiran Kumar and P. Shivashankar. (2005). 'Joint Forest Planning and Management (JFPM) in the Eastern Plains Region of Karnataka: A Rapid Assessment'.

Papers Presented at Workshops, Conferences and Seminars

1. Lélé, S., K. S. Bawa and C. Made Gowda. 'Ex-Post Evaluation of the Impact of an Enterprise-Based Conservation Project in BRT Wildlife Sanctuary, India'. Paper presented at the conference 'The Commons in an Age of Global Transition: Challenges, Risks and Opportunities', organised by International Association for the Study of Common Property at Oaxaca (Mexico), 9-13 August 2004.
2. Ramana, M. V. 'Energy and Environmental Sustainability'. Paper presented at the national seminar on 'Integrating Environmental Sustainability with Economic Development', Maharani's Arts College for Women, Bangalore, 26 August 2004.
3. Shah, E. 'Technological Vulnerability and Farmers' Suicides in South India'. Paper presented at the annual conference of European Association for Studies in Science and Technology, Paris, 26-28 August 2004.
4. Lélé, S. and K. S. Bawa. 'Interdisciplinarity In Action Research: An Enterprise-Based Conservation Project In the BRT Wildlife Sanctuary Of Karnataka: India'. Paper presented at the international conference on 'Interdisciplinary Research and Management in Mountain Areas (IRMMA)', organised by Banff Center for Continuing Education at Banff (Canada), 23-26 September 2004.
5. Shah, E. 'Questioning Modernity's Tradition: Designs of Tank Irrigation Technology In Historical Perspective'. Paper presented at the annual conference of the Society for History of Technology, Amsterdam, 7-9 October 2004.
6. Ramana, M. V. 'Nuclear Energy and Security'. Paper presented at the conference 'The Challenge of Hiroshima: Alternatives to Nuclear Weapons, Missiles, Missile Defenses, and Space Weaponization in a Northeast Asian Context', organised by International Network of Engineers and Scientists Against Proliferation, Hiroshima (Japan), 8-11 October 2004.
7. Lélé, S. 'Whither JFM Research?'. Paper presented at the workshop 'JFM-Spread, Performance and Impact: Ecological Economics Research Network', organised by Centre for Ecological Sciences, IISc, Bangalore, 18-19 November 2004.
8. Ramana, M. V. 'India and Nuclear Secrecy'. Paper presented at the conference on 'Transparency as a Prerequisite of Arms Control', organised by Peace Research Institute, Frankfurt, at Bensheim (Germany), 19-20 November 2004.
9. Shah, E. 'Resource, Rules and Technology: Capturing Dynamics of Building Water Users' Association'. Paper presented in a symposium on 'Water and Governance', organised by IRMA, Anand, 14-17 December 2004.
10. K. J. Joy, S. Paranjape, A. Shah, S. Badiger and S. Lélé. 'Scaling Up of Watershed Development Projects In India: Learnings From the First Generation Projects'. Paper presented in the 4th Annual IWMI-Tata Partners' Meet 2005, organised by International Water Management Institute at Anand, 24-26 February 2005.
11. Shah, E. 'Technological Vulnerability and Farmers' Suicides'. Paper presented in the conference on 'Agrarian Distress and Farmers Suicides', organized by Governance and Policy Spaces (GAPS), CESS, Guntur, 24 -26 February 2005.
12. Shah, E. 'Bill Gates and Robin Hood Join Hands: Development and Diffusion of the Bt Cotton Technology in Gujarat'. Paper presented at the conference on 'Globalization of Biotechnology: Multidisciplinary Views from South', organised by Centre for Globalisation and Regionalisation, Warwick University, 11-23 March 2005.
13. Singh, P. 'Nationalist Perspective on Floods: A Case Study of North Bihar'. Paper presented (in absentia) in the annual meeting of the Association of Asian Studies, Chicago, 31 March-3 April, 2005.
14. Badiger, S. 'Critical Issues In Watershed Development In India'. Paper presented in the workshop 'FAWPIO Inception and Scenario Building', organised by CLUWRR, University of Newcastle and FAWPIO-India at Bangalore, 6-7 May 2005.
15. Ramana, M. V. 'An Estimate of India's Uranium Enrichment Capacity'. Paper presented in the 17th International Summer Symposium on 'Science and World Affairs', organised by Union of Concerned Scientists at Princeton (USA), 21-23 July 2005.
16. Menon, A. 'Environmental Impacts Of Large Dams'. Paper presented in a seminar 'Unraveling Bhakra', organised by Madras Institute of Development Studies, Chennai, 3 August 2005.
17. Badiger, S. 'Water Regulation and Socio-Ecological Impacts'. Paper presented in the workshop on 'Managing Arid and Semi-arid Ecosystems: Towards Integrated Water Management', organised by Norwegian Institute for Water Research at Hyderabad, 22-24 August 2005.
18. Shah, E. 'Use and Management of Tank Irrigation and Political Economy of Agrarian Change'. Paper presented in a seminar on 'Pricing, Policy and Regulation Issues Related to Water', organised by

Society for Promotion of Wasteland Development (SPWD), New Delhi, 26 -27 August 2005.

19. Ramana, M. V. 'India's Nuclear Enclave and the Practice of Secrecy'. Paper presented at the conference on 'Culture, Society and Nuclear weapons in South Asia', organised by Social Science Research Council, New York (USA), 28-29 August 2005.
20. Ramana, M. V. 'Feeding the Nuclear Fire'. Paper presented at the conference on 'International Nuclear Cooperation with India', organized by Simons Centre for Disarmament, University of British Columbia, Vancouver (Canada), 22 November 2005.

Articles in Newspapers, Magazines, and other Popular Media

1. Ramana, M. V. 'Reinforcing Nuclear Secrecy', *The Daily Times*, 5 February 2004.
2. Ramana, M. V. 'A Fast Breeder of Danger', *The Indian Express*, 7 September 2004.
3. Bawa, K. S., W. John Kress, N. M. Nadkarni, S. Lélé, P. H. Raven, D. H. Janzen, A. E. Lugo, P. S. Ashton and T. E. Lovejoy. 'Tropical Ecosystems Into the 21st Century', *Science*, 306(5694): pp.227-228, 8 October 2004.
4. Lélé, S. and A. Menon. 'Neo-Liberal Verbiage', *Down To Earth*, 15. 53. (also reprinted in *Central Chronicle*, January 5 and *New Indian Express*, 9 January 2005).
5. Ramana, M. V. and Amulya K. N. Reddy. 'Nuclear Power is not Cheap'. *The Indian Express*, 20 June 2005.
6. Ramana, M. V. 'Nuclear Power: No Solution to Global Warming'. *The Friday Times*, 1 July 2005.
7. Ramana, M. V. 'India-US Nuclear Agreement: A Bad Deal'. *The Friday Times*, 29 July 2005.
8. Shah, E. 'Who Benefits from the Cultivation of Bt Cotton?'. *The Hindu*, 14 September 2005.

Professional Activities

Teaching Activities

1. Lélé, S., delivered one lecture on 'Database on Landuse and Forest Cover' in ISEC Ph.D. course on research database.
2. Menon, A., delivered two lectures on 'Common Property Resources' in ISEC Ph.D. course 'Perspectives on Social Change'.
3. Shah, E., delivered two lectures on 'Overview of Debates on Science and Technology Studies' in ISEC Ph.D. course 'Perspectives on Social Change'.
4. Ramana, M. V., delivered two lectures on 'Science, Technology and Development' in ISEC Ph.D. course 'Perspectives on Social Change'.
5. Shah, E., participated in one day consultation on curriculum design of masters course on social water management by Mahatma Gandhi university, Cochin.
6. Shah, E., took two sessions teaching social science research methodology to M. Sc. wildlife students at National Centre for Biological Research, Bangalore
7. Badiger, S., serving on one Ph.D. thesis committee in ISEC Ph.D. programme.
8. Lélé, S., served on two Ph.D. student assessment panels, and is serving on one Ph.D. thesis committee in the ISEC Ph.D. programme.
9. Lélé, S. served as an external evaluator for CCS presentations, Indian Institute of Management, Bangalore, 31 August 2005.
10. Shah, E., A. Menon, and M. V. Ramana taught a module on Environment and Development to ISEC Ph.D. students.
11. Menon, A. served as an external examiner for the M.A. (International Studies) Programme at Stella Maris college, Chennai.
2. Badiger, S. 'Global Water Issues', Talk delivered in the training programme on Social Development Research Capacity Building (SDRC), organised by TATA-Dhan Academy, Madurai, 26 February 2004.
3. Shah, E. 'Tanks of South India', Talk delivered in the training programme on Social Development Research Capacity Building (SDRC), organised by TATA-Dhan Academy, Madurai, 26-27 February 2004.
4. Menon, A. 'Common Property Resources and Agrarian Issues'. Talk delivered in the training programme for Ph.D. scholars, organised by Foundation for Agrarian Studies, Bangalore, 27 March 2004.
5. Menon, A. 'Environmental Degradation and Agrarian Change', Talk delivered at Foundation for Agrarian Studies, Bangalore, 29 March 2004.
6. Lélé, S. 'Rethinking Institutions for Natural Resource Management', Public lecture organised by Centre for Environment Education, Kalpavriksh, SOPPECOM & Open Space, Pune, 13 May 2004.
7. Ramana, M. V. 'Secrecy and India's Nuclear Establishment', Talk delivered at the Alternate Law Forum, Bangalore, 21 May 2004.
8. Lélé, S. 'Forests, Environment & People'. Lecture delivered at Bangalore Association for Science Education, Bangalore, 4 June 2004.
9. Lélé, S. 'From Participation to Self-Governance: Rethinking People's Role in Watershed Development'. Keynote address delivered at the National Seminar on Forest, Water and People, organised by National Institute of Hydrology, Belgaum, 29-30 July 2004.
10. Lélé, S. 'Promoting Interdisciplinary Research on NRM: Some ideas & experiences'. Lecture delivered at Centre for Ecosystem Science, Universidad Nacional Autonoma de Mexico at Morelia (Mexico), 16 August 2004.
11. Ramana, M. V. 'Nuclear Power in India: An Overview'. Lecture delivered at Department of Chemical Engineering, Indian Institute of Science, Bangalore, 19 August 2004.
12. Ramana, M. V. 'Future of Nuclear Power in India'. Seminar presented at Program on Science and Global

Invited Lectures and Talks

1. Lélé, S. 'Sustainable Forest Management: Concepts, Ecology and Institutions', Talk delivered in the training programme on Social Development Research Capacity Building (SDRC), organised by TATA-Dhan Academy, Madurai, 22 February 2004.
11. Ramana, M. V. 'Nuclear Power in India: An Overview'. Lecture delivered at Department of Chemical Engineering, Indian Institute of Science, Bangalore, 19 August 2004.
12. Ramana, M. V. 'Future of Nuclear Power in India'. Seminar presented at Program on Science and Global

- Security, Princeton University, Princeton, U.S.A., 1 October 2004.
13. Shah, E. 'Technological Vulnerability and Farmers' Suicides in South India'. Seminar presented at Department of Technology and Agrarian Development, TAO, Wageningen University, The Netherlands, 12 October 2004.
 14. Shah, E. 'Technological Vulnerability and Farmers' Suicides in South India'. Seminar presented at UNU-INTECH, Maastricht, The Netherlands, 20 October 2004.
 15. Lélé, S. 'Alternative Development Model: Some thoughts (in Marathi)'. Keynote address delivered at 12th Vichaar Vedh Sammelan, organised by Dr. Babasaheb Ambedkar Academy, Barshi, 28 November 2004.
 16. Ramana, M. V. 'Technology and Development: Nuclear Energy in India'. Lecture delivered at a course on Technology and Sustainable Development, Indian Institute of Technology, Chennai, 4 January 2005.
 17. Menon, A. 'Critiquing the Draft National Environment Policy'. Lecture at the seminar on Comprehensive Security Issues and Challenges: An Indian Perspective, organized by Stella Maris College, Chennai, 6-7 January 2005.
 18. Lélé, S. 'SFM: Definitions and Measurement'. Lecture delivered at College of Forestry-Sirsi, University of Agricultural Sciences-Dharwad, 11 January 2005.
 19. Ramana, M. V. 'Nuclear Energy and Nuclear Weapons: Issues for an Informed Public Debate'. Public lecture organized by Society for Promoting Participative Ecosystem, Prayas, Kalpavriksh, and others, Pune, 12 January 2005.
 20. Ramana, M. V. 'Nuclear Power: the Department of Atomic Energy's Plans and Constraints'. Presentation at Consultation Meeting on Strategies to Realize a Non-nuclear India organized by Citizens for Alternatives to Nuclear Energy and Centre for Interdisciplinary Studies in Environment and Development, Bangalore, 29 January 2005.
 21. Ramana, M. V. 'Economics of Nuclear Power in India'. Seminar delivered at Institute for Social and Economic Change, Bangalore, 17 February 2005.
 22. Ramana, M. V. 'Technology Choices and their Implications: The Case of Nuclear Energy in India'. Lecture delivered in a course on Technology and Policy in India, Indian Institute of Management, Bangalore, 16 March 2005.
 23. Lélé, S. 'Socio-Economic Drivers of Landscape Change'. Lecture delivered in course on Landscape Ecology at National Centre for Biological Sciences, Bangalore, 2 May 2005.
 24. Ramana, M. V. 'Ionizing Radiation and Health'. Lecture delivered at Bangalore Planetarium, 27 May 2005.
 25. Lélé, S. 'Economic Analysis of Forest Issues'. Two lectures delivered at training programme, organised by South Asian Network for Development and Environment Economics, Bangalore, 15 July 2005.
 26. Ramana, M. V. 'Nuclear Power in India: Current Status, Future Prospects'. Talk delivered at Stanford University, Palo Alto, USA, 20 July 2005.
 27. Ramana, M. V. 'An Estimate of India's Uranium Enrichment Capacity'. Talk delivered at 17th International Summer Symposium on Science and World Affairs, Princeton, 23-31 July 2005.
 28. Menon, A. 'Tribal Development and Modernity'. Talk delivered at ATREE, Bangalore, 27 July 2005.
 29. Menon, A. 'Matching Theory and Practice: Equity in Sustainable Livelihood Interventions'. Talk delivered at ATREE, Bangalore, 27 July 2005.
 30. Shah, E. 'Development Diffusion of Genetically Modified BT Cotton Technology in Gujarat'. Talk delivered at Gujarat Institute of Development Research (GIDR), Ahmedabad, 8 August 2005.
 31. Ramana, M. V. 'Nuclear Power: Plans, Prospects, and Constraints'. Talk delivered at Greenpeace, Bangalore, 24 August 2005.
 32. Ramana, M. V. 'Promises and Failures: The Story of Atomic Energy in India'. Talk delivered at Raman Research Institute, Bangalore, 6 October 2005.
 33. Lélé, S. 'Sustainable Development and the Role of Science & Technology'. Lecture delivered in a training programme on Multidisciplinary Perspectives on Science and Technology organised by National Institute of Advanced Studies, Bangalore, 9 November 2005.
 34. Ramana, M. V. 'South Asia: Under the Nuclear Shadow'. Talk delivered in a seminar organised by University of British Columbia, Vancouver (Canada), 23 November 2005.

Participation in Workshops and Conferences

1. Shah, E. Participated in annual partners meeting titled 'Water and Welfare: Critical Issues in India's Water Future' organised by IWMI-Tata at Anand, 17-19 February 2004.

2. Shah, E. Participated as discussant in the conference titled 'First Plenary Conference of Tensions of Europe, the Role of Technology in the Making of 20th Century Europe' organised by Foundation for the History of Technology, The Netherlands, at Budapest (Hungary), 18-20 March 2004.
3. Singh, P. Participated in the 'National Workshop on Drought Mitigation Strategies' organised by ICRISAT, Hyderabad, 18-19 March 2004.
4. Lélé, S. Participated in the 'SANDEE Research and Training Workshop' organised by South Asian Network for Development and Environment Economics, Colombo, 13-16 June 2004.
5. Lélé, S. Participated as panelist in a panel discussion on 'Eco-Development versus Economic Development' organised by Infosys Technologies, Electronic City, Bangalore, 28 June 2004.
6. Lélé, S. Participated as rapporteur in the meeting on 'Watershed Development in India' organised by SOPPECOM, GIDR and CISED to launch the network for research, advocacy and capacity-building, Pune, 28 October 2004.
7. Badiger, S. Participated in the meeting on 'Watershed Development in India' organised by SOPPECOM, GIDR and CISED to launch the network for research, advocacy and capacity-building, Pune, 28 October 2004.
8. Lélé, S. Participated as panel speaker in 'Live Debate on National Environment Policy' organised by Media for Sustainable Development, Centre for Environment Education and National Law School of India University, Bangalore, 25 November 2004.
9. Menon, A. Participated as discussant in 'National Workshop on Rural Governance' organised by Centre for Public Policy, Indian Institute of Management, Bangalore, 12-13 December 2004.
10. Shah, E. Participated as discussant in a symposium on 'Water and Governance' organised by IRMA, Anand, 14 - 16 December 2004.
11. Lélé, S. Participated in the workshop titled 'Sustainable Land Use in Dry lands: Global and National Perspectives for India' organised by UNDP and TERI, Delhi, 2 February 2005.
12. Lélé, S. Participated in a special consultation meeting on 'Draft National Environment Policy 2004' organised by Ministry of Environment and Forests and National Advisory Council, Delhi, 15 February 2005.
13. Lélé, S. Participated in the expert committee meeting on 'Review of Water and Agricultural Policy Analysis of Karnataka' carried out by SRIJAN and organised by Oxfam GB, Bangalore, 25 February 2005.
14. Singh, P. Participated in the workshop on 'Water Conflicts in India' organized by ICRISAT, Hyderabad, 21-22 March 2005.
15. Badiger, S. Participated in the 'NGO Consultation for Assessment of ADB Water Policy' organized by CURE, WaterAid and ADB, Bangalore, 15 April 2005.
16. Badiger, S. Participated as discussant in 'Inter-Agency Co-ordination Workshop on Water for Livelihoods' organised by Oxfam GB and Dhan Foundation at Bangalore, 25 April 2005.
17. Lélé, S. Participated in the workshop titled 'FAWPIO-India Inception and Scenario Building' organised by University of New Castle-upon-Tyne and Indian Institute of Technology-Delhi, Bangalore, 6-7 May 2005.
18. Ramana, M. V. Participated as discussant in the first workshop on 'Culture, Society and Nuclear Weapons in South Asia' organized by Social Science Research Council, Amsterdam, 9-11 May 2005.
19. Lélé, S. Participated as session chair in the conference titled 'Ecology and Human Well-Being' organised by Indian Society for Ecological Economics, GIDR, Mumbai, 3-4 June 2005.
20. Lélé, S. Participated as discussant in the 'SANDEE 10th Biannual Research and Training Workshop' organised by South Asian Network for Development and Environment Economics, Bangalore, 23-24 July 2005.
21. Badiger, S. Participated as co-organizer in the 'Consultative Meeting with the Parthasarthy Committee on DDP, DPAP and IWDP' organised by the Forum for Watershed Development Research and Policy Dialogue, Pune, 25 July 2005.
22. Lélé, S. Participated as co-organizer in the 'Consultative Meeting with the Parthasarthy Committee on DDP, DPAP and IWDP' organised by the Forum for Watershed Development Research and Policy Dialogue, Pune, 25 July 2005.
23. Shah, E. Participated in the workshop organised by Society for Promotion of Wasteland Development, New Delhi, 26-27 August 2005.
24. Lélé, S. Participated in 'Science, Technology and Development: Workshop in honour of Prof A K N Reddy' organised by Department of Management Studies, Indian Institute of Science, Bangalore, 28 October 2005.

25. Shah, E. Participated in the 'Annual Conference of Society for History of Technology', Minneapolis (USA), 3-6 November 2005.
26. Badiger, S. Participated in the workshop on 'Monitoring and Evaluation of Watershed Development' organised by ISRO, ANTRIX and Watershed Development Department, Government of Karnataka, Bangalore, 9 November 2005.
27. Badiger, S. Participated in the 'Dialogue on Improving Watershed Policies, Practices and Knowledge to Impact People and Ecosystems' organised by ICRISAT, Hyderabad, 24-25 November 2005.
28. Menon, A. Participated as discussant in the workshop on 'Reconciling Conservation and Livelihoods in Practice' organised by ATREE, Bangalore, 15-17 December 2005.
29. Lélé, S. Participated as session chair in the workshop on 'Reconciling Conservation and Livelihoods in Practice' organised by ATREE, Bangalore, 15-17 December 2005.

Other Professional Activities

1. CISED faculty and staff have served as reviewers in various contexts, including for papers submitted to journals such as Conservation & Society, Water International, Science and Global Security, Economic and Political Weekly, and ISEC Journal; research proposals submitted to SANDEE and MacArthur Foundation; reports published by ISEC and the Sustainable Development Policy Institute (Islamabad) and books.
2. Sharachchandra Lélé was re-elected to the Executive Committee of the Indian Society for Ecological Economics in April 2004.
3. Esha Shah visited the Department of Technology and Agrarian Development at Wageningen University, The Netherlands during 6-22 October 2004 under IDPAD Exchange of Scholars' visiting fellowship.

Workshops and Seminars

Workshops Organised

1. Meeting on 'Watershed Development in India' to launch the network for research, advocacy and capacity-building, in collaboration with SOPPECOM and GIDR, Pune, 28 October 2004.
2. Consultation Meeting on 'Strategies to Realize a Non-nuclear India' in collaboration with Citizens for Alternatives to Nuclear Energy, Bangalore, 29 January 2005.
3. Consultative Meeting with Technical Review Committee on Watershed Development, in collaboration with SOPPECOM and GIDR, Pune, 25 July 2005.
4. Workshop on 'Understanding Community-Based Natural Resource Management in South Asia, Bangalore, 13-14 December 2005.
5. Workshop on 'Reconciling Conservation and Livelihoods in Practice', in collaboration with ATREE, Samrakshana Trust, Foundation for Ecological Security, and Kalpavriksha, Bangalore, 15-17 December 2005.
4. 'Urbanization and Environment in Metro and Small Town Regions: Towards a Local Government Focused Conceptual Framework', Solomon Benjamin, Researcher, Bangalore, 6 July 2004.
5. 'Global Commons, Local Solutions: Climate Change Policies and Small-Scale Industries in India', Preeti Soni, Ph.D. Scholar, IVM, The Netherlands, 12 July 2004.
6. 'Reaching the Un-Reached: Towards An Energy - Development Paradigm For Rural India', Shirish Sinha, Ph.D. Scholar, University of Twente, The Netherlands, 14 July 2004.
7. 'The Land Surface Hydrological Processes: An Evaluation Using Macro Scale Process Models and the Application of Remote Sensing and GIS in Hydrology', Venkataramana R Sridhar, Assistant Professor, University of Nebraska, Lincoln, 22 November 2004.
8. 'Political Economy of Energy', John Byrne, Professor, Centre for Energy and Environmental Policy, University of Delaware, 18 January 2005.
9. 'Democratisation of Technological Culture: The Role of Science and Technology for Development', Wiebe E. Bijker, Professor, University of Maastricht, CISED-NIAS Public Lecture, 16 August 2005.
10. 'The Politics of Modern Biology', Wiebe E. Bijker, Professor, University of Maastricht, CISED-NCBS Public Lecture, 17 August 2005.
11. 'Energy Strategies to Deal with Climate Change', Robert Williams, Professor, Institute of Energy Studies, Princeton University, 4 November 2005.

Seminars Organised

1. 'Biennial Research Seminar', CISED Faculty, 12 January 2004.
2. 'Remote Sensing and GIS based flood vulnerability assessment of human settlements: A case study of Gangetic West Bengal', Joy Sanyal, Research Scholar, National University, Singapore, 11 June 2004.
3. 'Battles over Nature: Nature Conservation in South Asia in Historical Perspective', Mahesh Rangarajan, Environmental Historian, Delhi, 22 June 2004.

CISED Staff

Core Faculty

Sharachchandra Lélé. Ph.D. in Energy and Resources.

Ajit Menon. Ph.D. in Economics.

M. V. Ramana. Ph.D. in Physics.

Esha Shah. Ph.D. in Environmental Sciences.

Shrinivas Badiger. Ph.D. in Soil and Water Resources.

Visiting Faculty

Surendra Gadekar. Ph.D. in Physics.

Priya Sangameswaran. Ph.D. in Economics.

Administrative Staff

S. Anand. B.Com., Dip. in Oracle-RDBMS.

T. K. Ganesha. B.Sc., M.Lib.Sc.

Jwala Prathamshetti. B.Sc., Dip. in Software Engineering
(*Jan.2003-Sept.2005*).

Vartika Saxena. B.Com.

Visiting Students and Scholars

Samina Khalil (Applied Economics Research Center, University of Karachi).

Muthatha Ramanathan (Department of Geography, University of Washington, Seattle).

Shrinidhi Ambinakudige (Department of Geography, Florida State University).

Gregor Meerganz von Medeazza (Institute of Environmental Sciences and Technology (IEST), Universitat Autònoma de Barcelona).

Research Staff

Research Associates

Praveen Singh. Ph.D. in History.

Jayasree Vaidyanathan. Ph.D. in Hydrometeorology.

Gautam Menon. M.A. in Economics, M.S. in Environmental Studies.

Sowjanya Peddi. M.Phil. in Applied Economics, M.A. in Economics (*Jan.2004-Aug.2004*).

Research Assistants

A. K. Kiran Kumar. M.Sc. in Silviculture and Agroforestry.

Iswaragouda Patil. M.A. in Economics.

Santosh Hegde. M.Sc. in Geoinformatics.

Rajeev Kumar. M.A. in Economics.

Lakshmikant P. M.Tech. in Hydraulics and Water Resources
(*Oct.2004- Oct.2005*).

Student Interns

R. Rajaram (National Institute of Technology-Karnataka, Suratkal).

Gouravkumar Undale (National Institute of Technology-Karnataka, Suratkal).

Vidisha Somasekhar.

Financial Report

Financial Year 2003-2004

Receipts	Amount (Rs.)	Payments	Amount (Rs.)
Opening Balances		Salaries & Staff Costs	2,310,955
Cash in Bank	135,438	Travel Costs	219,544
Cash on hand	35,939	Operating Costs	482,020
Fixed Deposits	14,425,265	Sub-grant disbursed to partners	639,844
		Workshop Costs	308,016
		Equipment Costs	60,383
Grant Received	2,701,443	TDS Paid	5301
		Advances	105,775
Interest & Other Income	577,756	Closing Balances	
		Cash in Bank	790,538
		Cash on Hand	40,890
		Fixed Deposits	12,912,575
Total	17,875,841	Total	17,875,841

Financial Year 2004-2005

Receipts	Amount (Rs.)	Payments	Amount (Rs.)
Opening Balances		Salaries & Staff Costs	3,622,885
Cash in Bank	790,538	Travel Costs	146,874
Cash on hand	40,890	Operating Costs	893,415
Fixed Deposits	12,912,575	Workshop Costs	129,367
		Equipment Costs	242,574
Grants Received	5,094,604	Sub-grant disbursed to partners	716,047
		Advances	11,977
Interest & Other Income	304,393	Closing Balances	
		Cash in Bank	1,902,221
TDS Refund Received	2,040	Cash on Hand	21,454
		Fixed Deposits	11,458,226
Total	19,145,040	Total	19,145,040

As certified by G. ANANTHA & CO., Chartered Accountants, Bangalore.

COLLABORATING ORGANISATIONS

Ashoka Trust for Research in Ecology and the Environment
Department of Management Studies, Indian Institute of Science
Foundation for Ecological Security
Gujarat Institute of Development Research
International Energy Initiative
International Hydrology Programme, UNESCO
Kalpavriksh
Karnataka Forest Department
National Institute of Hydrology
PRAYAS
Sampoorna Kranti Vidyalaya
Samrakshana Trust
Society for Promoting Participative Ecosystem Management

DONORS/FUNDERS

The Ford Foundation
International Development Research Centre
United Nations Educational, Scientific and Cultural Organization
Department of Space, Government of India
Ploughshares Fund
Water Aid India
India Canada Environment Facility
United Nations Development Fund

We are also grateful to the several individuals who have made donations to CISED.

CISED's mission is to promote environmentally sound and socially just development by conducting interdisciplinary research, training, and dialogue with society on issues at the interface of environment and development in South Asia.



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