

# Proceedings of the workshop on “Economics of Desertification, Land Degradation and Drought (DLDD) in India” held at India Habitat Centre on 20<sup>th</sup> May 2015

Prepared for  
Ministry of Environment, Forest & Climate Change  
New Delhi

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## Background and context

Land is a vital resource for producing food, preserving biodiversity, facilitating the natural management of water systems and acting as a carbon store. Appropriate land management can protect and maximize these services for society. Conversely, desertification, along with climate change and the loss of biodiversity were identified as the greatest challenges to sustainable development during the 1992 Rio Earth Summit. The United Nations Convention to Combat Desertification (UNCCD) is one of 3 Rio Conventions and focuses upon Desertification, Land Degradation and Drought (DLDD). The Convention addresses specifically the issue of land degradation in arid, semi-arid and dry sub-humid areas of, drylands, which are home to some of the most vulnerable people and ecosystems in the world. Scientific studies indicate that around 12 million hectares of land are transformed into new man-made deserts every year and that one quarter of the world’s agricultural land is highly degraded. The underlying biophysical and anthropogenic causes of land degradation are multiple and overlapping.

The status of land degradation and desertification in India has been assessed by several organizations, providing various estimates. As per a 2007 study carried out by Space Application Centre, India has a total geographic area (TGA) of 328 million ha, out of which drylands constituted an area of 228.3 million hectares (about 69.6 %) <sup>1</sup>. The drylands comprising of Arid areas covered 50.8 million hectares (15.8 %), Semi-Arid areas covered 123.4 million hectares (37.6 %) and Dry sub-humid areas covered 54.1 million hectares (16.5 %). The total area undergoing the process of land degradation in India is estimated at 105.48 million hectares, which constituted 32.07 percentage of India’s total land area. The area undergoing desertification is 81.45 million ha, which constituted 24.78% of country’s geographical area.

India is in the process of aligning its New National Action Programme to Combat Desertification (NNAP-CD) with the UNCCD 10 Year Strategy. The NNAP-CD will strive toward achieving the aspirational goal of land degradation neutral India by 2030. An inter-ministerial effort, this will help mainstream DLDD issues in the national development priorities and be incorporated in relevant sectoral planning, budgeting and implementation frameworks. A major constraint in balancing trade-offs between competing land uses and designing interventions to combat DLDD is the lack of adequate understanding of the economics of desertification, or of land degradation in general. To address this deficiency, the Ministry of Environment, Forests and Climate Change has engaged TERI to undertake a

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<sup>1</sup>SAC 2007. Desertification and land degradation: Atlas of India. Space Application Centre. Indian Space Research Organization. Government of India  
[http://www.moef.nic.in/sites/default/files/desert\\_atlas.pdf](http://www.moef.nic.in/sites/default/files/desert_atlas.pdf)

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study on the economics of desertification with the following objectives and terms of reference.

## Objectives of the study

- Assess the scale of land degradation in the country with the economic impacts.
- Assess the quantum, along with the sources, of investment required for undertaking preventive and restorative measures which can help achieve the aspirational goal of land degradation neutral India by 2030

## Terms of Reference

- Examine economic valuation studies and data available from secondary literature and published sources.
- Review Government's programmes and schemes relating to DLDD issues, targets, financial allocations and achievements.
- Select six case study sites for micro-economic assessment in arid, semi-arid and dry sub-humid regions of the country, identify the data requirements and sources of information.
- A macro-economic assessment for the entire country and scenario development (till 2030).
- A micro-economic assessment for six case study sites for full economic assessment and scenario development (till 2030).

An inception workshop was organized on 20 May 2015 with the following objectives:

- Deliberate on and finalize the broad methodology for the study
- Short-list states for the six case studies

In the following, we sum up the key points that were raised and discussed during the meeting.

## Session I: Inaugural session

The meeting began with a welcome address by Dr Leena Srivastava, Acting Director General, TERI. She recalled some of the pioneering work that TERI had done in the early 1990s in the area of resource assessment and emphasized the importance of economics in understating both the drivers of resource change and the management of natural resources.

Mr A K Mehta, Joint Secretary, MoEFCC, Government of India provided an overview of the project objectives and expected outcomes. He highlighted the relevance of the study in the broader socio-economic context of food security, poverty and political unrest in some parts of the country. Mr Mehta stressed on the fact that the issue of DLDD comes under the ambit of multiple ministries and departments in the Government of India including rural development, agriculture, water resources, and panchayati raj institutions, thus underscoring the involvement and participation of these agencies in the study. He noted deficiencies in data and analysis in this area and emphasized on the importance of this study in creating new knowledge and providing direction on the goal of a land degradation neutral India by 2030. He also noted that the study would serve as an important input to

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international negotiations on the Sustainable Development Goals post 2015 and relevant policy interventions at national level.

## Session II: Initiatives by Ministries for addressing the DLDD challenge

Mr. Sushil Kumar, Joint Secretary, Ministry of Panchayati Raj, highlighted the importance of bottom up planning and resource management, which has been more successful in some states (e.g. Kerala, Gujarat, West Bengal) than in others. He said that while the Ministry of Panchayati Raj does not have any scheme that directly deals with the issue of land degradation, substantial funds are available through 14th Finance Commission at panchayat level that can be utilized to take up some of the issues of land degradation at village level. There are 29 lakh elected representatives of panchayat across the country and the results of the study can be used for apprising and educating them about these issues.

Dr. C M Pandey, Additional Commissioner, Ministry of Agriculture, enumerated the many schemes and programmes that have been initiated by the Ministry to tackle land degradation. These programmes, inter alia, aim to address land degradation and make agriculture productive and sustainable by improving the management of its underlying resources such as water and soils as well as by developing capacity amongst the farmers and stakeholders. In particular, he highlighted the increasing focus on crop diversification and improving the productive potential of crops and on developing a policy on agroforestry for treatment of culturable wastelands.

Dr. S.K. Gangwar, Sr. Joint Commissioner, Ministry of Water Resources, River Development and Ganga Rejuvenation, spoke of river development and interlinking of rivers and pointed out that degradation in command areas of large projects is a major issue. The Ministry is focusing on Command Area Development to address the issue of land degradation. He also added that migration from village to urban area is also contributing to land degradation as the fertile and good land is not being looked after. Finally, he noted that the NITI Ayog and National Rainfed Authority also have a role in dealing with this issue.

Dr. G.N. Sharma, Irrigation and Soil Engineering, Expert, Ministry of Rural Development pointed out that more than 60% of the works under MGNREGA are on natural resource management to mitigate DLDD in India through various public works and by creating individual/community assets. These include water conservation and water harvesting structures to augment and improve groundwater with special focus on recharging ground water including drinking water sources, watershed management works, and renovation of traditional water bodies, afforestation, tree plantation and horticulture in common and forest lands, road margins, canal bunds, tank foreshores and coastal belts and land development works in common land. At the community/individual level, initiatives include land development provision of suitable infrastructure for irrigation including dug wells, farm ponds and other water harvesting structures, improving livelihoods through horticulture, sericulture, plantation, and farm forestry, and development of fallow or waste lands of households.

Under MGNREGS it is now mandatory to take up at least 60% work in a district for creation of productive assets directly linked to agriculture and allied activities through development of land, water and trees. An assessment of projects shows that 42% of works under MGNREGS are related to water conservation, 13% to land development and another 13% to

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individual land. Joint convergence guidelines have been issued for convergence with other schemes like Green India mission and Ministry of Agriculture and allied sector schemes.

Detailed presentations made by each of these panelists is enclosed.

### Session III: An overview of the issues of Desertification, Land Degradation and Drought (DLDD)

Dr Pia Sethi, Fellow TERI made a presentation on the various biophysical estimates that are available on land degradation in the country. The session spelled out the definitions adopted by the UNCCD on land, land degradation and desertification. These definitions are broad ranging encompassing all land uses apart from soil including loss of productivity in forests, rangelands, agricultural areas due to a number of anthropogenic and natural causes. These include wind and water erosion, waterlogging, salinisation and alkalinity. Apart from detrimental land use practices resulting from overgrazing, deforestation, degradation, indiscriminate use of fertilisers, pesticides, depletion of ground water, etc., the role of industrial development and mining in causing degradation was emphasized. The underlying or distal causes of degradation in terms of inappropriate policies and ineffective institutions, and the need to address these issues becomes important for the study, given their role in influencing policies at the national level.

The session emphasized the need to use appropriate estimates for studies, given that studies on degradation over the years have resulted in highly variable results. For example, various studies have estimated land degradation in India as ranging between 53 mha to 188 mha and this in turn has produced economic estimates of land estimates to the tune of 75-499 billion rupees. A number of atlases have been developed over the years that estimate the extent of India's wastelands, degraded and desertified areas. Differential usage of spatial methods, definitions of land use and causal processes and coverage of issues under land degradation have produced very different figures from 105 mha to 120 mha that are degraded in the country. By and large, however, while India has almost 70% of its area in the drylands, the area under desertification is about a quarter of the land mass, while land degradation covers about a third of the land area.

The session emphasized the need for adopting one set of estimates and definitions for the country to ensure that methods were kept consistent across all the study sites and were comparable. The attempt at harmonizing these disparate estimates by ICAR and others which resulted in the harmonized atlas on land degradation in the country 2010 was mentioned, with the suggestion that perhaps these harmonized figures (or updated ones if any) could be used for this study.

Ms Divya Datt, Fellow TERI made a presentation on the valuation of impacts of DLDD both in India and internationally. The presentation stressed on the fact that the impacts of DLDD were direct and indirect as well as onsite and offsite and hence it was impossible to understand and capture all impacts in any single valuation attempt. Nevertheless a number of important studies have been undertaken to value some of these impacts. For India, most of these studies have focused on the loss of agricultural production while one study undertaken by TERI in 1997 also tried to estimate the offsite impacts in terms of loss of irrigation potential due to siltation of dams due to soil erosion. Several of these studies rely on the benefits transfer or value transfer method which uses results (typically factors linking a change in the resource to a per unit impact) and applies these in a similar context. Internationally, there have been some attempts to study the indirect impacts of soil erosion

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(e.g. impacts of siltation of lakes on housing rentals, or impacts of siltation of reservoirs on costs of dredging) as well as economy-wide impact of soil erosion on income and poverty based on macro models that build in linkages between production and consumption across sectors. The methods underlying these studies were briefly discussed (e.g. productivity loss, replacement cost, travel costs, contingent valuation, choice experiments, hedonic pricing etc.) as well as the limitations and challenges of each of these.

## Session IV: Discussion on study methodology

Dr J V Sharma, Senior Fellow, TERI made a presentation in which he emphasized that the study will estimate both direct and indirect costs of DLDD drawing on secondary literature, data and information from the relevant ministries and the in-depth analysis in six case studies. Broadly, the following methodology was proposed:

- Micro studies – would assess both direct and indirect costs and development detailed cost-benefit analysis of restorative vs preventive measures to combat DLDD as relevant
- Macro analysis- will draw on the 6 case studies as well as other relevant literature to arrive at the cost of DLDD at the national level.

Dr Sharma emphasized the importance of the benefits transfer approach in undertaking the macro assessment. The method is used to estimate economic values for ecosystem services by transferring available information from studies already completed in another location and/or context. The basic goal of benefit transfer is to estimate benefits for one context by adapting an estimate of benefits from some other context. While the method has its limitations, it is often the best option when it is too expensive and/or there is too little time available to conduct an original valuation study.

Prof. Kanchan Chopra, Visiting Professor, TERI University emphasized that adoption of research findings or academic work into policy domain is important and the result of the study should make an impact on future policies. The present study will have to look at both biological and economic productivity of land resources. Land use undergoes change over time and its drivers could be anthropogenic or natural. The resulting degradation could be reversible or irreversible. The cause of land degradation and whether they are reversible or irreversible can help in determining the right methodology for assessment of costs on a particular site

She emphasized that land system characteristics must be assessed for determining the associated costs and interventions. Some of the important characteristics that need to be taken account of in this assessment are:

- Resilience
- Sensitivity
- Land ownership (public, private or community)
- Predominant land use of a land system

Dr. Gopal Prasad Juyal, Former Head, Division of Hydrology & Engineering, CSWCRTI, Dehradun emphasized that watershed approach best captures the situation of a site and social systems, livelihood practices etc. help in determining associated costs and benefits. These factors thus must be built into the study. He also reiterated the necessity of support from various relevant state and local departments especially in collecting essential

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information such as geographical attributes, soil characteristics and socio-economic characteristics. The agreed brief methodology is defined as under:

- Review of studies assessing economic impacts of degradation and methodology (global and India-specific) and main findings-both reports and published papers.
- Identification of six Pilot sites in Six States
- Assessment of Direct and Indirect Economic Impact due to Desertification, Land Degradation and Drought through Primary Research. Direct economic impacts may include agriculture producing and also through allied activities like horticulture, animal husbandry, producing of forests. The indirect benefits would include societal impacts, assets created, siltation of dams etc.
- Application of outcome of primary research for Macro-Economic Assessment with the help of Benefit Transfer Method
- The direct and indirect impact will assessed with the help of secondary data and Benefit transfer Method for Macro-Level Assessment.
- Estimating rehabilitation cost and prevention cost by using secondary data
- Analyze Cost Effectiveness of rehabilitation and economic impact(direct and indirect) and suggesting the land use options

## Session V: Criteria and Indicators for Site Selection

In this session, TERI proposed a three-tier system for selection of sites. The first criteria will be to select states lying within the drylands. Given the geographical coverage of arid, semi-arid and dry sub-humid areas, three sites could be selected from the arid, two from the semi-arid and one from the dry sub-humid. However, this will depend on the inclusion of the next set of criteria. Although the North-East of the country suffers from vegetal degradation, this area, the W. Ghats, patches in the Himalayan belt and some of the Eastern parts of the country lie outside the drylands. Therefore, these areas have been excluded for the study.

The second tier for site selection was:

- Those states most impacted by desertification
- States that include the major processes of land degradation (water, wind, salinity/alkalinity, vegetal)
- Sites that include anthropogenic and natural causes of desertification
- Sites that ensure geographical representation of the country

Based on these criteria, the following tentative list of states was suggested based on statistics provided in the harmonized atlas (ICAR, 2010). Of these States, six or less will be selected for the six case studies.

State	Area (mha)	% of TGA	Dryland category
Rajasthan	20.46	6.23	Arid
Madhya Pradesh	14	4.26	Semi-arid & sub-humid
Uttar Pradesh	14.58	4.43	Semi-arid & sub-humid

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State	Area (mha)	% of TGA	Dryland category
Maharashtra	10.05	3.06	Largely sub-humid
Andhra Pradesh	9.57	2.91	Largely semi-arid
Karnataka	8.5	2.59	Largely semi-arid
Chhattisgarh	4.71	1.43	Others and sub-humid
Uttarakhand	1.25	0.38	Largely sub-humid
Tamil Nadu	3.21	0.98	Semi-arid
Gujarat	3.07	0.93	Arid & semi-arid
Total	120.72	36.72	

The third tier of selection is at the sub-state, case study level. Of these states, the most degraded districts will be selected and a small watershed selected for study. Remote sensing data will be used to assess the extent and types of degradation and changes over 20 years. The case studies will then quantify the economic impacts of degradation and explore options for restoration/prevention

Based on the nature, magnitude of the degradation and its economic impacts, technical options will be suggested, and costs of a restoration/preventative plan for each selected site will be determined

Several suggestions were received on the criteria for site selection from the panelists. These include the following:

- Ms Bharati, Director, Ministry of Environment, Forest and Climate Change, Government of India, suggested that the team could also look at the selection criteria used by the Green India Mission of the Government of India which encompasses a landscape/watershed approach emphasising vulnerability to climate change.
- Dr P G Dhar Chakrabarti, Distinguished Fellow, TERI suggested that the team identify specific criteria (including population density, type of land degradation etc.) and relevant indicators for each criteria based on which sites can be selected. This will also facilitate the extrapolation to similar areas at the national level.
- Mr Rajive Kumar, CPD, JICA, Uttar Pradesh recommended that a watershed approach should be followed and the selected site must have some forest area. He cautioned that the issue is very large but the team must stay focused on the TOR of the study given the limited time.

On the basis of discussions, the following states have been identified for the micro-level assessment

State	Dryland category
Rajasthan	Arid
Uttar Pradesh	Semi-arid & sub-humid

State	Dryland category
Andhra Pradesh	Largely semi-arid
Madhya Pradesh	Semi-arid & sub-humid
Uttarakhand	Largely sub-humid
Gujarat	Arid & semi-arid

## Session VI: Concluding remarks

In the final session, the group deliberated on some specific aspects of the methodology raised during the day and arrived at some decisions to move ahead

1. Approach for the study- Watershed or Landscape

Watershed approach would be followed for the study with a caveat that an alternate approach could be considered, if required, depending on the site.

2. Number of Sites

6-7 sites would be studied.

3. Sample size

The size of the watershed should not be less than 500 ha

4. Location of Sites

The suggested States for the study include Uttarakhand, Rajasthan, Gujarat, Chhattisgarh, Uttar Pradesh, Andhra Pradesh, Madhya Pradesh and Tamil Nadu. The exact location will be decided in consultation with the States.

5. Indirect or direct benefits

Both the direct and indirect benefits would be calculated while carrying out the assessments  
Direct benefits would assess impacts on productivity which includes agriculture and allied activities (horticulture, animal husbandry etc), forests etc  
Indirect benefits would assess societal impacts, assets, siltation of dams etc

Two scenarios will be provided; in one scenario only direct benefits will be provided and in second both direct and indirect benefits will be provided

6. Methodology

The study methodology should allow a comparative analysis of the results. Comparability of results could be an issue if different methods are adopted for different sites.

- I. Micro- economic assessments: the economic impact (direct and indirect) should be assessed on the basis of primary research.
  - II. Macro-economic assessments: For the macro-level economic assessment, secondary data should be used for direct economic impact. The benefit transfer method could be used for indirect economic impact.
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Various types of land degradation processes including vegetal degradation, soil erosion, etc should be covered. Moreover, the watersheds can ensure a range of land uses-forests, agricultural lands and pasturelands /common land.

The latest estimates and figures for land degradation for the country should be utilized and as far as possible harmonized figures should be used.

7. Extrapolation

Extrapolation of results from micro assessment to arrive at the macro picture should be done.

8. The different micro-watersheds should be studied with reference to resilience and sensitivity so that the adaptive capacity and reversibility of land degradation can be understood with respect to differences in the parameters.

9. Land degradation induced by natural or anthropogenic factors

The study would attempt to distinguish between anthropogenic and natural drivers of DLDD

10. Classifying sites based on reversibility or irreversibility of DLDD impacts/ identify tipping points

The reversible and irreversible changes due to DLDD will be assessed qualitatively; ways of addressing DLDD in reversible sites will be mapped out.

11. Land ownership patterns

The micro-watersheds have a range ownership patterns resulting in huge impacts on land degradation issues. Land ownership patterns will be considered while carrying out assessment.

12. Different planning approaches

Different sites and states have different planning processes; this has to be considered while carrying out the assessment and needs to be highlighted. Ministry of Panchayati Raj will be consulted on how planning should be done at the village level.

13. Confidence Levels

The study would aim at delivering results with a high confidence level and should make efforts to achieve a confidence level of 80 %.

14. Population density and poverty

Different areas have different population density which impacts DLDD differently. Linkages with population density and incidence of poverty need to be established.

15. Vegetal degradation

**Issues of vegetal degradation and biomass need to be addressed in the study**

16. Land Degradation Neutrality

**The study should also aim to develop a definition for Land Degradation Neutrality, following a consultative process, which could be adopted for the study**

17. Methodology to be uploaded on web-site for comments

The suggested methodology should be uploaded on website and circulated amongst stakeholders for comments before finalization

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18. Linkage between incidence of poverty and land degradation and trouble spots  
**It should be studied as one of the key deliverables**
19. Financing for LDN  
Attempt should be made to provide ball park assessment of financing required to achieve land degradation neutrality before September prior to UNGA
20. The study will map degraded areas, areas under desertification and those particularly vulnerable to droughts.

The workshop was ended with vote of thanks.

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## Annexure I Agenda

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### Workshop on "Economics of Desertification, Land Degradation and Drought (DLDD) in India"

Date of Event: 20<sup>th</sup> May, 2015 Schedule: 0930 to 1330hrs

Venue: Magnolia, India Habitat Centre, New Delhi

#### Agenda

0930-1000 hrs	Registration
Inaugural Session	
1000-1010 hrs	Welcome Address Dr Leena Srivastava, Acting Director General, TERI
1010-1020 hrs	An overview of the project objectives and expected outcomes Mr A K Mehta, Joint Secretary, Ministry of Environment, Forest and Climate Change, Government of India
Technical Session	
1020-1145 hrs	Initiatives by the Ministries for addressing the DLDD Challenge Moderator: Mr A K Mehta, Joint Secretary, Ministry of Environment, Forest and Climate Change, Government of India Mr. Sushil Kumar, Joint Secretary, Ministry of Panchayati Raj Dr. C M Pandey, Additional Commissioner, Ministry of Agriculture Dr. S.K. Gangwar, Sr. Joint Commissioner, Ministry of Water Resources, River Development and Ganga Rejuvenation Dr. G.N. Sharma, Irrigation and Soil Engineering, Expert, Ministry of Rural Development
1145-1200 hrs	Tea Break
1200-1245 hrs	An overview of the issues of Desertification, Land Degradation and Drought (DLDD)- TERI <ul style="list-style-type: none"><li>• Biophysical Estimates Dr Pia Sethi, Fellow, TERI</li><li>• Economic Estimates &amp; Valuation</li></ul>

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	Ms Divya Datt, Fellow, TERI
1245-1400 hrs	<p>Discussion on Study Methodology</p> <p>Chair: Ministry of Environment, Forest and Climate Change, Government of India</p> <p>Panel:</p> <p>Dr J V Sharma, IFS, Senior Fellow, TERI</p> <p>Prof. Kanchan Chopra, Visiting Professor, TERI University</p> <p>Dr. Gopal Prasad Juyal, Former Head, Division of Hydrology &amp; Engineering, CSWCRTI, Dehradun</p>
1400 hrs	Lunch
1500-1515 hrs	<p>Criteria &amp; Indicators for Site Selection</p> <p>Presentation by Dr Pia Sethi, Fellow, TERI</p>
1515-1545 hrs	<p>Criteria &amp; Indicators for Site Selection</p> <p>Chair: Dr P G Dhar Chakrabarti, Distinguished Fellow, TERI</p> <p>Dr J V Sharma, IFS, Senior Fellow, TERI</p> <p>Mr Rajive Kumar, CPD, JICA, Uttar Pradesh</p> <p>Ms Bharati, Director, Ministry of Environment, Forest and Climate Change, Government of India</p>
1545- 1600 hrs	<p>Concluding Remarks</p> <p>Mr A K Mehta, Joint Secretary, Ministry of Environment, Forest and Climate Change, Government of India</p> <p>Dr J V Sharma, IFS, Senior Fellow, TERI</p>

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## Annexure II List of Participants

S.No.	Name	Designation	Organization	Email	Mobile No.
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