

Report of the Sub Group III
on
Fodder and Pasture Management

Constituted under the Working Group on
Forestry and Sustainable Natural Resource Management

Planning Commission of India

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Terms of Reference

for Sub-Group III on

‘Fodder and Pasture Management’

- I. Suggest mechanisms including capacity building for Management and Planning for conservation and development of fodder and pastures/ grasslands in forests, nonconventional forest areas, village common lands and other potential areas rooted in the principles of ecology, economics, social and gender equity, sustainability, carrying capacity, energy conservation, employment generation and social auditing;

- II. Policy prescriptions for strengthening convergence of forestry, agriculture, watershed development programmes with pastures and grazing land management in forests, nonconventional forest areas, village common lands and other potential areas.

Executive Summary

Context

Livestock rearing is one of the major occupations in India and is making significant contribution to the country's GDP. The livestock population, over the years, has shown a steady growth on broadly two counts i.e. (i) increase in the number of stall feeding based bovine livestock viz. buffaloes and hybrid cattle, and (ii) increase in the number of free grazing based livestock like goats and sheep that can survive on the fast degrading pasturage. The first category of livestock growth pertains to the people with arable land and resources to grow or procure fodder, and forms a good source of additional income for them. The second category of livestock growth on the other hand pertains to millions of resource-starved households - landless pastoralists and marginal farmers - for whom livestock rearing often forms the only one and most critical source of food and cash income.

The animal husbandry sector has a good growth potential. However, further growth of the sector will be as much dependent upon the availability of fodder as it will be dependent upon the breed improvement programs. Whereas Animal Husbandry departments and various research institutes in the country are engaged in improving the breeds of livestock, it is the issues related to fodder that are a cause of concern. The available data reveals that the present fodder availability in the country is well below requirement. The data also reveals that only about half of the annual fodder requirement is met from the cultivated fodder and crop residues, whereas open grazing and fodder availability from common property resources like forests, pastures, village commons, etc. fulfils the remaining half of the annual fodder requirement. The issue to be taken note of is that it is the open grazing and fodder availability from the common property resources that provides sustenance to a vast majority of households with animal husbandry as the only vocation.

In view of the large number of resource-poor households dependent upon open grazing for their livestock, it is neither desirable nor possible to simply wish away open grazing. Similarly, with increasing demands of food grains on the available arable land resources, the opportunity cost to divert cultivable land for fodder production in a big way might be very high. The only plausible option, therefore, is to revitalize the degrading common fodder and pasture resources in the country and improve their productivity.

Issues

The grazing lands, considered to be one of the most productive ecosystems in the Indian Subcontinent, have been at the receiving end for long. As per estimates, the country's pastures have reduced from about 70 million ha in 1947 to just about 38 million ha in 1997. The remaining grazing lands have either already degraded or are in the process of degradation with average carrying capacity of less than 1 ACU (adult cattle unit). These grazing lands, often looked at as 'wastelands' on which tree plantations have to be done or which can be easily diverted for other uses, are suffering due to management neglect. Many of the grazing lands have been invaded by non-palatable invasive alien species like *Lantana*, *Eupatorium*, *Parthenium*, *Prosopis juliflora*, *Leucaena*, etc. severely impacting their productivity. The once robust village level traditional institutions ensuring their sustainable management have broken down and there is no other agency to look after their management issues. Many of the ecologically sensitive pasture lands viz. Shola grasslands of Nilgiris; Sewan grasslands of Bikaner, Jodhpur and Jaisalmer; semi-arid grasslands of Deccan; Rollapadu grasslands in the semi-arid tracts of Andhra Pradesh; Banni grasslands of Gujarat and Alpine grasslands of Sikkim and Western Himalaya are already on the verge of no return.

It is felt that the lack of comprehensive grazing-cum-fodder and pasture management policies at national and state levels is the major cause of degradation and diversion of grazing lands. Similarly, the sector has suffered due to the absence of any nodal agency to coordinate and steer grassland and fodder development program in the country.

Then there are issues viz. gradual erosion of the traditional agro-forestry/ silvi-pastoral systems; lack of fodder banks and value addition facilities to handle and store surplus fodder during monsoons; lack of field level research on management protocols in respect of ecologically sensitive grasslands; un-organised use of grazing lands; etc. that contribute to further degradation of grazing lands and depletion of fodder resources.

Past Efforts

The major focus of the departments of animal husbandry and agriculture has been to promote stall feeding based mainly on cultivated fodder and feed meals viz. Accelerated Fodder Development Programme (AFDP) a part of the Rashtriya Krishi Vikas Yojana (RKVY) under which fodder resources in 25,000 villages were to be improved over the 11th Plan. However, there does not seem to be any program by these departments to develop fodder resources on CPRs.

The forest departments have been, over the past Plans, engaged in managing grazing lands that have been legally classified as forests. A centrally sponsored scheme titled “Area Oriented Fuel and Fodder Project Scheme” under National Afforestation & Eco-development Board (NAEB) has also been implemented over the 11th Plan period. However, most of these efforts have been to close the areas and plant up these with trees, resulting in further depletion of areas for free grazing. The MoEF also set up a team of experts to draft a grazing policy. However, report of the team is awaiting implementation since 1994. These efforts have been too small and too widespread to show any significant results. Also there has been negligible inter-sectoral dialogue between the key departments dealing with the subject. Suffice is to say that development of the grazing lands has not received any concerted focus over the past Plans.

The Proposal

In view of the context and issues brought out above, development of fodder resources and rehabilitation of grazing lands on forests and in forest fringe areas is of paramount importance in view of the total dependence of a large number of people on this resource for their livelihood needs.

This proposal is based on the hypothesis that the development of fodder resources will be best achieved through allocation of clear and mutually exclusive but closely inter-linked roles and responsibilities to the various line departments, viz.

- the department of animal husbandry, in collaboration with research institutes, will be responsible for development of better livestock breeds; and fodder storage, feed development, value addition protocols.
- the department of agriculture, in collaboration with agricultural universities and research institutes, will be responsible for developing, promoting and extending nutritious and high yielding varieties of fodder species for cultivation on agricultural lands.
- the department of forests, in collaboration with Panchayati Raj Institutions, Joint Forest Management Committees, Centre of Excellence, and research institutes will be responsible for rehabilitating the degraded grazing lands through promotion of fodder

species – grasses, legumes and trees - and creating fodder banks in the Forest Fringe Villages.

Such an approach will allow the various line departments to concentrate on their defined roles, especially in view of the anticipated changes in the livestock growth patterns in the country. It is presumed that the departments of animal husbandry and department of agriculture will be making independent proposals in respect of their mandates.

The current proposal is, therefore, aimed at developing fodder resources and pasture development on forests and other CPRs under the aegis of Ministry of Environment & Forests.

Salient features of this proposal include –

- Formulation of a national policy on grazing-cum-fodder and pasture development in consultation with civil society organizations and domain experts.
- Designation of a suitable agency, like ICFRE, as Centre of Excellence on fodder and pasture development on CPRs to coordinate and steer various research, educational and extension programs under the proposed scheme.
- Mapping of ecologically sensitive grasslands across different agro-climatic zones and development of appropriate rehabilitation models.
- Rehabilitation and productivity enhancement of degraded forests through silvi-pastoral practices of integrating grasses and fodder trees under the instruments of Joint Forest Management.
- Develop fodder blocks in Forest Fringe Villages through revival and development of pastures on CPRs in collaboration with Panchayati Raj Institutions.
- Creation of fodder banks/ storage facilities in partnership with user groups.
- Development of seed/ germplasm banks and nurseries in every state for pasture development program in collaboration with research institutes.
- Promote incorporation of fodder trees with agricultural practices towards agro-forestry initiatives.

The scheme envisages (a) putting in place community based mechanisms towards sustainable management of fodder resources and grazing lands, (b) enhancing the productivity/ carrying capacity of the grazing lands tackled under the scheme, and (c) adoption of a comprehensive grazing-cum-fodder and pasture development policy at national level.

Total scale of the scheme is proposed to be **Rs. 910 crores**.

Implementation and Monitoring:

The scheme will be implemented under the aegis of National Afforestation and Eco-development Board/ Green India Mission, MoEF, GoI. At the State level, the scheme will be implemented through the State Forest Departments. The ICFRE and its regional institutes, to be developed as Centre of Excellence on the subject will coordinate and steer research, education and extension activities related to the scheme.

Monitoring of the project progress will be through specially appointed Steering Committees at the National and State levels. These Steering Committees will have members drawn from across various line departments, research institutes and user groups for effective inter-sectoral coordination, implementation and mid-course corrections if any needed.

1. Introduction

Livestock rearing is one of the major occupations in India that provides manure, draught power for agriculture and local transportation and forms important source of food and cash income to millions of households spread across various parts of the country. Significance of the livestock sector can be appreciated from the fact that it contributes about 8.5 - 9% to the country's GDP¹. The sector assumes still higher significance as it forms the most critical means of supporting the earning capacity of landless pastoralists and those of marginal and small farmers, especially those living in drought-prone, hilly, tribal and such other areas where crop production, dependent mainly upon vagaries of nature, is not certain.

Closer scrutiny of the sector, however, reveals that the contribution to the GDP by livestock sector is far too low for such a large size of livestock population. This low productivity of the sector is as much attributable to underfeeding of the livestock as it is attributable to the poor livestock breeds. An idea of the meager fodder availability can be had from the fact that about 50% of the cattle population, depending largely upon free rangeland grazing in forests, pastures, village commons and the like, end up getting only about 1.5 kg of dry fodder/ day/ ACU (Adult Cattle Unit) as against the healthy fodder requirement norm of 3% body weight. In absolute terms, the country is, by 2020, facing an estimated shortage of 728 million tons of green fodder and 157 million tones of dry fodder. Obviously, this low forage availability impacts the productivity. The increasing cattle population, due partly to the animal husbandry policies, without corresponding attention towards enhancing the forage production, is likely to put further pressure on the already scarce fodder resources in the country causing further depletion in productivity of the sector.

1.1 Review of the Past Efforts on the Subject

The subject pertaining to fodder and pasture management has been dealt over the last Plans by the departments of Animal Husbandry, Agriculture and Forests, with little inter-sectoral dialogue between these departments.

The major focus of the departments of animal husbandry and agriculture has been to promote stall feeding based mainly on cultivated fodder and feed meals viz. Accelerated Fodder Development Programme (AFDP) a part of the Rashtriya Krishi Vikas Yojana (RKVY) under which fodder resources in 25,000 villages were to be improved over the 11th Plan. This scheme, focused largely on promoting fodder cultivation and post harvest handling in the selected villages, does not have any component to develop fodder resources on Common Property Resources for the benefit of forest side and landless communities. The Department of Animal Husbandry, Dairy and Fisheries has spent about Rs. 141.4 crores over the 11th Plan on feed and fodder development. The department is now mulling the creation of a National Fodder Mission under the 12th Plan.

The issue has also been engaging the attention of the Ministry of Environment and Forests, GoI that has been trying to formulate a special National Grazing Policy. However, the proposed policy, for which an expert group was constituted under the aegis of NAEB (MoEF) during 1994-95, has remained at the draft level only. A Centrally Sponsored Scheme under NAEB titled 'Area Oriented Fuel Wood and Fodder Project Scheme', started during 9th Plan, was continued over the 11th Plan period also. However, the budgetary outlay has been too meager to have any significant impact. One of the recommendations under the Forestry sector's mid-term review of 11th Plan was that

¹ Anon (2006). Report of the Task Force on Grasslands and Deserts. Planning Commission. GoI.

'grassland and other ecologically important eco-systems need to be conserved (para 22.65)².

The government also set up expert committees/ task forces to address this issue viz. MoEF's Committee on Fodder and Grasses (1988) and Planning Commission of India's Task Force on Grasslands and Deserts (2006). However, the reports of these committees are yet to be comprehensively integrated into grassland management strategies and implemented on ground.

1.2 Ecological and Social Significance of Pastures:

The grasslands and pastures not only form major source of forage for the livestock, these also provide habitat to a large variety of wild animals and birds and are home to a myriad species of plants, many of which are 'threatened'. Any further degradation of these habitats is likely to put many more species under threat. In addition, the fodder and pasture development program has great significance towards fulfilling Millennium Development Goals in the form of reducing 'poverty and hunger' and bringing in 'gender equality' and 'maternal health'.

2. Dynamics and Issues Concerned with the Sector

Animal husbandry has traditionally been a critically important sub-sector of the agriculture, being the source of manure and draught power for various agricultural activities. It has also been the only source of cash income to a vast majority of landless people who maintain small stocks of cattle on the fodder resources available on common/ forest lands. However, the dynamics of animal husbandry practices have undergone a marked change over the years making India the leading milk producer in the world. The sector provides an excellent potential for further growth. However, there are various issues and corresponding developments have impact the sector directly and indirectly.

2.1 Change in Livestock Population & Population Patterns:

Livestock population in the country, recorded at 280 million in 1947, has shown significant increase over the years. Estimates of present livestock population in the country vary from 480 million (table below) to 520 million³.

Particulars	1961	1971	1981	1991	2001	2008
Buffaloes	51.21	56.88	67.50	82.16	95.25	98.60
Camels	0.90	1.12	1.05	1.02	0.71	0.63
Cattle	175.60	177.81	188.70	203.50	189.66	174.51
Goats	60.86	67.03	91.00	114.20	123.81	125.73
Horses	1.33	0.98	0.90	0.81	0.78	0.75
Mules/Asses	1.15	1.06	1.12	1.15	0.89	0.83
Pigs	5.18	6.53	9.60	12.50	13.44	14.00
Sheep	40.22	40.10	46.42	49.74	60.11	64.99
TOTAL	336.45	351.50	406.29	465.09	484.67	480.04

Source: FAOSTAT – As per 14th January 2010

² Anon. Mid term review of 11th Plan. Chapter 22 'Forests and Environment'. Planning Commission. GoI.

³ Anon (2006). Report of the Task Force on Grasslands and Deserts. Planning Commission. GoI.

A quick analysis of the table-1 reveals an almost twofold increase in the buffalo and goat populations over the last 50 years. Similarly, sheep population has also recorded an increase by more than 50%. On the other hand, the cattle population is on a gradual decline. This decline in cattle population is on account of greater inclination towards rearing less number of high-yielding hybrid cattle varieties against the earlier practice of keeping large number of local varieties by the people who have access to cultivated fodder.

One of the fallouts of the changing livestock dynamics is drastic increase in the numbers of scrub cattle. As more and more people are going in for improved breeds, they are turning the inferior cattle away adding to the already huge population of scrub cattle. Uncontrolled grazing by such cattle adds to the problems of pasture land management.

Obviously, this changing livestock rearing pattern has implications on the type of fodder resources needed to meet the fodder requirements.

2.2 Major Fodder Sources and their Status in the Country:

Fodder in the country is sourced from either the agricultural fields or the natural pasture lands (see box below).

Major Fodder Sources in India and their Status

A. Tropical and Sub-tropical Grasslands: These mid-successional/ sub-climax type of grasslands, found in high rainfall areas (western ghats) to arid/ semi-arid areas including terai and Gangetic plains, experience periodic burning and are subjected to heavy grazing. It has resulted in their general degradation and very low productivity. Such type of grasslands form important source of fodder for the livestock maintained by poor and landless people.

B. Shola Grasslands: Climatic climax type of grassland where climax stage is maintained by severe frost and recurrent fires. The major interference in Shola grasslands is on account of attempts to bring these under tree plantations.

C. Alpine, Sub-alpine Meadows: Climatic climax type of pastures that usually witness intensive transhumant grazing activity during summers. The climax stage is maintained by severe winters, high velocity winds and frost. The alpine and sub-alpine meadows have come to suffer from general degradation, increasing incidence of non-palatable species and erosion due to overgrazing.

D. Village Commons, Fallows & Wastelands: These lands used to form an important source of forage to the village cattle. However, most of these lands have been diverted for other uses, and whatever is remaining has become badly fragmented and degraded with no management concerns.

E. Forests: Forests of almost all crown density classifications, and the natural blanks contained within these, form an important source of forage. However, free grazing and invasion by exotic weeds has resulted in degradation of the ground cover of fodder value in the forests.

F. Tree-leaf fodder: Tree leaf fodder is a very important source of forage, especially during pinch periods. Less prone to periodic droughts, trees form an assured source of fodder year after year. The major sources of tree leaf fodder are the trees growing on forests and common lands. However, with high timber value plantations coming up on scrub forests, this resource is getting depleted from near habitations. Another source of tree leaf fodder is the trees growing on farm lands. However, with traditional cropping practices giving way to intensive agriculture, this source of tree leaf fodder is getting depleted.

G. Cultivated Fodder & Crop Residue: Meets about half of fodder requirement in the country. However, its availability is limited to the arable lands and land rich farmers.

The country has seen a definite thrust over the years towards enhancement of cultivated fodder. The land area under cultivated fodder has grown to about 4% of the total cultivated land area of the country. However, the pastures over the common lands including forests, forming source of about 280 million tones of fodder annually⁴, have been experiencing a corresponding fragmentation and degradation over the years. The reduction in the size of pastures and closing of some pastures for tree plantation has resulted in greater pressure on the remaining resources, especially along the forest fringes. The issue has a very significant bearing on strengthening of fodder resources in the country, especially with respect to the following:

2.2.1. Diversion of grazing lands for non-pasture uses: Most of the pastures are neither defined nor marked on ground, and thus the total extent of such areas is a matter of guesstimate. Even as only 12.15 million ha of land in the country is classified as permanent pastures/ grazing lands, grazing is estimated to occur on about 40% of the land area in the country, most of these lands being not designated as grazing lands. In the absence of such designation and accompanying land records and maps, these non-designated grazing lands are gradually being put to other land uses, causing reduction in extent of already fragmented grazing lands. As per estimates, the country's pastures have reduced from about 70 million ha in 1947 to just about 38 million ha in 1997. Major proportion of this loss of pasture lands is from the village common lands. There is an immediate need to map the grazing lands in the country, demarcate these on the ground and initiate policy steps to maintain their landuse.

2.2.2. Invasion of pastures/ grazing lands by Invasive Alien species: Invasive alien plant species (exotic weeds) viz. *Lantana*, *Parthenium*, *Eupatorium*, *Leucaena*, *Prosopis juliflora*, etc. have invaded most of the grazing lands – pastures, scrub forests, fallows, unculturable wastes, and village commons, severely affecting their productivity. Whereas some of these exotic weeds have proliferated due to long standing management negligence of these areas, some species like *Leucaena*, *Prosopis juliflora*, etc. deliberately introduced to help solve fuelwood problems have become opportunistic and have phased out native fodder species and grasses. Similarly, many exotic herbaceous components introduced in the pasture lands to enhance fodder availability, have suppressed the native fodder species. There is an immediate need to eradicate the exotic weeds and rehabilitate the affected grazing lands with native fodder species.

2.2.3. Gradual collapse of traditional agro-forestry practices: Traditional agri-practices involved intimate integration of tree component with the crops. The tree component used to fulfill the small wood and fodder requirements, especially of the small and marginal farmers. With the (i) intensification of agriculture and cultivation of high yielding crops and (ii) policies that are non-conducive to tree farming, the tree component has almost vanished from the agri-practices, putting further pressure on the already degraded grazing lands. There is, therefore, a need to revive the age old practice of integrating multi-use tree component in the agri-practices through policy and agri-practices reforms.

2.3 Fodder Availability – Demand and Supply Status:

The increasing number of livestock and the changing dynamics of animal husbandry practices require corresponding increase in the type of fodder needed to meet the requirements of these new situations. Various studies have been carried out to assess the demand and supply of fodder resources, especially with respect to green and dry fodder. One such estimate (table-1) pegs the demand of green fodder and dry fodder in 2006 at 817.25 and 614.93 million tonnes respectively.

⁴Anon. Report of the Working Group on Forests for the 11th Five Year Plan (2007-2012). Planning Commission. GoI.

Table-1: Estimates of Annual Requirement of Green Fodder and Dry Fodder for Livestock in India (1996, 2001 and 2006) (In Million Ton)

Category	1996		2001		2006	
	Green Fodder	Dry Fodder	Green Fodder	Dry Fodder	Green Fodder	Dry Fodder
Cattle	383.27	305.08	446.28	344.28	501.79	371.58
Buffaloes	209.53	150.02	252.27	177.64	315.46	211.70
Sheep	-	7.13	-	7.40	-	7.67
Goats	-	19.43	-	21.59	-	23.98
Total	592.8	481.66	698.55	550.91	817.25	614.93

Source: Forestry Statistics India 2000. Indian Council of Forestry Research & Education

Similarly, the Planning Commission's Working Group on Animal Husbandry and Dairying looking into the demand and supply of fodder resources in India arrived at the following estimated fodder status (table-2).

Table-2. Demand and Supply Status of Fodder Resources in India (in Million Ton)	Supply		Demand		Shortfall	
	Green	Dry	Green	Dry	Green	Dry
2000	384.5	428	988	549	604	121
2005	389.9	443	1025	569	635	126
2010	395.2	451	1061	589	666	138
2015	400.6	466	1097	609	696	143
2020	405.9	473	1134	630	728	157

Source: Draft Report of the WG on Animal Husbandry and Dairying for 5-year Plan (2002-2007). Planning Commission of India. August 2001.

Perusal of the above table reveals that the availability of fodder, both dry and green, has not been commensurate with the requirement. Whereas the project requirement has increased by more than 50%, the fodder availability is estimated to have increased by only 14.5% in the five years between 2001 and 2006. It has resulted in a projected shortage of more than 60% in green fodder and nearly 23% in dry fodder by 2020. Converted into absolute terms, this deficit works out to 728 million tons in respect of green fodder and 157 million tons in respect of dry fodder.

3. Gap Analysis

The various issues that impact the strengthening of fodder and pasture resources in the country are due to various gaps that exist in the policy administrative and research frameworks. Some of the major gaps are:

3.1 Policy Level: The absence of pasture management and grazing policy at national/ state level have rendered the pasture lands, including village commons and unculturable wastes, open to developmental, societal and grazing pressures. Large chunks of such lands have experienced change in landuse due to transfer for developmental projects, land grants to landless, plantations on degraded pastures and bringing of such lands under irrigated cultivation at the expense of traditional agro-forestry practices. It is estimated that the area

under permanent pastures and other grazing lands has shrunk from 70 million ha in 1947 to just about 38 million ha by 1997. The major policy related issues for the shrinkage and degradation of common grazing lands are (i) transfer of land for developmental purposes, (ii) allocation of land to landless, (iii) bringing of more and more land under irrigation and shift in crop preference, (iv) closing of land for raising plantations/ watershed management projects, non-inclusion of local bodies in management of such areas, (vi) non-sustainable use/ overgrazing, and (vii) non-finalisation of National Grazing Policy. It is estimated that the total recorded pasture land in the country has shrunk by more than 30% since independence. It is also estimated that about 78% of the forest area has degraded due to heavy grazing and other unregulated uses, adversely affecting their productivity⁵.

Similarly, the absence of such a policy has encouraged unilateral implementation of animal husbandry policy that seeks to increase the number of livestock without corresponding focus on developing fodder resources. It has resulted in further degradation of the pastures and fodder resources. A comprehensive pasture management and grazing policy would have taken care of such issues. There is, therefore, an urgent need to enunciate pasture management and grazing policy at national level over the 12th Plan period.

3.2 Institutional Level: There is no single designated agency to steer the management of grazing lands and fodder resources in the country. It has resulted in the land use agencies and research organizations pursuing their own different agendas towards management of grazing lands in the country. The Forest Departments, in their endeavour to bring 33% land area under forest cover, have been busy in closing the grazing lands for raising plantations – mainly of commercial tree species like Eucalyptus, etc. The watershed departments have been closing the areas for raising tree crops in the hope of stabilizing the erosion prone areas. The Panchayats find it beneficial to lease out village commons for agriculture. There is no department to educate the communities about the usefulness of maintaining tree component on agricultural lands. All these have led to severely restricting the availability of fodder. A central body is, therefore, needed to steer the fodder development and grazing land management program in the country.

3.3 Resource Level: There is acute deficit of fodder in the country with livestock, especially that dependent upon open grazing, getting less than 1/5th of the healthy fodder requirement per day. There are more than 4 lac villages in the country having no forests³. Similarly, there are about 1.7 lac forest fringe villages, located in interior areas with animal husbandry as their main vocation, that depend upon the highly degraded forest/ village grazing lands for their livestock. No wonder that productivity of the sector is low. Apparently, fodder development on grazing lands has not received due attention over the past.

3.4 Management Level: Since most of the fodder and grazing resources are available on forests and common lands, a perception has emerged amongst the resource users and resource managers that management of these lands is the sole responsibility of the government. The erstwhile robust village institutions towards community management of such areas have broken down and these have come to be seen as belonging to all with control by none. This has resulted in gradual deterioration of these lands as nobody's baby. The local stakeholders have been, by and large, kept outside whatever little management initiatives taken in respect of these lands. With the growing appreciation about the role of local communities in the management of natural resources, the grazing land management also needs to be undertaken in collaboration with the local communities.

⁵ Anon. 11th Five Year Plan. Chapter 3. 'Forests'. Planning Commission of India.

It is especially important to develop fodder resources around the 1,70,000 odd Forest Fringe villages, these being remote and having tremendous pressure on the forest lands.

Further, much of the fodder on common lands in the country becomes available during summers/ monsoons, with winters experiencing severe shortage of fodder. Most of the people during this pinch period are dependent upon dry crop residue with low nutrient value. A large part of the fodder available during monsoons is wasted due to want of appropriate storage/ value addition facilities. There is a need to carefully preserve surplus production from grasslands during rainy season to meet the forage requirements of the lean periods and to tide over unforeseen conditions like drought, etc. through efficient post harvest handling systems, including drying, bailing, storage, transportation to deficit areas, etc.

Another management issue is that most of the grass on common/ forest lands is removed before the seed has ripened and fallen. Similarly, most of the tree branches are lopped before seed setting. In both these scenarios the regeneration of the species is adversely affected, causing further depletion of the resource. The problem gets compounded as the community systems of management of common property resources are fast breaking down, leaving the common property resources to un-organised individuals.

3.5 Research Level: There are a number of research studies pertaining to the productivity and carrying capacity of the grazing lands. However, most of these studies are fragmented and are difficult to apply on large scale towards grassland ecology. Similarly, there is a need to develop better understanding on the impacts the changing land use, animal husbandry, social and environmental conditions are having on the resource. Towards these end, strategic studies are needed.

4. Proposal

Inferences drawn from the issues, gaps and challenges presented above clearly bring out that -

- (i) Fodder production in the country is well below the requirement and that the gap between demand and supply was increasing every year due to (a) increase in the livestock population and (b) degradation of existing fodder resources.
- (ii) Open grazing cannot be simply wished away due to critical dependence of millions of households on this vocation.

It, therefore, becomes clear that there is a definite need to enhance the area under fodder cultivation in the country to meet the fodder deficit. It is also clear that poor majority engaged in animal husbandry will benefit only from the better managed common grazing lands.

In view of the above, the subgroup strongly recommends launch of a special program under the 12th Plan to address the issue of dwindling fodder and grazing land resources. It is time that a comprehensive National Fodder and Pasture Management Policy is put in place. It is also time that the reports/ recommendations of the MoEF's Committee on Fodder and Grasses (1988) and Planning Commission of India's Task Force on Grasslands and Deserts (2006) be revisited, updated and developed in the form of a concrete scheme under the 12th Plan towards rehabilitation and enhancement of pastures and fodder resources in the country.

Details of the scheme along with broad implementation strategy are as under:

4.1 Mapping of ecologically sensitive pastures and development of rehabilitation packages: The ecologically sensitive pastures like the alpine/ subalpine, shola, eastern ghats, arid zones (e.g. *Sewan* grasslands of Rajasthan; semi-arid grasslands of Deccan; *Rollapadu* grasslands in the semi-arid tracts of Andhra Pradesh; *Banni* grasslands of Gujarat, etc.) are facing the highest threat due to unsustainable biotic interference. These pastures, with unique floristic compositions, have evolved to climax/ sub-climax stages over hundreds of years of ecological succession and it may not be possible to bring these back once these are destroyed. These ecologically sensitive pastures will, therefore, be comprehensively mapped using GIS/ remote sensing and their extent worked out for each phyto-geographical zone. Natural floristic composition of these pastures will be studied and keystone species/ formations identified. Appropriate rehabilitation packages towards conservation of these grasslands⁶ will be worked out under the 12th Plan.

4.2 Rehabilitation and productivity enhancement of degraded grazing lands: Many of the grazing lands, including scrub forests, unculturable wastes, village commons, etc. have become degraded on account of –

- heavy biotic pressure, especially over grazing over the years.
- attempts at tree plantations – mainly of commercially important exotic trees like Eucalyptus, Teak, Gmelina, Leucaena, etc. and bamboos, with many of such plantations having failed to establish. Whereas tree planting does improve the soil and helps check erosion, these intensive plantations have caused reduction of grazing lands and further alienation of local communities from management of CPRs. Many of the tree species used for these plantations have run wild and assumed weedy proportions, further affecting grass and fodder availability.
- occupation of large extent of grazing lands by invasive alien species – invasive alien plant species - severely affecting their productivity.

Appropriate provisions at comprehensive rehabilitation of these degraded grasslands will be made under the 12th Plan -

- The existing Working Plan prescriptions to convert grazing lands classified as forests into woodlands will be reviewed and such practices discouraged.
- Research shows that judicious integration of woody perennials into grass lands actually results in increase in fodder grass yield and it has been possible to increase land productivity from 0.5-1.5 t/ha/yr to about 10 t/ha/yr on a rotation of 10 years through such interventions. It is, therefore, a matter of choosing the correct species mixture and correct planting density. Viable models of judicious species mix and plantation density to improve productivity of grass lands will be worked out for major phyto-geographical zones and implemented during the 12th Plan.
- The grasslands infested with alien weed species will be taken up for priority rehabilitation action. This would need physical removal of weeds followed by rehabilitation of the areas with a mixture of native species – woody perennials and grasses - of multiple use value. Such rehabilitation will not involve the use of (i)

⁶Anon. Mid term review of the 11th Plan. Chapter 22 'Forests and Environment'. Planning Commission. GoI.

any chemical methods of weed control, and (ii) non-native species for productivity enhancement.

The Chandigarh Forest Department initiated a specific program to clear the Sukna Catchment of exotic weeds, mainly *Lantana*. The program has, over the past ten years, resulted in near elimination of exotic weeds and springing back of native vegetation, including grasses and fodder shrubs and trees. The moisture regime of the area has also improved and silt load has substantially reduced due to these interventions.

- Special focus will be laid on developing/ rehabilitating pasture lands around 1 lac of the 1.7 lac Forest Fringe villages in association with village communities.

4.3 Promoting fodder species under agro-forestry initiatives: Animal husbandry in the country is intimately woven with the agricultural practices. However, the traditional practice of growing and maintaining fodder trees/ bamboos/ grasses on farm bunds, to meet fodder requirements during winters, has slowly given way to intensive agriculture severely affecting this traditional practice. Leaf fodder is a very useful resource, especially during winter months when all other fodder sources have been exhausted. Suitable models towards integration of fodder species with the intensive agricultural practices will be developed in collaboration with research institutes and promoted on large scale.

4.4 Developing seed/ germplasm banks/ nurseries of native species for rehabilitation of grazing lands: It is widely believed that the native species have a higher chance of surviving the harsh natural conditions, especially in open conditions such as grasslands. There is, however, an acute shortage of seeds/ germplasm of native species – grass, forbs, woody perennials, and trees - for use in rehabilitation program of grazing lands. At least one such germplasm bank with associated nursery network would be established in each state. Institutes like Indian Grassland and Fodder Research Institute and state agricultural universities would be involved in establishment of such germplasm banks and nursery networks.

4.5 Developing fodder storage/ value addition facilities: As has been brought out above, there is surplus fodder during monsoons, much of which goes waste. There is a need to handle this surplus fodder in a way so that it could be appropriately stored/ pickled for use in the pinch periods. Towards this end fodder storage banks under the aegis of state animal husbandry departments will be established in each state in close collaboration with Indian Grassland and Fodder Research Institute and state agricultural universities.

PPP model of producing, storing green and dry fodder, and supply, especially value added feed blocks, leaf meals will be worked out on pilot basis under the 12th Plan.

4.6 Capacity building of Managers/ Community Groups: Rehabilitation and management of the resource that has witnessed neglect for such a long period would need appropriate orientation of the mind sets of the managers and the user communities alike. It would involve development of training material and its delivery. In view of the enormity of the work, it would need steering by a central agency and collaboration with Civil Society Organisations.

4.7 National Grazing-cum-Fodder and Pasture Management Policy: That the country needs a National Policy to address the subject needs no highlighting. The Expert Committee to review the National Forest Policy 1988, and its implementation under the

chairmanship of Mr. C. D. Pandya, IGF (Retd.), also recommended that “A National Grazing Policy should come into effect at the earliest.” The draft Grazing Policy will be revisited, put up for public debate and finalized as comprehensive policy in the first 2 years of the 12th Plan. The Policy would address issues pertaining to diversion of grazing lands for other purposes, conversion of critical grassland habitats into plantations, research on grassland ecology and pasture management, capacity building of managers and resource users, rehabilitation of degraded grazing lands, collaborative management of grazing lands and fodder resources with local communities. The Policy would also look into the issues related to transport of fodder from one area to another without first fulfilling local needs, migration of livestock from one area/ state to another, rotational grazing, stall feeding, regulating the number of livestock, and the problems of stray and feral cattle.

4.8 National Centre of Excellence (CoE) for Fodder and Pasture Land Management:

The issues cutting across various departments and stakeholder groups are best addressed if these are steered under one nodal agency. A Centre of Excellence on Fodder and Pasture Land Management would be established under the 12th Plan. Even the Chairman, Steering Committee on Environment, Forests, Wildlife & Animal Welfare in its meeting of 19 May 2011 for 12th Plan recommended setting up of more Centres of Excellence to address specific issues in a focused manner. A suitable nodal agency for hosting the Centre of Excellence would be identified and strengthened to undertake research, coordinate with stakeholders, prepare effective implementation plan and propose policy framework. This CoE will work in a Mission Mode – may be under Green India Mission.

4.9 Encourage establishment of Cooperatives for Fodder and Pasture Management:

The present approach to utilize the common grazing lands is to maximize the benefits on individual level without any concern for its management. Since the major user of the resource is community, the best bet to ensure the sustenance of the resource is organize the community into user groups with responsibility to manage the resource also entrusted to the group. It would need to settle the tenural issues. Such groups could be formed on the lines of highly successful Milk-Cooperatives. An appropriate incentive scheme to user groups for effective management of grazing lands would also be worked out.

In view of the above discussion, the Sub-Group recommends initiating a separate long term scheme (at least 15 years) to comprehensively address this issue of great ecological and socio-economic significance. Proposed title of the scheme is “**Central Sector Scheme for Fodder and Grazing Land Management**”. The scheme would be developed into different programs, each program defined with its measurable outputs.

5. Scheme Details – Central Objectives and Measurable Outputs:

The proposed scheme titled “**Central Sector Scheme for Fodder and Grazing Land Management**” - a fully funded scheme - is envisaged to be implemented in the form of well defined programs so as to provide due focus on all crucial issues. The proposed programs also provide opportunity for implementation through specialized/ expert agencies.

Central objectives and measurable outputs in respect of various programs under the scheme will be as under:

S. No	Title of scheme (S)/ program (P)	Central objectives of S/P	Measurable outputs for 12 th plan (in bullets)
P-1.1	Development of National Grazing-cum-Fodder and Pasture Management Policy	<ul style="list-style-type: none"> ○ To ensure optimum productivity of fodder on sustainable basis. ○ To guide focused and effective implementation of pasture management action plans. ○ To create wider awareness and build consensus through participation by all stake-holder groups. ○ To define roles of different departments and build strong inter-sectoral linkages. 	<ul style="list-style-type: none"> ○ A National Grazing-cum-Fodder and Pasture Management Policy in place by the end of 2nd year of the Plan and adopted by the State governments. ○ The Scheme Implementation Plan suitably modified in view of Policy recommendations.
P-1.2	Mapping of ecologically sensitive grasslands and developing rehabilitation packages	<ul style="list-style-type: none"> ○ To map total extent of ecologically sensitive grasslands across different phyto-geographical zones for undertaking comprehensive management action. ○ To develop field scale rehabilitation models for such grasslands located in different areas for eventual replication. 	<ul style="list-style-type: none"> ○ Extent of area under each such grassland type documented and mapped with respect to their conservation status. ○ Field scale rehabilitation models for major ecologically sensitive grasslands developed.
P-1.3	Rehabilitation and productivity enhancement of pasture lands in forests	<ul style="list-style-type: none"> ○ To enhance productivity of grazing lands through improving density of desirable forage species by way of <ul style="list-style-type: none"> - removal of exotic weeds - encouraging natural regeneration of native tree/ herbaceous species of fodder value - augmentation with native species of fodder value ○ To create local stake in such rehabilitation under JFM instruments. 	<ul style="list-style-type: none"> ○ 2 lac ha area in different regions of the country completely rehabilitated with enhancement in productivity by >25% and proportional reduction in fodder deficit. ○ Local communities/ user groups actively managing the rehabilitated pasture lands.
P-1.4	Revive/ develop pastures on common/ revenue lands around	<ul style="list-style-type: none"> ○ To create fodder availability in the vicinity of 1 lac forest fringe villages 	<ul style="list-style-type: none"> ○ Pastures of an average size of 1 ha developed around 1 lac forest fringe villages in association with local

	forest fringe villages	<ul style="list-style-type: none"> ○ To create sense of ownership amongst stakeholders 	communities, resulting in enhancing fodder availability by >100 million tons/ year.
P-1.5	Develop seed/germplasm banks & nurseries of fodder species	<ul style="list-style-type: none"> ○ To develop adequate germplasm of fodder species for grassland rehabilitation program. ○ To develop standardized storage/nursery and rehabilitation protocols in respect of various species. 	<ul style="list-style-type: none"> ○ At least one functioning seed/germplasm bank with attached nursery network in place in 20 states.
P-1.6	Develop fodder storage/ value addition facilities	<ul style="list-style-type: none"> ○ To develop protocols and facilities for storage of fodder to meet lean period requirements. ○ To develop and operationalise PPP models of fodder storage/ value addition. ○ To link fodder storage/ value addition initiatives with user groups 	<ul style="list-style-type: none"> ○ Functioning fodder storage/ value addition facilities in 20 states.
P-1.7	Promote incorporation of fodder trees on agricultural lands	<ul style="list-style-type: none"> ○ To enhance the fodder availability from private fodder banks to make people self-sustained. 	<ul style="list-style-type: none"> ○ Fodder availability enhanced for winter months.
P-1.8	Establish National Centre of Excellence (CoE) on Fodder and Pasture management	<ul style="list-style-type: none"> ○ To act as nodal agency to steer the Policy formulation work. ○ To establish and ensure inter-sectoral participation in scheme implementation. ○ To guide and undertake strategic research/ surveys on various fodder and grassland management issues. ○ To guide and undertake capacity building programs for user groups/ resource managers in respect of good management practices. ○ To bring out literature, monographs, and other extension material on the subject. ○ To set up effective monitoring mechanisms for effective implementation of the scheme 	<ul style="list-style-type: none"> ○ The CoE established and functioning. ○ Research findings in key grassland management areas available. ○ Organised cadres of user groups established in project states.

The magnitude of the problem being stupendous, the sub-group strongly recommends that the scheme be rolled over to the next at least two plans to create significant impact of the programs. It is especially so as the subject matter of the scheme is biological resource that is very slow growing besides being exposed to the vagaries of Nature.

6. Budgetary Outlay

(Centre Sector Scheme for Fodder and Grazing Land Management)

Program-wise proposed budgetary outlay in respect of the scheme for the 12th plan period is given as under:

S. No.	Title of scheme (S)/ program (P)	Basis of Budget Calculation	Proposed Outlay (Rs. in Crores)
P-1.1	Development of National Grazing-cum-Fodder and Pasture Management Policy	LS (surveys/ studies/ consultations/drafting/ etc.)	1.00
P-1.2	Mapping of ecologically sensitive grasslands and developing rehabilitation packages	LS (maps/ landsat imageries/ analysis/ ground truthing/ development of rehabilitation models)	10.00
P-1.3	Rehabilitation and productivity enhancement of pasture lands in forests	@ 2 lac ha x Rs. 0.25 lac per ha ⁷	500.00
P-1.4	Revive/ develop pastures around forest fringe villages	@1 lac ha x Rs. 0.20 lac per ha	200.00
P-1.5	Develop seed/ germplasm banks & nurseries of fodder species	@2.5 crore/ state x 20 states)	50.00
P-1.6	Develop fodder storage/ value addition facilities	@2.5 crore/ state x 20 states)	50.00
P-1.7	Promote incorporation of fodder trees on agricultural lands	@500 lac trees @ Rs.10/- per plant)	50.00
P-1.8	National Centre of Excellence on Fodder and Pasture Management	LS (@Rs. 800 lac/year to support strategic research, education, capacity building, extension activities)	40.00
Sub-total:			901.00
	Management Support/ Contingencies	(@1%)	9.00
Grand Total			910.00

⁷ Based on Model Expenditure Norms in use by the Gujarat Forest Department

7. Implementation and Monitoring Mechanism

The proposed strategy for effective implementation, monitoring and appraisal of the scheme involves creation of a National level Task Force to steer the Scheme and effective involvement of CSOs/ domain experts in implementing the various programs:

a.	Over all Steering and monitoring of the proposed “Central Sector Scheme for Fodder and Grazing Land Management” at National Level.	<p>This scheme, with all approved programs, will be implemented as an all India coordinated scheme.</p> <p>MoEF will act as a national nodal agency for this scheme.</p> <p>This scheme will be steered by an inter-sectoral National Steering Committee under the Chairpersonship of Secretary (Forests & Environment), with members from Department of Animal Husbandry; DG (Forest); representatives of CSIR and ICAR; Director, IGFRI, Jhansi; PCCFs (from 2 states – to be coopted); representative of eminent CSO; and with DG, ICFRE as Member Secretary.</p> <p>This National Steering Committee, to be serviced by ICFRE as Centre of Excellence, would be responsible for approval and review of annual action plans.</p> <p>It will also be responsible for independent monitoring of the scheme through a panel of experts.</p>
b.	Steering of the programs under the scheme at State Level.	<p>At the State level, the scheme would be steered, reviewed and monitored by a State level Steering Committee under the Chairpersonship of Pr. Secretary (Forests), with members from Departments of Animal Husbandry, Agriculture and Rural Development; Vice Chancellors of State Agricultural/ Forestry Universities; Directors, local Research Institutes; representative of eminent CSO; with PCCF as Member Secretary.</p> <p>This State level Steering Committee would be responsible for approval and review of the State’s annual action plans.</p>
c.	Coordination	<p>Effective coordination amongst various stakeholders is the key to successful implementation of the scheme. It is proposed to develop the Indian Council of Forestry Research & Extension (ICFRE), as a dedicated node in the form of a National Centre of Excellence (CoE) on Fodder and Pasture Management for this purpose.</p> <p>The CoE will be responsible for –</p> <ul style="list-style-type: none"> - Coordinating the Policy development action - Coordinating and steering strategic research - Coordinating and steering capacity building and extension activities - Monitoring of the progress of various programs under the scheme <p>The action plan of the CoE and its activities will be monitored by a Committee under the Chairpersonship of Jt. Secretary, MoEF, with members from the concerned departments, research institutes, CSOs and nominated representatives from states</p>

		The Planning Commission will coordinate Policy formulation through a specifically constituted Core Group with ICFRE as the convener of the Core Group.
d.	Monitoring & Evaluation	Monitoring of the scheme will be at the following levels: <ul style="list-style-type: none"> • Implementation level <ul style="list-style-type: none"> - Continuous monitoring at the State levels - Steering Committee monitoring at national level twice a year - Third Party monitoring on sample basis on annual basis • Impact assessment level <ul style="list-style-type: none"> - By Third Party from 3rd year onwards

8. Expected Outcomes

Inadequate availability of good quality fodder is the major limitation in further development of the animal husbandry sector in the country. India has vast tracts of grazing land, most of which has fragmented or become degraded due to lack of appropriate policy interventions and management inputs.

The proposed scheme is envisaged to result in putting in place community based mechanisms aimed at sustainable management of grazing lands, especially around the forest fringe villages. The scheme also aims at arresting the degradation and fragmentation of grazing lands and reversing the degradation process through active management interventions towards developing fodder species on these lands. It is estimated that the scheme would result in enhancing the fodder availability from the present 280 million tons per year to >400 million tons per year from 3rd year onwards under the 12th Plan. This will have a very significant impact on the subsistence rural economy, particularly in respect of rural poor/ landless people depending upon open grazing for livestock rearing.

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Annexure-I

Sub Group III on Fodder and Pasture Management

List of Members

S. No	Name of Member	Designation
1	Shri S.Roy, Additional Chief Secretary (Forests), Himachal Pradesh	Chairman
2	Dr. S. K. Nanda, Principal Secretary, Forests and Environment., Gujrat	Co-Chairman
3	Shri Dinesh Misra, Add. PCCF, JICA., Gandhinagar	Member
4	Sh. Ashwani Upadhyaya, Add. PCCF, Rajasthan	Member
5	Dr. G S Goraya, CCF (Fl. Diversity, NTFP & Res. Mgmt.), Himachal Pradesh	Member
6	Shri. D.K.Sharma, DIGF (NAEB), MoEF	Member
7	Dr. K.K.Singh, Director, IGFRI, Jhansi	Member
8	Dr. Kinsuk Mitra, President, Winrock International India	Member
9	Shri. N.C.Saravanan, AIGF (NAEB), MoEF	Member Convenor