

Towards a Policy for Livestock in Watershed Development Programmes¹

Livestock-Environment-Watershed Interactions in India: A Synthesis of Five State Level Reports

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1. Introduction

Livestock is an important means of livelihood in drought prone or semiarid regions of India.

In fact as the five LEAD State reports/documentations highlight, in most rain fed areas the rural economy revolves around the mixed crop-livestock farming system and not just a crop farming system. In the Rajasthan Report the phrase “agriculture and allied activities” has been used in many cases in place of just “agriculture” with the animal husbandry component making up the bulk of the allied activities and “contributing (a staggering) 19% of the net state domestic product”. The AP Report mentions that the “(livestock) sector is gaining prominence due to higher income elasticity of demand for its products – milk, meat and eggs” and its contribution of 20% of the state domestic product from agriculture (and allied activities) is increasing. The MP Report states that “livestock forms an important component of most farm households” and “livestock rearing provides important supplementary incomes to resource poor house holds in rural areas” while according to the Maharashtra Report “due to the uncertainty of agricultural production, now days (livestock) is considered as an important source of income in most areas of Maharashtra”. The Karnataka Report lists the many ways in which livestock contributes to the livelihoods and farming systems of rural families. These are “(1) consumption of milk at source, (2) cash income through sale of milk, (3) use of dung manure, (4) cash income through sale of dung manure, (5) use of animal labour (draught power), (6) cash income by hiring out of animal labour (draught), (7) cash income through sale of animals, (8) consumption of animal at source (self-consumption) and (9) religious importance of some animals”.

The principal objectives of farmers engaged in mixed crop-livestock farming have been identified by Campbell et al in the Livestock and Environment Toolbox, CD-ROM published in 2000. These include –

- Complementary benefit from an optimum mixture of crops and livestock farming
- Spreading income and risk over both crops (primary) and livestock (secondary) production
- Scope to adjust crop/livestock ratio to social, economic and physical needs and opportunities

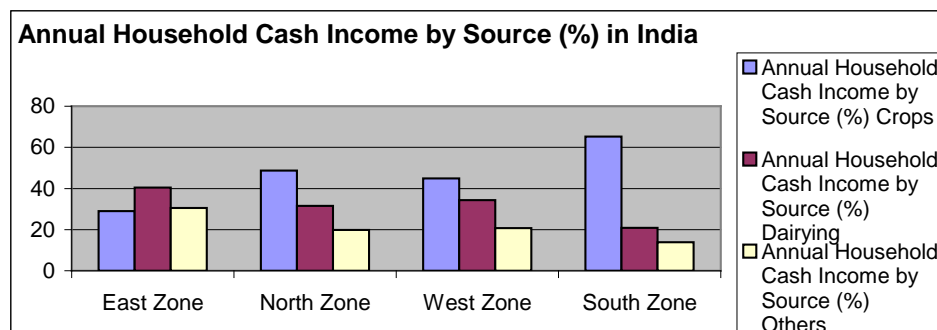
The above observations seem to be valid in the Indian scenario also and, as Kurup has pointed out in his paper ‘Livestock Policy Synthesis’ that “over seventy per cent of rural households keep livestock of one species or the other and earn income out of them and next to crop production animal husbandry is the most

¹ This document draws on the reports prepared by the partners reviewing the state level livestock and watershed/livestock policy situation in five states of India, namely Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh and Rajasthan, as part of the Livestock-Environment-Watershed Interactions in India (LEAD) study being implemented by the International Water Management Institute (IWMI) and supported by the Swiss Agency for Development and Cooperation (SDC) India, and Livestock, Environment and Development (LEAD) division of the Food and Agriculture Organization (FAO). Apart from relying on the state reports, this document has been supplemented and complemented by reference to some other project outputs and to some additional review of available and relevant literature. The document is being prepared with the purpose of sharing the core findings/information related to livestock-environment-watershed interactions from the five state reports among the members of the steering committee, partner NGOs/Institutions and project staff at IWMI, as well as at State level workshops with the aim of generating discussion, comments, suggestions and feedback.

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important income generating activity in farm households”. The chart below, which shows the percentage share of dairying and crops in annual household cash income, confirms Kurup’s views.

Table 1:



Source: NCAER document “Impact Evaluation of Operation Flood”, 1999

Apart from the monetary benefits provided by milch animals, the role of small ruminants like goats and sheep is very important as they serve as a lifeline during drought years by providing income and sustenance. This is especially true for areas like the arid and hyper arid western plains of Rajasthan where in drought years the problems of water scarcity are multiplied by the low fertility of the soil. Such regions tend to have a large number of small ruminants, which are not dependent on crop residue for fodder and are able to more easily migrate to areas where edible vegetation is still available in common grazing lands³.

Backyard poultry is also, in many cases, an important source of supplemental income for small and marginal farmers and Kurup has mentioned that maintaining a ten hen flock can provide more than Rs 5000 additional income per year for a family.

Another facet of livestock rearing, which has been highlighted in some of the state reports, is the importance of draught animals in rain fed farming. While the percentage share of animal power in farming has come down substantially since independence, the actual number of animals being used for this purpose has not changed much (see Table 2).

A reason for the continued dependence on draught animals may be that the majority of the land holdings are small and spatially scattered and thus keeping in mind economic and physical considerations it may not be possible to effectively undertake mechanised farming on these land holdings. There are also regional variations in the use of draught animals as has been discussed in the State reports and are dealt with later in Section 4 of this draft discussion document.

Somewhat linked to the point of small land holdings mentioned above and reinforcing the vital role played by livestock in rain fed areas is the fact that, unlike land holdings in these regions, the distribution of livestock is much more equitable, and the majority of the livestock is in fact owned by the marginal and small holders. Some researchers feel that that large ruminants are mainly owned by farmers with relatively large land holdings and the small ruminants like sheep and goat are owned by landless, small and marginal land holders (Walker & Ryan 1990). In contrast the Land and Livestock Holding Survey (NSS 48th Round, NSSO Report No.408, 1997) records that over 67% of milch animals and 86% of small ruminants like sheep and goat are in reality owned by small, marginal and landless farmers. Thus one can argue that animal husbandry is the support that enables the small, marginal and landless farmers to survive in rain fed areas.

³ For more details on concentration of small ruminant populations see section 4 of this document on Livestock Trends in the Five States

Table 2: Power availability on Indian Farms from Different energy sources

Source Of Power	Years								
	1971			1981			1991		
	Number (Million)	Power (mw)	% of Total	Number (Million)	Power (mw)	% of Total	Number (Million)	Power (mw)	% of Total
Human	126.80	8385	18.7	146.80	10951	12.4	173.00	12906	10.1
Draught Animals	81.7	30426	60.5	84.6	31556	35.8	80.00	29840	23.3
Tractor	0.11	2462	4.9	0.53	11861	13.4	1.14	25513	19.9
Power Tillers	.001	6	0	.02	119	0.1	.10	579	0.5
Diesel Engines	1.54	5744	11.4	4.44	16561	18.8	5.10	19023	14.9
Electric Motors	0.61	2275	4.5	4.60	17158	19.5	10.75	40093	31.3
Grand Total		50298	100		88206	100		127972	100
Net cropped area			133.20			140.30			140.00
Farm Power Available (Kw/Ha)			0.31			0.36			0.92

Source: Reconstructed from Mittal & Srivastava 1992 – Proceedings of the Workshop on Human and Draught Animal Power – Harare 1993

In view of the above, it is ironic that the watershed guidelines and policies developed by both the central and the state Governments, which for over 30 years have been considered the main catalysts for the development and growth of drought prone areas, have paid only lip service to livestock development⁴ and that no integrated or holistic policy for improving the productivity, equity and sustainability of livestock production, for better livelihoods in watershed development projects has evolved. It is this gap in policy, knowledge and, in some cases, implementation that the LEAD project hopes to plug via extensive knowledge creation through primary and secondary data based studies and, at a subsequent stage, convening policy dialogues.

2. Watershed/Agricultural policies, inter-linkages with livestock policies and implications for livestock.

To better understand the issues at hand it would perhaps be best to start by looking at the Government of India's policies and guidelines for watershed development over the last decade and the implications for livestock before moving on to any state specific analysis.

In fact the Government of India has for long been relying on the watershed approach for many of the programmes of the Ministries of Rural Development, Agriculture and Environment. As Hanumatha Rao (2000) had stated in his well known Lovraj Kumar Memorial Lecture of 2000 "conceptually the present⁵ strategy of watershed development is prompted by the need to protect the inhabitants of the fragile eco-systems from acute distress caused by recurring droughts". Based on the report of the Hanumantha Rao committee, which had reviewed Drought Prone Areas Programme (DPAP) and the Desert Development Programme (DDP), the Government of India had in, 1994, sponsored the development of Guidelines for Implementation of Watershed Programs and these guidelines were subsequently (following the publication by the Rainfed Farming Division of the Ministry of Agriculture in 2000 of Common Principles of Watershed Development, which had been prepared jointly with the Ministry of Rural Development) revised

⁴ For more details see Section 2 of this document, which examines the Watershed/Agricultural policies in India and their implications for livestock

⁵ In 2003 a newer version of the watershed guidelines called "Haryali Guidelines" were issued by the Government of India. There is some modification in the strategy in those guidelines, which has been explained later in this Document.

in 2001 by the Department of Land Resources of the Ministry of Rural Development and circulated as the Guidelines for Watershed Development (Revised 2001) or GWD (also referred to as common guidelines by some people). DPAP and DDP were totally recast to bring them in line with the common guidelines. DDP, DPAP, the Integrated Wasteland Development Programme (IWDP), The National Watershed Development Project in Rainfed Areas, Watershed Development in Shifting Cultivation Areas and other watershed schemes of the Ministry of Agriculture and Cooperatives and Ministry of Environment and Forests were thus fully covered by the common guidelines. The common guidelines propagated a holistic area oriented integrated watershed development approach involving comprehensive treatment plans including soil and moisture conservation, water harvesting structures, **horticulture and pasture development and up-gradation of existing common property resources**. The focus was on the enhancement of the viability and quality of rural livelihood support systems as is obvious from the objectives of the Watershed Development Projects mentioned in the Guidelines which not only referred to developing wastelands, degraded lands, and drought prone and desert areas on watershed basis; mitigating the adverse effects of climatic conditions such as droughts and desertification on crops, human and livestock population; restoring ecological balance by harnessing, conserving and developing natural resources but also called sufficient attention to improving the socio-economic conditions of the resource poor sections inhabiting the programme areas; employment generation; poverty alleviation; community empowerment etc.

In March 2003, the Government of India issued the Haryali Guidelines for Watershed Development. While marking a major departure in terms of institutional arrangements by making the Panchayat bodies (Gram Sabhas, Gram Panchayat, Block Panchayats, Panchayat Samitees and Zila Parishads) the only agencies allowed to manage and implement watershed development activities, as regards objectives of watershed development there remained a lot of commonality between the 2001 and 2003 guidelines.

The following table makes this clearer –

Table 3: Objectives of 1994, 2001 and 2003 guidelines for Watershed Development

Guideline	Objective Statement
	Theme: Drought
1994	Optimum utilization of the watershed's natural resources like land, water, vegetation, etc that will mitigate the adverse effects of drought and prevent further ecological degradation.
2001 and 2003	Mitigating the adverse effects of extreme climatic conditions such as droughts and desertification on crops, human and livestock population for over all improvement of rural areas
	Theme: Economic Development
1994	Promote the economic development of the village community which is directly or indirectly dependent on the watershed. Special emphasis to improve the economic and social conditions of the resource poor and the disadvantaged sections of the Watershed Community such as the asset less and the women.
2001 and 2003	Promoting the overall economic development and improving the socio-economic condition of the resource poor and disadvantaged sections and inhabiting the programmes areas
	Theme: Employment Generation
1994	Employment generation and development of the human and other economic resources of the village in order to promote savings and other income generation activities.
2001-2003	Employment generation, poverty alleviation, community empowerment and development of other economic resources of the rural areas
	Theme: Ecological Degradation/Balance
1994	Optimum utilization of the watershed's natural resources like land, water, vegetation, etc that will mitigate the adverse effects of drought and prevent further ecological degradation
2001 and 2003	Restoring ecological balance by harnessing, conserving and developing natural

	resources i.e. land, water, vegetative cover especially plantations.
	Theme: Resource Development/Management
1994	Optimum utilization of the watershed's natural resource like land, water, vegetaion, etc. that will mitigate the adverse effect of drought and prevent further ecological degradation.
2001	Developing wastelands/degraded lands, drought prone and desert areas on watershed basis, keeping in view the capability of land, site conditions and local needs.
2003	Harvesting every drop of rainwater for purposes of irrigation, plantation including horticulture and floriculture, pasture development, fisheries etc to create substantial income for village communities as well as drinking water supplies.

Modified version of table in M V Rama Chandrudu's "Historical Transact of Watershed Policies in India: Shifts in Content and Philosophy and their Implications"

Another point worth noting is that the 1994 and 2001 guidelines had suggested setting up of an interdisciplinary Watershed Development Team consisting of four members, one each from the disciplines of forestry/plant science, **animal sciences**, civil/agricultural engineering, at the project level. This is the only part of the institutional arrangement that has been carried forward to the 2003 guidelines.

From the above it is quite clear that at least at the national watershed policy level the interaction between watershed-livestock-environment in rain-fed areas is acknowledged. The various states have formed their own guidelines or developed their own processes based on the based on the national guidelines and livestock development invariably finds a mention in them. But there exists a need to clearly express the need for livestock development as part of the watershed programmes

The ground level situation, as repeatedly described in the state reports, is that livestock development does not form part of the core of most watershed projects. The real problem here has possibly been identified in the AP Report, which while talking about the recently issued process guidelines for watershed development of the Government of Andhra Pradesh states that "In the watershed policy, there is always a mention of the importance and priority for livestock development for poor; but this is not matched by clear design in procedures and processes on ground".

Another area of concern is the lack of coordination among the various government departments (this list is extensive, covering the departments of agriculture, animal husbandry, water resources, panchayati raj, rural development, tribal development, women and child welfare etc) as well as between the NGOs and GOs in the watershed sector.

The reasons for the lack of coordination can be possibly traced to the fact that the livestock policy of India has not been treated as part of the rural development or poverty eradication policies of the Government of India but the government has rather looked at livestock as an economic activity which provides raw material to industries and food for household consumption. The Report of The Steering Group of the National Livestock Policy Perspective, May 1996, which seems to believe that the entire livestock sector in India revolves around the milk cooperatives, is a very good example of this divide between livestock and watershed policies. This report was published two years after the 1994 watershed guidelines had explicitly identified livestock and pastureland development as means of improving the livelihoods of the rural poor, but still there were no attempts at synergy; and in fact watershed development does not seem to be visible at all in the horizon of the livestock policy makers.

A look at the strategic framework suggested by the report for achieving its policy goals makes an interesting read and highlights the extent of the divide between the livestock and watershed policies. The six-pronged strategic framework of the report is as follows –

- 1) Use national and global market pull creatively to provide energy and impetus for sectoral growth.
- 2) Enhance quality and economic efficiency at the sector level through promotion of appropriate institutions and mechanisms.

- 3) Use positive discrimination to support livelihood-intensive institutions, technologies and programmes so that future growth of livestock sector does not occur at the cost of rural livelihoods.
- 4) Redesign and revitalise the research establishment, extension and input supply mechanism to serve as the protective armour around women.
- 5) Promote research, experimentation, propagation of intermediate production units that blend advanced techniques with traditional modes of production
- 6) Monitor environment implications of livestock sector growth and evolve local mechanisms of CPRs (common property resources) Management.

Reading this one gets the impression that that livestock sector in India is experiencing very fast growth, which may lead to problems concerning environment and equity. This does not seem to match with the ground level picture as has been described in the five state LEAD reports.

At the state level also there exists a gap between the objectives of the watershed and livestock policies. So despite attempts at setting up coordination cells etc. success is only minimal. For example in the case of Rajasthan the main objective of the watershed development policy is “conservation, up-gradation and utilization of natural endowment in an integral manner. Perpetual availability of food, fodder, timber and other biomass to meet growing demand of human and livestock population in rural areas”, while the objectives of the livestock policy as per the [Rajasthan Report](#) are a) improvement of outreach services, b) increase of income of peoples engaged in animal husbandry, c) promotion of livestock industries in the state, d) active participation of local breeders, e) shift from veterinary health care to breed improvement, f) enabling the small producer to participate in the process of globalisation. Synergy between the two policies or a real integrated approach is thus next to impossible.

Even if we take the example of Orissa, a state that has not been studied as part of the LEAD study but has in 2002 brought out a very balanced state livestock sector policy having many similar objectives to the watershed development programmes, one will find that the term “watershed” finds no mention in their livestock policy.

One more reason for the lack of integration between the livestock and watershed policies is that till recently the livestock policy has focused on dairying as its main activity. The history for this favouritism has been traced in the [Karnataka Report](#) to the success of the National Dairy Development Board during the fourth plan period, which led to “dairying becoming the flagship project of the government (and) crossbreeding of cattle the policy with artificial insemination as an important tool”.

On the basis of the above one can conclude that the current livestock policy seems to be struggling to find the right balance between the overarching aim at the macro-level of positioning India as a major player in the livestock sector and achieving sustainable, equitable and livelihood focused growth in livestock.

In effect there seem to be two schools of thought as far livestock policy is concerned, One which looks only at maximizing economic gains from livestock at the national level, without an adequate focus on environment, rural livelihoods, resource creation for the rural poor etc. Most suggestion along these lines do not seem to look at the watershed-livestock relationship at all but rather suggest ways of improving productivity of the livestock assuming that overall growth in the livestock sector will have a trickle down effect. They are concerned with market pulls and pushes and overall trends in this sector, especially with the global markets opening up. Their solution for protecting the poor favours market protection so as to help the poor cope and compete on a level playing field. While their aims, of replicating the growth of the green revolution in the livestock sector are noble, such one sided policies are likely to run into the same problems as encountered by the green revolution and also be severely criticized for their lack of concern for environment as well as lack of understanding of the ground level situation in rural areas.

Table 4: Two Schools of Thought on Livestock Policy

1. Overarching Aim of India as Global Player with Higher Productivity
Make India a major player in the global livestock market Maximise Economic Gains Increase Productivity Replicate the growth of the green revolution and build of the advances of the white revolution in the livestock sector
2. Question of Achieving Environmental Sustainability, Equity, and Livelihoods
Focus on livelihoods and environment Focus on security aspect of livestock Need to maintain gene pool Stress on equity centred growth in livestock and not green revolution type

The other school looks at livestock as an equity enhancing mechanism, an important means of income and security for the rural poor that mitigates the disparities between the large landholders and the marginal farmers and the landless. This approach tends to neglect the fact that livestock is kept in many cases for commercial reasons also and not just for livelihood security.

The watershed-environment-livestock approach presents a unique opportunity to achieve sustainable growth in the livestock sector and has been discussed in more detail in section 7 of this document.

The state LEAD reports have also pointed out some other policy lacunas –

AP Report highlights the fact that in many states there is no separate policy for livestock and it is considered a sub-part of the agriculture policy. In most states there is a separate policy but animal husbandry is part of the agriculture ministry.

The Karnataka Report also highlights some state level policy contradictions like “giving sheep and goats to poor and landless as part of anti poverty programs” but not linking them to the “carrying capacity or availability of feed and fodder from grazing lands”.

The MP Report points out something similar as the state policy there “encourages stall feeding, but does not deem it fit to consider ways in which fodder will be availed for such stall feeding”.

Fodder policy seems to unsatisfactory in all the five study states and this is one area where good interlinkage with watershed policy can play be an important plus in the rectification process.

3. Overview of the Five State Reports

The partners who are implementing the LEAD study together with IWMI are Samuha in Karnataka, Sampark in Madhya Pradesh, WOTR in Maharashtra, WASSAN in Andhra Pradesh and Sevamandir in Rajasthan⁶.

Each of the partners was provided with an outline for preparing the state level LEAD report on watersheds and livestock⁷. The outline asked for information on the profile of the state, Government/Externally supported programmes in the state, relevant policies, models of watershed development programmes, impact on livestock development etc. The partners did in most cases follow the overall structure of the outline but where the available data or local conditions demanded, some suitable modifications were also made. A brief summary of the reports is being presented below with some of the more important findings/issues being dealt with in detail in later sections of this document.

At the outset itself it should be noted that while all the reports have provided extensive information on, and devoted a large number of pages to socio-economic profiles of the state, watershed and agricultural policies and programmes, impact of watershed development on soil and water conservation, biomass and cropping patterns, the sections on impact of watershed programmes on livestock are relatively smaller. The

⁶ For more information on selection of Partners see Appendix 2

⁷ The outline is reproduced in Appendix 1

reports are unanimous in their explanation for this apparent shortcoming; they point out that there is no direct or clear focus on livestock development as part of watershed development programmes which still seem to focus more on soil and water conservation, and plantation and horticulture interventions. Therefore despite there being some indirect benefits to livestock because of watershed development (the AP report mentions that water harvesting structures though not planned explicitly with livestock in mind have improved livestock drinking water supply) little or no systematic data in this regard is being collected.

A cursory look at Appendix 4 will show that all the five states have large populations with Maharashtra leading the pack at 96.7 million people and Karnataka bringing up the rear with a population of 52.7 million. In terms of density of population, the pressure on land is the least in Rajasthan and Madhya Pradesh, followed by Andhra Pradesh, Karnataka and Maharashtra, which has a relatively higher population density of 314/sq.km. Rajasthan, Madhya Pradesh and Andhra Pradesh have a largely rural population base; while in Karnataka and Maharashtra have a larger urban base. One demographic detail that really stands out is the low literacy rate in Andhra Pradesh (44.1% in 1991, 60% in 2001), which is considerably lower than the other four states.

In terms of climate all the five states fall within the tropical regions of India, but three of them, Andhra Pradesh, Karnataka and Maharashtra, have large coastlines and this implies greater rainfall and more moderate temperatures in the coastal areas. Rajasthan and Madhya Pradesh are land locked and situated in the central/northern parts of India, implying a greater variation in temperature ranging from 0°C in winter to regularly over 45°C in summer. Local climatic variations exist within each state, but the Sahyadris in Maharashtra and the Aravalis in Rajasthan effectively divide the respective states into two climatic zones with the rain shadow areas getting considerably less rain than the areas on the windward side.

The number of people living below the poverty line (based on GOI/Planning commission figures) is highest in Madhya Pradesh (37.06% in 199-2000) while in the other states the number ranges between 15 to 25%.

Economic trends show that the contribution of agriculture and allied activities (primary sector) to the state product has been diminishing over time and in all the five states the tertiary or the services sector is the dominant sector. The data from Rajasthan is especially interesting as the livestock sector itself contributes nearly 20% of the state domestic product. It is also noteworthy that in all the five states the majority of the human population lives in the rural areas with Maharashtra having the lowest percentage of people living in rural settings and Madhya Pradesh the highest at 87.5%.

Andhra Pradesh and Karnataka have large canal networks with over one third of the total area being irrigated by canals. Dependence on ground water for irrigation seems to be increasing in every state, with approximately 50% of the ground water resources having been developed in the five states.

Comment [user1]:

APPENDIX 4 provides more details about the main characteristics of the five states.

Livestock trends and production systems are being looked at extensively in section 4 of this document but some of the main trends are as follows –

- There has been a steady increase in ruminant livestock population; its pace has been slower than that of human population growth.
- Cattle growth has stagnated, while buffalo population has been increasing in all the states.
- In terms of percentage there is a move towards milch animals and away from draught animals, but the overall population of draft animals has not declined
- Poultry seems to be more popular in the southern states and since 1977 the rate of growth of the poultry sector seems to be increasing while ruminant sector growth is stagnant.
- Rajasthan has a substantially larger small ruminant population compared to the other states.

Comment [user2]: Rakshat – This is an oversimplification, will try and be more accurate in later versions

Before moving on to examining the watershed-livestock-environment interaction the partners were

also asked to undertake a SWOT analysis of the livestock sector in their respective states. The results of such exercises, because of the very nature of the activity, tend to oversimplify the situation, but they do help in developing a basic understanding of the situation. The table below lists some of the common points raised in the SWOT analyses of the livestock sector in the five states –

Table 5: Common Points in SWOT Analysis of Livestock Sector as per State LEAD Reports

<p>Strengths Provides income and employment. Energy aspect (use of draft power, manure and transportation). <u>Genetic diversity and potential to increase productivity.</u> Distribution of livestock is less skewed than distribution of land holdings. Milk production likely to increase over time.</p>	<p>Weaknesses Low productivity, and low per capita availability of livestock products. Poor animal health cover. <u>Limited marketing support, problem of middlemen in trade.</u> Seasonal fluctuations in availability of fodder, No adequate cattle feeds Absence of proper data records No clear policy on buffalo</p>
<p>Opportunities Increasing demand for milk as well as value added products, opportunity for India's dairy trade in International markets. Availability of animal production technologies for faster development and growth Availability of diverse germ-plasm/ gene pool with unique features like heat tolerance, disease resistance, ability to reproduce under stress conditions etc Improvements in animal health services</p>	<p>Threats Shortage of draft power Excessive grazing pressure on degraded and small community lands. Low extension services</p>

Comment [mvk3]: Rakshat- This should be both in Strengths and Opportunities

While comparing the SWOT analysis of the various state LEAD reports, one important contradiction that catches ones attention is that while the Karnataka Report lists indigenous cattle as a weakness, the Rajasthan Report lists them in the strengths column and proudly claims that “Rajasthan is the only state in the country where indigenous breeds of livestock are not only safe, but also ardently available. Thus Rajasthan has the privilege of possessing much prized breeds of the livestock”. Another interesting point is that the MP Report is the only one that seems to think of watershed programmes with a strong livestock focus as an opportunity for livestock development!

In their examination of the watershed, agricultural and livestock policys and the impact of watershed development programmes on livestock, the reports have raised a number of issues and concerns. Most of these will dealt with again in later sections of this document, buta few of the main points are as follows –

- a) There seems to be a lack of coordination among the various government departments like the animal husbandry/agriculture departments and water resources or rural development departments, all of whom are undertake work related to watershed and livestock development. This seems to be recurring issue or problem being brought up by the five reports again and again and if one were to analyse the tone of the following extract from the MP Report

“there is no planned comprehensive government intervention for the improvement of livestock rearing. There is no coordination between the related departments of water resources, agriculture, animal husbandry, forests, panchayati raj and the RGWM (Rajiv Gandhi Water Mission) to formulate and then operationalise a viable livestock and fodder development policy with the active involvement of the poor people who will benefit most from it within the larger framework of a comprehensive watershed development policy”

The above seems to be a serious cause of concern.

- b) The importance of common property- land and pasturelands -for sustainable livestock activity in watersheds has also been highlighted in the reports. The problem of overgrazing and degradation is accepted with some reports suggesting the need for greater policy and ground-level interventions in controlled grazing and pastureland regeneration efforts and the Karnataka Report

advocating reduction in number of goats. The Rajasthan Report while accepting the negative impact of overgrazing points out that the major portion of the subsistence feed of goats and camels comes from “top feeds” or tree leaves and shrubs which are otherwise of little value and are able to regenerate in adverse conditions. The problem of encroachment of common lands also finds mentions in the reports.

- c) The problem of shortage of fodder and feed because of an inadequate fodder policy is also a common thread running across the five reports. The MP Report seems to suggest that there is no identifiable fodder policy in Madhya Pradesh while emphasising that “ the (MP livestock) policy starts with the absurdly fallacious assumption that livestock rearing does not make any demands on land. In this way it is able to sidetrack the single biggest problem that confronts poor livestock rearers – the availability of fodder, either through grazing or from crop residues or fodder crop. Consequently there is no mention in the policy about fodder development”
- d) The importance of draught animals for marginal farming has been highlighted in some of the reports with the MP Report stating that “despite increasing mechanisation of traction, electrification of pumps and post harvest operations, draught animals still provide most of the power for marginal and small farmers”
- e) The reports also provide an interesting picture with respect to the availability of health care and veterinary services. In terms of infrastructure the number of veterinary hospitals, dispensaries, primary veterinary centers, mobile dispensaries, artificial insemination centers seem to adequate, yet there seems to be a feeling that veterinary services are not adequate! The explanation for this maybe, as the Karnataka Report puts it, that “though veterinary services are available and subsidised/free, accessibility and effectiveness (of these services) is still a problem area”.
- f) According to the reports there seem to have been no efforts by any of the governments to form user groups, self help groups or beneficiary groups of livestock owners like there has been for other rural income generating activities and land owners in watersheds.
- g) Except for areas where dairy cooperatives are very active and for large- scale poultry farming, the marketing of livestock and livestock products is another area that can make do with some improvement. The government does not seem to be playing a major role in livestock marketing and the livestock owners are mainly dependent on middlemen. In Rajasthan the Government (Department of Animal Husbandary) does organise 10 large livestock fairs every year plus a number of small ones.

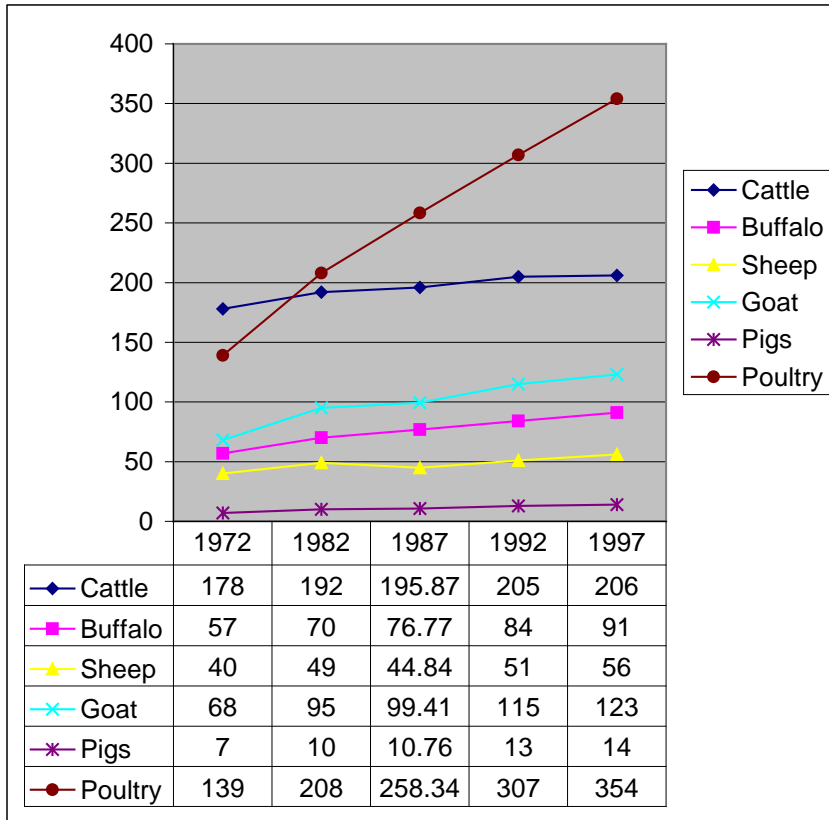
Apart from the above-mentioned issues, the state reports also look at livestock production and breeding systems in the various states. All the states have breeding centers as well as mobile artificial insemination systems for production of higher quality livestock. Appendix 3, based on a study on ‘Livestock Feeding Situation in Andhra Pradesh: Options for Improvement’ carried out by the Indo-Swiss Project, identifies 13 different major livestock production systems in Andhra Pradesh. It may be possible to use a similar approach to study livestock production systems in the other states.

After livestock production systems it would be appropriate to look at the detailed livestock trends from the five states.

4. Livestock Trends in the Five States

Let us start by looking at all India livestock trends as this will help to put the state figures in perspective and thereby provide a better understanding.

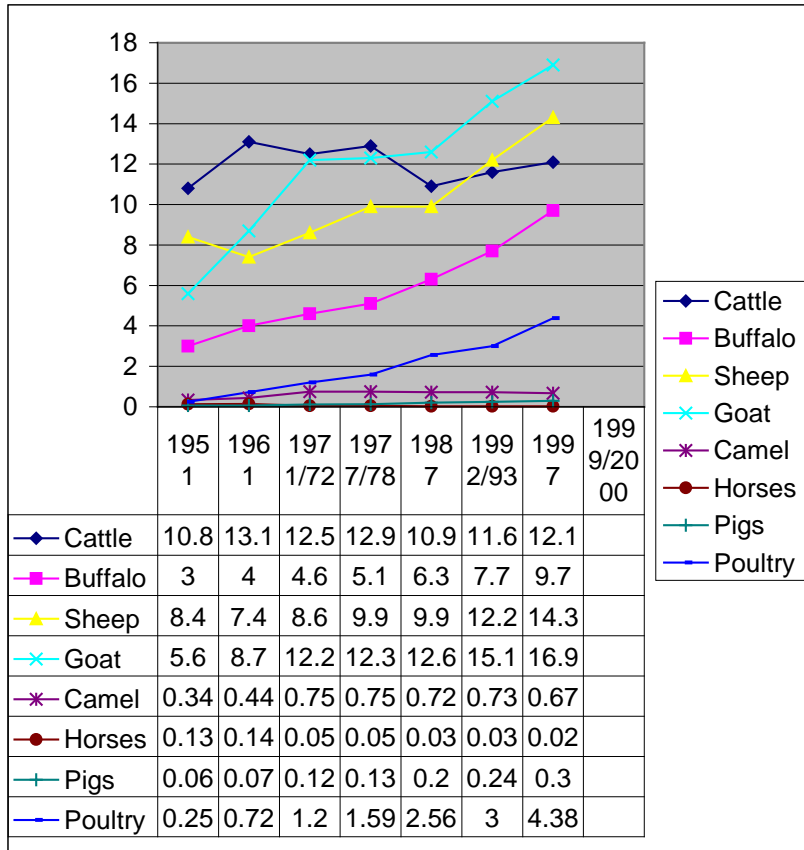
All India livestock population (in millions)



Source: Basic Animal Husbandry Statistics 2002

As is quite obvious from the table above poultry is the fastest growing segment among all livestock, but among ruminants it's the goat population that is increasing. Cattle population has in fact shown a negligible growth, while the buffalo has shown a better increase. Sheep and pig populations have also stagnated. The point to remember here is that the goat is a free grazing animals and normally are not stall fed. Despite a commonly held belief that goats cause extensive harm to the land by grazing, why are more people preferring to keep goats rather than milch animals is a question that needs to be examined. The answer to this question may possibly be found by looking at the livestock trends in Rajasthan.

Livestock trends in Rajasthan (in millions)

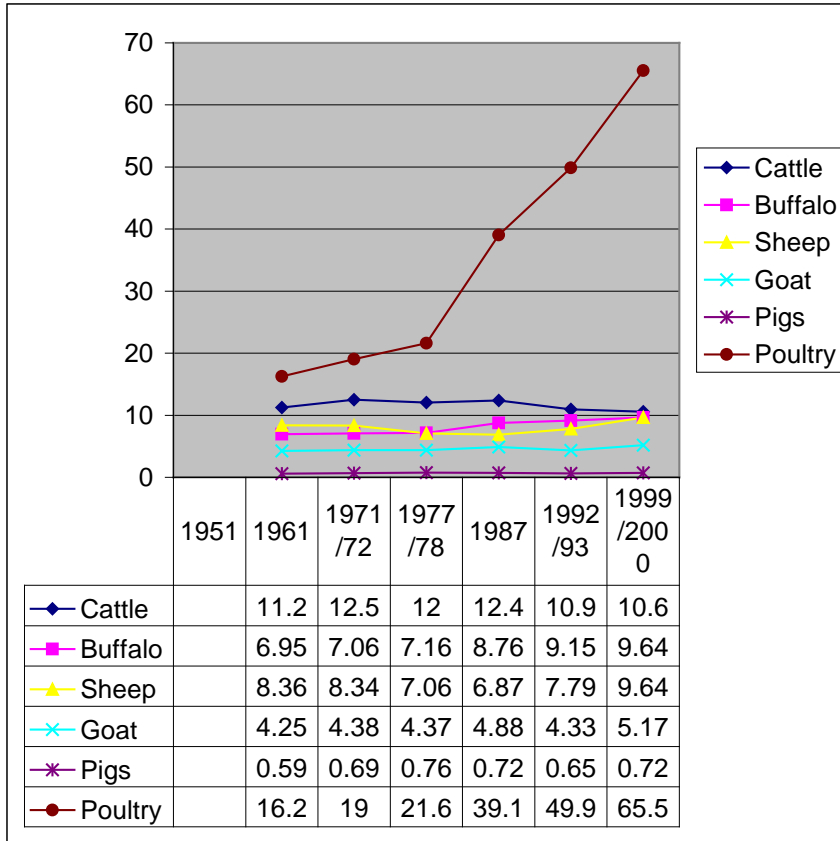


Source: Rajasthan Report

Rajasthan has the highest ruminant population in the country and contributes 40% of wool production and 10% of all milk production in the country. As is obvious from the table above there has been growth in Rajasthan of all animal populations- even cattle. A more detailed examination shows that there has been a sharp increase in the percentage growth of cross-breed cattle but in overall terms their numbers remain negligible in comparison to indigenous cattle. Sheep and goat population have shown steady increase as they provide an important source of income in the arid and semi-arid districts. Camel population has been growing as it is being used extensively for transportation purposes in rural areas. In stark contrast to states like Andhra Pradesh, poultry does not seem to have much of a presence in Rajasthan though in percentage terms recent growth is impressive.

Let us now look at the livestock trends in Andhra Pradesh. The figures below clearly seem to indicate that there is a shift in composition taking place since the beginning of the nineties with a decrease in cattle population and a corresponding increase in buffalo population. Other than that, with the exception of poultry, the entire livestock section seems to be stagnating.

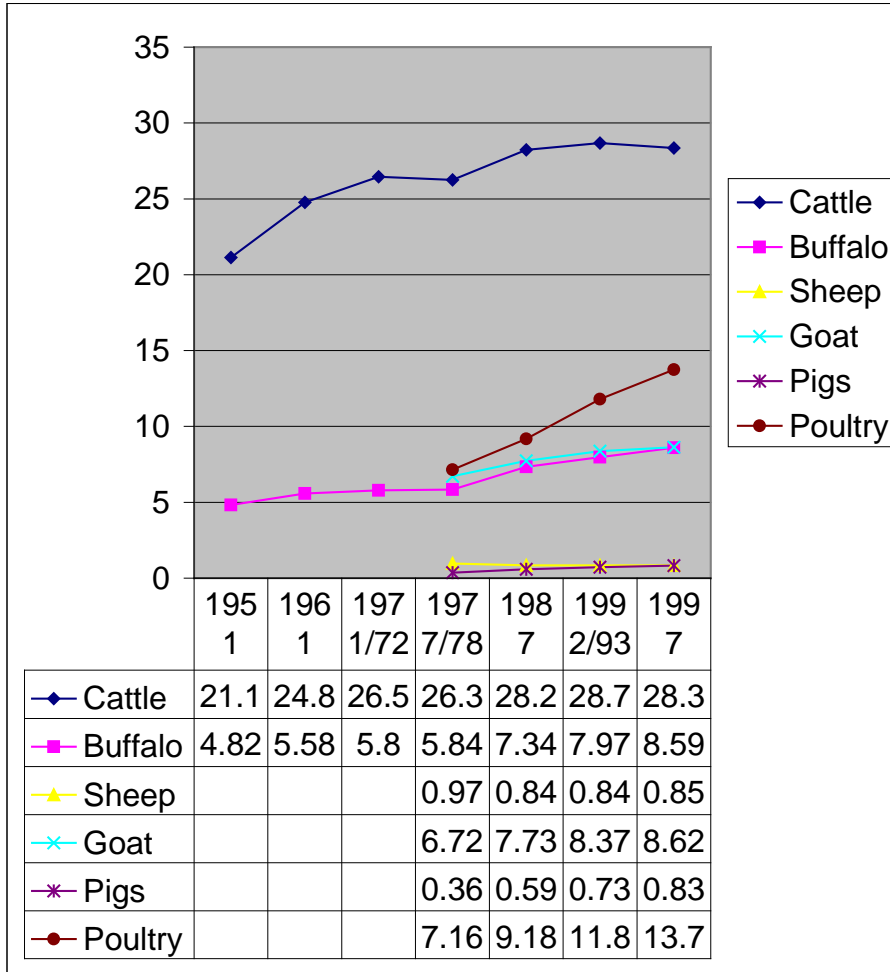
Livestock trends in Andhra Pradesh (in millions)



Source: Andhra Report

In Madhya Pradesh again cattle growth seems to have started to stagnate and the population remains mainly indigenous. Sheep rearing does not seem to have caught on in Madhya Pradesh. The MP Report also mentions that a large number of draught animals are still used in agriculture though exact number has not been provided.

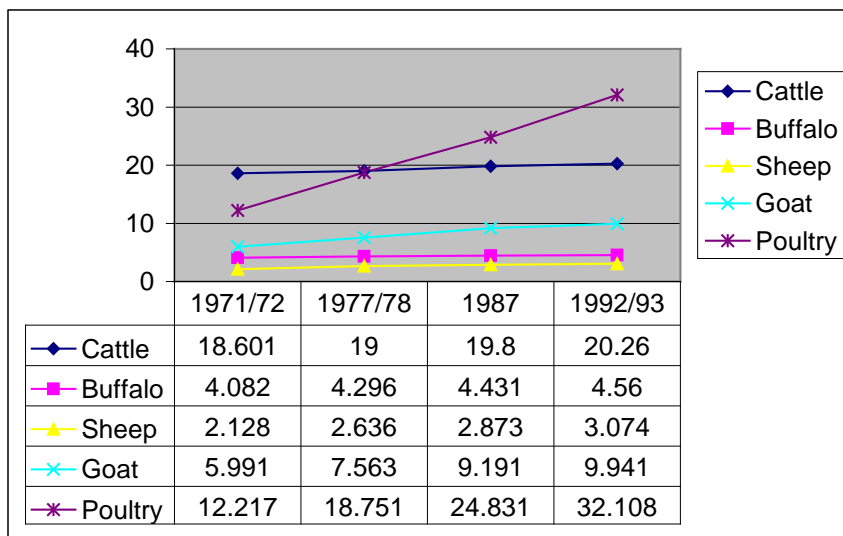
Livestock trends in Madhya Pradesh (in millions)



Source: MP Report

Maharashtra trends show that milch animals are increasing at a very slow but steady rate because of comparatively more developed dairy network. The presence of cross-breeds is also more common in Maharashtra than other states. Draught animals have shown a slightly negative trend while sheep and goat populations have not shown and decrease despite 30-40% of them being slaughtered every year. Of the total ruminant population almost 60% are cattle/buffalo and about 28% small ruminant

Livestock trends in Maharashtra (in millions)



Source: Maharashtra Report

Between 1957 and 1997 the cattle population, in Karnataka has increased by 20% whereas buffaloes have increased 63%. The real surprise here is the high growth rate in sheep population, which has grown by 83% during the corresponding time frame. Since the 1980s the number of cross-bred cattle has been increasing and by 2000-2001 estimates accounted for approximately 20% of the total cattle population. The growth rate in poultry seems to have slowed down in the 1990s though in absolute numbers the growth is still substantial.

Livestock trends in Karnataka (in millions)

Year	Cattle	Buffalo	Sheep	Goat	Camel	Horses	Pigs	Poultry	Total
1951									
1961	9.7	3.0	4.8	2.9				8.8	
1971/72	10.0	3.2	4.7	3.7				10.2	
1977/78									
1987									
1992/93									
1997	10.8	4.4	8.0	4.9				21.4	
1999/2000									

Source: Karnataka Report

5. Experiences of watershed development programmes and impact on livestock development

1994 is without doubt a watershed year in the history of watershed development in India. The number of projects in all the five states, as well as area under treatment, has increased since then. There have been visible improvements in productivity, soil conservation, water availability etc. But on the question of the impact on livestock, though all the reports agree that watershed treatment helps in livestock development, there seems to be no data available or any direct effort for livestock development as part of the watershed activities.

Extracts taken from the five reports, reproduced below, provide a clearer picture-

Maharashtra Report – “In almost all the watershed development programmes operational in the state, livestock component is not a focus area nor have any special budgetary allocation. Under NWDPR, Western Ghat developmental programme a local livestock worker is being trained. However, livestock being a major source of livelihood, fodder and grass production both in private, forest and common lands get a boost in order to sustain the fodder requirements. Livestock health camps and extension services are also facilitated by the NGOs”.

AP Report – “Watershed development approach as enunciated in the program Guidelines in 1994-5 is an action plan oriented approach. The primary stakeholders organised into groups (SHGs and UGs) are to identify the problems and opportunities, find out solutions and plan for their development. In line with this approach there is no sectoral allocation of budgets or activities to livestock development”.

AP Report – “The action plans are mostly on soil and water conservation. Plantations, horticulture and distribution of fodder seeds are the other interventions. But none of these interventions have a focus on livestock development”.

MP Report- “A majority of farmers in the state cultivate small plots of dry upper watershed lands which are not amenable to the modern flood irrigation and external artificial input based agriculture. Moreover, these farmers also rely significantly on the income and other kinds of support that they derive from livestock rearing. This means that they have to rely heavily on the resources of village common lands and forestlands and in the absence of proper and sustainable community management of these lands they are being degraded rapidly. Thus there is an urgent need for the implementation of comprehensive watershed development programmes to stabilise the upper watershed regions in the state, increase the soil moisture, soil depth and soil quality as also the irrigation potential in these regions while at the same time ensuring better and more sustainable use of village common and forest lands”.

Karnataka Report – “The type and the degree of impact of watershed development programs vary depending upon various factors such as the type, scale and effectiveness of the technologies used, design and quality of implementation, land tenure and access to CPRs, fodder development and access to fodder, watershed endowment and context, migration, market access, institutions etc. Under well managed WDPs significant effects on livestock production system through improved availability of water, biomass and crop residues could be found”.

AP Report – “The water harvesting structures though not planned explicitly with a focus on livestock, have served the livestock drinking water purposes – particularly where people have greater say in decision making. In several places they eased the constraint of water on livestock production”.

Maharashtra Report – “Common property resources such as forest and community land is developed with the objective of increasing the bio-mass base. In certain projects, such as IGWDP, forest land is developed in close collaboration with forest department and the community and usufructory rights are assigned to the people. They in turn take the responsibility of developing and protecting the forest. Under IGWDP, the village watershed committee transfer the money to the forest protection committee to

undertake treatment of forest land”

Rajasthan Report – “Traditionally livestock had been the backbone of the rural economy. As the droughts hit the vast arid tracts more frequently than any other part of the country, people of Rajasthan have learnt many lessons from the harsh famine conditions arisen from the droughts. Traditionally, Rajasthan’s both common and private property resources had been managed to support the livestock”.

Karnataka Report – “though there is no scientific and direct account available on land regeneration and its impact on livestock, our experience based on field studies shows that wherever the quantity of biomass has increased as a result of watershed development programs, milk yield and milk production have also shown an increasing trend. How much land has been regenerated and how it is being managed also influence the biomass availability. Even in watersheds increase in milk yield and milk production is due to crossbred animals, which are also fed on commercial feeds and fodder. We have observed that generally crossbred cows are maintained only where water facilities (for drinking, washing and to get good crop residues) are available. Also by developing and regenerating lands, both arable and non-arable the biomass quantity has increased, which was helpful in maintaining livestock. Regeneration of non-arable lands was more helpful in maintaining ruminant livestock. This is the indirect way wherein the livestock got the support through watershed development programs, as there was no scheme to demarcate, regenerate, develop and maintain lands exclusively for ruminant livestock”.

AP Report – “There are no clear linkages with the animal husbandry department, though there may be few people deputed from the department to the multi-disciplinary teams. This in itself did not bring about convergence”.

Karnataka Report - “There is hardly any mention about the situation and role of draught animal power in a watershed. One can argue that the available number of draught animals in a watershed could be more when calculated on the basis of per hectare requirement, which would again be based on standardized units. But in reality many farmers, particularly small and marginal farmers lack adequate draught animal power. In dry land agriculture timely operations are crucial, and draught power needs, particularly of small and marginal farmers have to be met. This is where the watershed development programs have failed. Draught animal power is central to dry land farming, and it may not be wrong to argue that without the required number of draught animals, sustainable dry land agriculture in the State is a myth. A rethinking and action plan is required in this direction. Action plan to maintain the required stock and at the same time maintaining the feed and fodder supply and also to maintain the ecological balance of the watersheds. A big challenge indeed, which has been safely neglected”.

AP Report – “The new bilateral programs A.P. Rural Livelihoods Project and Indo-German Watershed Development Program-A.P explicitly recognise the need to integrate livestock resources – but these are still at a nascent stage with respect to grounding livestock development plans. APRLP has initiated training of livestock para-workers with the help of Animal Husbandry department”.

Though data on direct impact on livestock is not available (this is where the watershed studies of LEAD are important), it is clear that despite there being no direct focus on livestock there is a positive relationship between successful treatment of an area and livestock development.

6. Issues that need re-examination in light of the Watershed-livestock-environment interactions⁸

Some serious issues that need to be re-examined in light of the watershed-livestock interaction approach are –

- **Focus on livestock in watershed development programmes and acceptance of watershed**

⁸ This section has benefited from initial feedback provided by Dr B R Mangurkar on an earlier version of this document. Referencing for this section is not yet complete but proper referencing will be provided in future versions.

development as a means of livestock development.

Watershed development projects have mainly focused on soil and water conservation (despite terms like watershed plus and watershed plus plus being used to describe the role of watersheds development projects in natural resource management and improving rural livelihoods) and have tended to neglect biomass and livestock development. This leads to only a partial development of the rural production system.

Joy (2000) notes that surplus biomass production, over and above the subsistence requirements is necessary to provide for a basket of non- farm sustainable livelihood options to the resource poor segments of the rural society.

Similarly there are more opportunities to mitigate the negative and enhance the positive impacts of livestock on the environment in mixed systems than in specialised systems (Campbell et al 2000) and this aspect needs to be considered while planning and implementing watershed development programmes.

Dr. C. Hanumantha Rao while reviewing the impact of Watershed Development projects and observed that at present there is little presence of agriculture department or Animal Husbandry/ livestock development institutions, in the DPAP watersheds, by way of promoting locally relevant research and extending suitable technologies, inputs and other necessary support to farmers. He remarked that an early integration of the interventions by these departments in areas is very much called for.

Sanjeeva Reddy and Prasad Rao made observations that are relevant in the context of livestock-environment interactions: that motivation and training of local organizers including “Mitra Kisans” and “Gopals” has been woefully inadequate, only one or two core activities were implemented in a majority of projects, mismatch between livestock population and pasture development was noticed in some projects and line departments involved in implementation often lacked coordination.

Also, evaluation studies on livestock component in watershed projects are few and rarely provide adequate weightage for finding out the likely impact of emerging livestock-environment interactions.

Thus there is immediate need for modifying the existing policies to recognise the importance of the livestock-watershed-environment interactions

- **Coordination among various agencies (both GO and NGO) working in this field**
- **Common property and pastureland development and management from both the watershed and livestock angle**

The rural poor, with limited alternatives means of income, depend more on low pay-off options offered by Common Property Resources. A greater dependence of private resource based crop farming on Common Property Resources is revealed by the extent of support it receives from the sustenance of farm animals (N S Jodha 2001 (a)) Since Common Property Resources are a mainstay of any community’s livestock, their decline has forced significant adjustments in livestock management. Reduced grazing space and depletion of forage potential have brought about both a reduction in the size of animal holding and change in their composition. Feeding the bullock for the whole year without Common Property support becomes uneconomical when they are in agricultural use for only three or four months. High private cost implied in increased stall- feeding favoured buffalo keeping as against cows. Reduced CPRs favour the shifting over to small ruminants over that of cattle. Thus sheep and goat, often accused of destroying Common Property vegetation, seem to have attained importance following degradation of Common Property Resources (N S Jodha 2001 (b)). The ecological and environmental need to protect Common Property Resources and sustenance of rural poor are quite important factors, which can not be ignored at the policy level. Controlled grazing has emerged as an important system of protecting Common Property Resources. A number of institutions and rules already exist and can be put into place in order to implement controlled

grazing.

These include -

Table 6: Controlled Grazing Rules and Institutions (Formal and Informal)

	Formal	Informal
Local	Local movement controls Local disease control policy Access to resources of different kinds forests, village grazing, private land etc.	Use of communal grazing resources Rules of share rearing or share cropping Rules for contribution of labour for group based grazing Livestock management practices Local power structures.

- **Ways to meet the fodder deficit**

According to recent estimates made by ISPA (1997), average total feed availability per livestock unit per year is 1867 kg against requirement of 2281 kg per year in India. Out of this, crop residues constitutes 60%, Common Property Resources 24%, private grazing (fallows) 16%. Grains and concentrates are important in intensive production systems.

According to Dr Mangurka, fodder based cropping systems for different zones are required with promising crop species and varieties for optimizing productivity of irrigated and rainfed systems. Some of his suggestions include -

- Grasslands/rangelands need development through silvi-pastoral approach to assure grazing and top feed supply in all seasons.
- In the Joint Forest Management (JFM) areas, pasture grasses and legume need integration for quality forage production, conservation and grazing for the benefit of livestock.
- Saline sodic and inundation condition need bioremediation through grasses-trees for forage production.
- Forage conservation and processing - hay, silage, complete feed block, pelletization, fortification of low grade roughages.
- Mechanization- Bailing/densification/ compressing to facilitate storage, transportation and quality upkeep.
- Establishment of fodder banks and cooperatives for fodder bank management
- Development of fodder based land-use system specially in hilly, arid and semi – arid, coastal regions for milk, meat and wool production.

There is also an urgent need to treat drought as an integral component of the production function rather than as an unpredictable occurrence and to develop national drought management strategies with strong central planning and administrative support, appropriate technical back stopping, including early warning and rangeland monitoring systems, and decentralisation to the regional and local level.

- **Role and importance of Draught animals for marginal and small farmers**

Draft animals have the following salient advantages that have led their use being so widespread:

They reproduce themselves and do not require large capital outlays if an appropriate stock of animals is maintained.

They provide cow-dung as fuel (or return nutrients to the soil), milk, meat, and leather.

Comment [mvk4]: most prob not the correct ref

Their use is flexible in that they can be used for many different purposes such as ploughing, threshing, irrigation, and transportation.

They can be obtained in small unit sizes (in terms of power per unit), a big consideration for small farmers.

They are not dependent on external supplies of fuel, so that the element of risk in fuel cost is minimized.

They largely involve non-monetized energy sources, and use non-monetized labor which is available especially in the off-season.

They can provide peak power at several times the average power over short periods.

Despite these advantages, the number of draft animals is not large enough to fulfill all the energy needs of agriculture. This is because the principal advantages of draft animals can accrue only to farmers already possessing cattle and adequate amount of cultivated land to provide fodder and off-season grazing land. Initial capital outlays for acquiring cattle are substantial, and their maintenance can involve considerable monetary costs if the farmer does not possess enough land to produce the required fodder. Thus, the monetary costs of draft animals can be considerable and they are often out of the reach of the small farmer. As we have seen, even in those cases where farmers do have cattle, their numbers frequently fall short of meeting the needs of present cropping intensity, much less increasing it. However, average efficiencies do not tell the whole story. The system of draft animals exists in and is the mainstay of, agriculture.

From an ecological point of view, the replacement of bullocks by tractor cultivation has both pros and cons. There are no adequate studies in the Indian context exploring this matter. Also it is not very clear if tractors are replacing draught animals in agriculture or the change is more due to use of electric and diesel pumps (ref table 2)

One clear policy option is revival of the breeding objective of dual purpose animals as they provide income, draught power as well as manure, belong to the disease resistant and hardy local gene pool and their total cost of ownership is comparatively lower.

- **Improved market access for milk and egg producers and setting up of basic marketing infrastructure for other livestock.**

Cees de Henning, Stienfeld and Harvey Blackburn have written that dynamic markets and access to inputs leads to the fully sustainable development of livestock in resource poor areas.

Comment [mvk5]: will give ref later

Most rural enterprises being small, scattered and unorganised, their owners have very low or practically no bargaining power vis-a-vis those to whom they sell their produce and from whom they buy their supplies.

Market development/infrastructure is a necessary condition to achieve significant changes in livestock production. Where markets are non-existent or poorly developed, investments in market infrastructure should take precedence over all other research and development initiatives. Once this is in place, farmers of their own volition are expected to make better use of existing resources and, as a result, should be more receptive to the introduction of new technologies.

- **The ongoing debate on crossbred V indigenous breeds**

There is a need to recognise the justification for different extensive and intensive production systems the neglect of which could have serious consequences for the livestock rearing community. The low input-low output model seems to be the preferred production system in areas where institutional support in the form of market access, health support etc. are not available

The nutritional constraints in intensive production are very real and the conditions under which stall-feeding, concentrate feeding and cultivated fodder become viable options may not be

possible in many semi arid regions.

- **Improving animal health services with specific reference to privatisation**

In order to manage the production risks faced by rural livestock owners and to realize the potential of small-scale dairy production as a means to reduce poverty, the farm productivity has to be raised. Raising productivity of dairy farms and mitigation of their production risks requires among others the (i) availability of improved breeding services, (ii) targeted preventive animal health care (specifically addressing viral diseases like FMD and other highly infectious bacterial diseases like haemorrhagic septicaemia) and (iii) better feeding strategies.

Governments are finding it difficult to maintain quality animal health and breeding services and there may be a need to consider other supplementary options including barefoot vets and partial privatisation

- **The importance small ruminants and their development**

Generally, the goat occupies a crucial position in most household economies in the region. Many households depend upon goats for their daily milk supply despite the low yields recorded under the extensive systems practiced throughout the region. Households report only 2 to 3 litres daily in the kidding season. Nevertheless, this production is highly efficient considering the low or negligible inputs of capital and labour in the household goat enterprise (Sagar and Ahuja 1993). Children do much of the goat herding or goats herd themselves in and around the village during the day. Only large holders (>15 animals) reported the use of any kind of preventative veterinary care. Furthermore, through steady cash sales of animals for meat, goats provide economic stability and investment with a high rate of reproductive return; most she-goats kid at least once a year. The market for animal sales is good and access is easy with middlemen coming even to the remotest villages on a continuous basis. This is especially significant in a region where failures in monsoon rainfall are common and agricultural production is highly risky. More specific causes for the rapid growth of the goat population are the result of:

- 1) changes in the regional ecology,
- 2) alterations of the local land-use institutions, and
- 3) the explosion of regional and national demand for meat.

The rapidly growing goat numbers certainly contribute to land degradation and transformation of the environment. However, the logic of goat raising is unquestionable from the marginal herder/farmers' point of view considering the increasingly constricted options available in the desert regions. Herders and farmers, by investing in goats, are responding to future uncertainty in traditional production systems and lack of control over grazing resources. Up until now, the remedial and development measures taken by the government and by some NGO's in forestry, irrigation and local industry have side-stepped pastoral production. As long as this remains the case, the present trajectory is the most reasonable and logical one for local producers to follow. Goat keeping is an adaptation to economic, institutional and environmental circumstances and goats are likely to continue to be one of the desert's most knowledgeable and efficient residents.

Attempts at crossbreeding with exotic breeds in small ruminants have largely failed and there are very few other Government interventions into small ruminant production. There are some domestic breeds that are recommended but it is left to the discretion of the owner to attempt any crosses. There is heavy emphasis on milch bovines, and small ruminants do not receive the kind of attention which is commensurate with their importance.

- **Why do farmers continue to keep non-descript breeds?**

The entirety of the milieu of a region (climate, terrain, soil, ecology, people and, through them, crop production), determine which species or species-mix of animals will be reared by

people there. It is difficult, if not impossible, to change this situation easily, i.e. replacement of the existing established category of animal by another one, (e.g.: Crossbred cattle in place of indigenous ones) considering the long-term population trends. Need for work-bullocks is still the prime moving force behind cattle keeping universally, and seems likely to remain so for quite some time to come. Tractorisation has not yet caused any great reduction in bullock numbers.

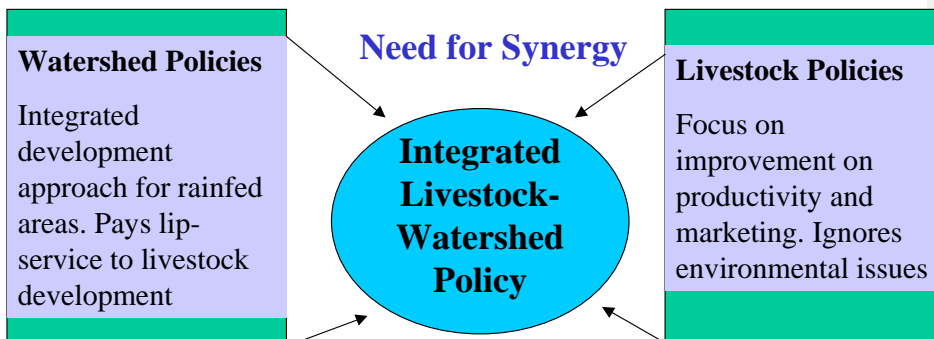
Poorer households exchange livestock products for cheaper grain and so greatly enhance food security. Livestock are one of the few natural capital assets owned by poor households, and can be crucial in maintaining household survival in times of crisis. They can be accumulated in good times and sold when the need arises, such as for school fees or health care, and are both inflation-proof and productive investments. Livestock are pivotal to farming systems practiced by the poor, providing draught power and manure when the purchasing of substitutes in sufficient quantities is often impossible. In some situations, ownership of draught power is essential for sharecroppers to secure a tenancy. Animals also act as a catalyst to improvement by providing one of the main sources of cash for agricultural inputs. Livestock allow the poor to gain private benefit from common property resources independent of private land holdings, and utilize feeds that have few alternative uses, support livelihood security by diversifying risk and acting as a buffer to crop yields, particularly in drought prone environments. Livestock are important in preventing the slide into abject poverty that occurs, for example, when pastoralists lose their animals, or sharecroppers and marginal farmers lose their draught power. Livestock provide a multitude of other benefits, including food transport of water, produce and inputs to and from remote markets and fields; fuel for cooking and heating, reinforcement of social support networks that are so important for the poor in times of adversity; and fulfilment of cultural roles.

- **Making credit available to livestock owners**

Lack of credit constitutes another obstacles to an acceleration of livestock production from the farmer's perspective. Lending in the livestock sector mostly takes the form of providing livestock to the weaker sections (except in developed dairy cooperatives). Most of the organised credit suffers from excessive over dues and poor performance. The rigidities and inefficiencies in the formal credit system are often of a magnitude that cancels the social intentions and make the services of the local moneylenders attractive (also landless and marginal farmers have problems getting credit from the organised credit sector). Self-Help Groups of livestock owners in semi arid areas may be a good option for making credit available.

7. Towards a policy for livestock in watershed programmes

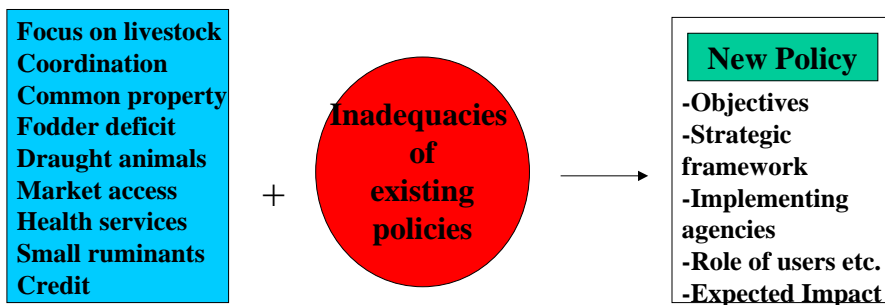
The livestock-watershed-environment interactions approach provides a unique opportunity to achieve "growth with a human face" in the livestock sector. In effect one will have to merge the two ideologies mentioned in section 2 of this document above with region specific variations and overall flexibility. This is where synergies between watershed and livestock policies can play an very important role as it seems, based on the five state LEAD reports, that the goals of both schools of thoughts i.e. positioning India as a global player in the livestock market and achieving sustainable and equitable growth can be achieved by focusing on livestock within the livestock-watershed-environment interaction.



But before moving onto any policy recommendations, a number of questions need to be thoroughly examined and answered. These include –

1. What is the impact on livestock and livestock keepers due to watershed interventions? Are there regional variations? Is so why?
2. What are the various policy elements (from various sectors) governing those interventions that need a review? And why?
3. Is there or/not enough flexibility in the concerned state policy/ies to make it adaptable to local changed situation of the watershed and to be able to make use of the the new opportunities arising out of watershed interventions?
4. What changes are required in the state/wsd policy to enable local adaptations for minimising the negative impact and maximising the positive impact on the environment and livelihood?
5. Is there proper concordance between the policies and programmes – in terms of infrastructure, implementation strategies, delivery systems etc?

Keeping these questions in mind, the answers to which will highlight the inadequacies of the current policy and the issues raised in the five state LEAD reports and discussed in section 6 one can start looking at integrating livestock development in watershed programmes with the aim of optimisation to maximize the positive benefits of and minimize the negative impact of watershed development on livestock and vice versa.



It may also be noted that there is a need for synergy and not convergence between livestock and watershed development. This synergy can be achieved through incremental improvements and modifications at various levels i.e. through policy changes, changes in operational procedures and administrative instruments for greater inter-linkage between livestock and watershed, through capacity building etc. There is also a need to make sure that strengthening the mechanism and instruments to implement the policy are given as much importance as the drafting of a policy.

To sum up the following concerns within the livestock-environment-watershed framework would need to be addressed in any future livestock and watershed development activity or policy (this table is still being evolved by the author):

Table 7:
Concerns that Need to be Addressed

LIVESTOCK	ENVIRONMENT	WATERSHED
- Ways to meet the fodder deficit	Maintenance of soil fertility and production	Carrying capacity of the watershed?
- Role and importance of Draught animals for marginal and small farmers	Degradation of land	Soil and water conservation
- Improved market access for milk and egg producers and setting up of basic marketing infrastructure for other livestock.	Ecological balance of an area	Optimum utilization of the watershed's natural resources like land, water, vegetation for the benefit of livelihoods
- The ongoing debate on crossbred V indigenous breeds	Water pollution & erosion	Developing wastelands/degraded lands
- Improving animal health services with specific reference to privatisation		Drought mitigation
- The importance small ruminants and their development		Harvesting every drop of rainwater for purposes of irrigation, plantation including horticulture and floriculture, pasture development, fisheries etc
- Why do farmers continue to keep non-descript breeds?		creating substantial income for village communities
Making credit available to livestock owners		drinking water supply

Common to all three (Livestock, Environment and Watershed)

- Focus on livestock in watershed development programmes and acceptance of watershed development as a means of livestock development.
- Coordination among various agencies (both GO and NGO) working in this field
- Common property and pastureland development and management from both the watershed and livestock angle

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State Livestock Policy Reports

Andhra Pradesh Policy Report on Watersheds and Livestock, Prepared by WASSAN for the LEAD Study

February, 2004. Watershed Support Services and Activities Network 12-13-452, Street No.1, Tarnaka, Secunderabad – 500 017

Karnataka State level report on watersheds and livestock, prepared for the LEAD Study by SAMUHA and Syed Ajmal Pasha, December 2003.

Madhya Pradesh State Policy Report on Watersheds and Livestock, Prepared by SAMPARK for the LEAD Study.

Maharashtra: State level report on Watersheds and livestock, Prepared for the LEAD Study by WOTR, Ahmednagar.

Rajasthan State level report on watershed and livestock prepared by SEVAMANDIR for the LEAD Study

Appendix 1

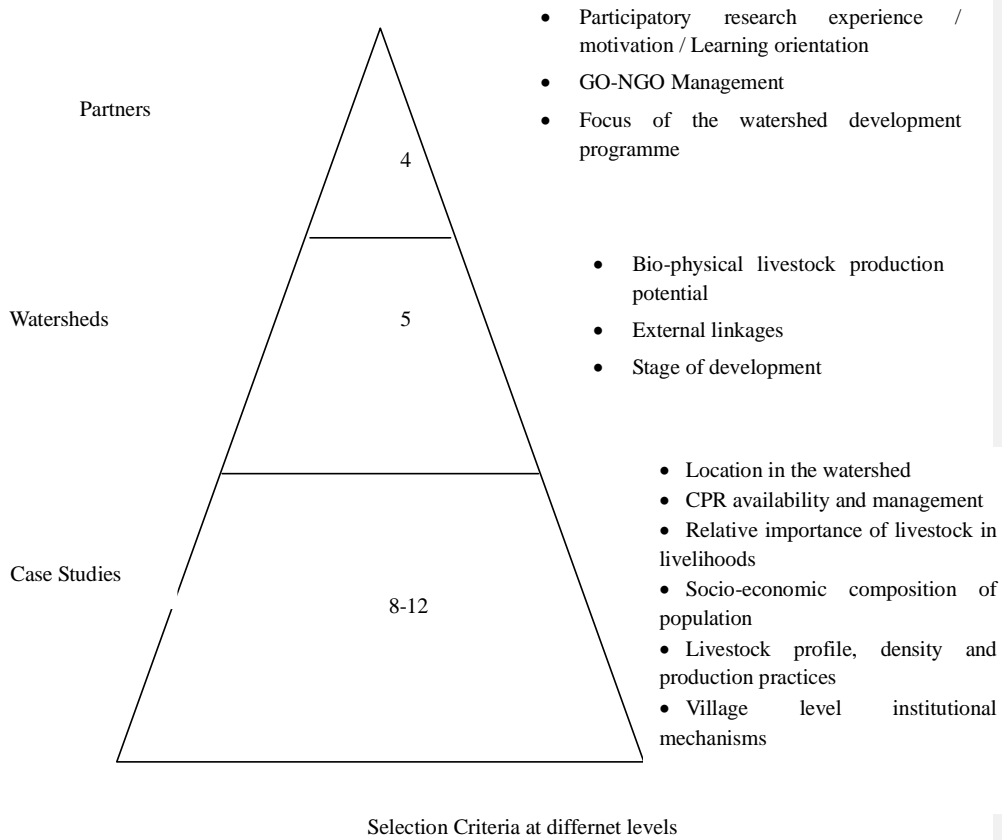
Outline for State level Report on Watersheds and Livestock

1. Profile of the state
 - a. General
 - i. Population
 - ii. Climate
 - iii. Economic trends
 - iv. Water resources and trends
 - v. Poverty trends
 - b. Rural Economy
2. Livestock sector in the state
 - a. Population and trends
 - i. Milch animals
 - ii. Draught animals
 - iii. Meat animals
 - iv. Poultry
 - b. Animal health
 - c. Feed and Fodder
 - d. Livestock breeding
 - e. Livestock marketing including processing and value addition
 - f. Institutional set up
 - g. Strengths, weaknesses, opportunities and threats
3. Government/Externally supported Programmes in the state (Current and during the past 30 years)
 - a. Investments, trends and priorities
 - i. Watershed development programmes
 - ii. Livestock development programmes
 - iii. Forest development programmes
4. Policies at the state level
 - a. Watershed development
 - b. Livestock sector
 - c. Rural/Agricultural development
 - d. Forestry
 - e. Water/Irrigation/drinking water Policy
 - f. Interlinkages and mutual influences of the above policies
 - g. Linkages with central policies

5. Design/Models of Watershed development programmes in the state
 - a. Donors
 - b. Implementing arrangements
 - c. Institutions
 - d. Livestock component in different programmes

6. Experience of watershed development programmes and impacts on livestock development
 - a. Watershed Management
 - b. Institutions
 - c. Policy
 - d. Collective action
 - e. Common Property Management
 - f. Changes in livelihood patterns
 - g. Livestock production and management

Appendix 2



Site selection – Partners for LEAD project

	ISPWD-K	CWDP-MP	WOTR	DPAP	Sevamandir
State	Karnataka	M.P.	Maharashtra	A.P	Rajasthan
District (s)	Koppal	Jhabua	Ahmednagar	Mahabubnagar	Udaipur
Name of watershed	Kanakanala	Ladki Nadi	Vaijubilgaon	Kosgi	Kalyanpur
LEAD partner	Samuha	Sampark	WOTR	WASSAN	Sevamandir
Implementing partnership arrangements	GO- NGO to NGO-CBO	GO-NGO	NGO	GO	NGO
Donor partner	SDC/IC	DANIDA	GTZ	GoI	
Scale of watershed	13,000 ha	19,823 ha	4300 ha	4100 ha	3000 ha
Major focus	NRM	NRM	NRM	SWC	NRM
Livestock component in watershed development programmes	Recent focus	As an adjunct	None	In watersheds where BAIF is active, and recently under APRLP	As a corollary, on farmer demand
Participatory research experience/ Learning orientation	Adequate	Adequate	High	Low	High
Data availability	Good	Good	Comprehensive	Adequate	Good
Average rainfall	575 mm	828-945 mm	434 mm	754 mm	642 mm

Appendix 3

A study on 'Livestock Feeding Situation in Andhra Pradesh: Options for Improvement' carried out by the Indo-Swiss Project, A.P identifies 13 different major livestock production systems. The following table details some of the characteristics of these systems.

Major Livestock Production Systems in A.P.:

Large ruminants Dairy	Low producing herds	Predominantly local buffalo, largely kept for production of milk for direct consumption and occasional sales Category continuously increased, with farmers substituting non-dairy local cattle Spread all over the state in combination with paddy based cropping systems and also other cropping systems.
	Small medium-high producing herds	Graded buffaloes in paddy (irrigated) based cropping systems with the exception of parts of north coastal Andhra Cross bred cattle in Chittoor and to lesser extent in north coastal zone. Besides home consumption, clear market orientation. Intensive use of concentrates, growing of irrigated fodder Includes especially in Delta zone category of landless labourers that collect fodder from fields of farmers as part of their payment.
	Large medium to high producing herds	Peri-urban dairy production, mostly graded or pure bred Murrah buffalo; occasionally high blood crossed HF. Most of the feed and fodder procured, profitable because high value of milk due to closeness of quality appreciating market.
Large ruminants non-dairy	Small (<4) herds male offspring production	Local cattle kept for manuring and occasional offspring Means of security and some times of status Widely spread in less agriculture intensive areas. Occasional milking for home consumption In limited areas, Ongole types for production of quality draft animals. These are also occasionally used for draft purpose
	Larger herds male offspring production	traditional herds of large land owners, mostly non-descript Main purpose dung and occasional offspring. Means of security and some times of status
	Herds for female offspring production	System developed in particular in north Coastal Andhra, production of cross bred cattle heifers for sale to dairy farmers Includes also raising of buffaloes for peri-urban dairies and bringing them into calf after cessation of lactation.
Draft animals	Predominantly non-descript cattle bullocks In parts of coastal Andhra in decreasing numbers of Ongole bullocks	

	North coastal Andhra buffalo bullocks	
Small ruminants	Medium to large sized sheep herds	In Rayalaseema and parts of coastal Andhra, Nellore type, mostly stationary herds In telangana, mainly Deccani, partly stationary partly migratory
	Lamb fattening	Ram lambs purchased and fattened for a period of 4-6 months by farmers or traders. Numbers fluctuate from few to 20-30.
	Medium to larger sized goat herds	Most villages have few goat herds that cover utilisation of the available fodder trees Concentrate of goats higher in Telangana regions along forest areas
	Backyard	Maintenance of a buck or a ram for the purpose of fattening and sale for ready cash
Poultry	Commercial	Modern large scale poultry farms around urban centres
	Backyard	Widely spread practice of keeping few chickens for eggs and meat for direct consumption

APPENDIX 4

State	Demographics	Climate	Poverty	Economic Trends	Water Resources	Land Resources
<i>Andhra Pradesh</i>	The population in 1991 was 66.5 million with density of population at 242/Sq.km. The literacy rate was at 44.1%, The rural-urban ratio at 73/27 and the sex ratio at 972.	The normal rainfall for AP is 925 mm, with the highest average in coastal Andhra (1025mm) and the lowest in Rayalaseema (689mm). The state is divided into seven agro-climatic regions i.e. Delta, North Costal, South Costal, North Telengana, South Telengana, south west and high altitude and tribal area. 12 districts have been declared as drought prone.	GOI figures in 1999-2000 show only 11% rural poverty and 26% urban poverty (overall 15.77% based on Lakdawala committee method). Deaton and Dreze using their method came up with the exact opposite figure- 11% urban poverty and 26% rural poverty in 1999-2000!	The primary sector contributed 35% of the gross SDP in 1993-94 which came down to 31% in 1998-99. Contribution of secondary sector went up from 21% to 24% and of the tertiary sector from 44% to 45% during the same period	AP has several river systems – Krishna Godavari, Penna being the major ones and a well knit irrigation system. In 1999-2000 36% of the state had canal irrigation, 23% was irrigated by tube wells, 21% by other wells, 5% by tanks and the remaining 15% by other sources. In recent years there has a shift towards ground water irrigation from surface water irrigation.	
<i>Karnataka</i>	In 2001 the population of the state was 52.7 million with a density of 275/ Sq. km. The literacy rate was 67.04%, the rural urban ratio 66/34 and the sex ratio 964	The normal rainfall for the state is 1189mm which is concentrated during the months of June-September (807mm). Rainfall in coastal regions ranges from 2500mm to 3000mm.	In 1999-2000 the poverty ratio was 20.04% (17.38% rural and 25.25% urban. The value of Human Development Index (2001) for Karnataka is 0.478 and the state ranks 7 th in the country. According to a recent NCEAR rural household survey, the incidence of poverty was 68% among landless wage earners, 51% among SC/ST and 45% in non literate households.	The share of primary sector in the State's Net SDP has declined from 38.1% in 1993-94 to 30.7% in 2000-2001. Share of secondary sector has gone down from 24% to 23% and that of tertiary sector has increased from 37.9% to 46.3% during the same time period. Livestock makes up 22.1% of the contribution of the primary sector and its share is increasing.	River water is the most important source in Karnataka. The total surface water irrigation potential in 2001-2002 was 2.86 million hectares. The state depends on monsoons for about 50% of its dry land farming. Exploitation of ground water was minimal in the 1960's but its use has been promoted and is growing rapidly. During 1989-99, 38.2% of the total net irrigated area was canal	In 1998-99, 61.7% of the total area was classified as net sown area, 16.1% as forest land, 5.2% as permanent pastures, 4.2% as uncultivable lands, 2.3% as cultivable wastelands and the rest as miscellaneous. Most of the agricultural land holdings belonged to small and medium farmers (76.5%), with 13.2% large holdings and only 10.3% marginal

Comment [mvk6]: Rakshat – We need to check this as the same AP report mentions that agriculture contributes 20% to the SDP! Is that a 200-2001 figure?

Comment [mvk7]: Rakshat- Is this Pennar?

State	Demographics	Climate	Poverty	Economic Trends	Water Resources	Land Resources
<i>Madhya Pradesh</i>	The population of MP in 2000-2001 was 60.38 million with a population density of 196/ Sq. Km. The rural urban ratio 73/27 and the sex ratio was 920	The temperature range in the state is between a low of 5°C and a high of 48°C. Normal rainfall also varies across different agro climatic zones with over 1500mm of rain in Chhattisgarh Plains and just 750mm of rain in Gird region	As per GOI figures 37.06% of the population was below the poverty line in 1999-2000, a figure that has come down substantially from over 65% in 1977-78.	In 2000-2001 the primary sector contributed 33.83% of the Net SDP, manufacturing and construction 25.6%, transport and communication 17.31%, Banking and allied activities 9.73% and commercial services 13.71%. Interestingly in 1999-2000 87.5% of the population was employed in the primary sector	dependent, 37.3% irrigated by wells and bore wells, 10.2% by tanks, 3.9 by lift irrigation and the remaining 10.4% by other sources. The state is part of six river basins and drains through the Yamuna in the north, the western part drains into the Narmada and Mahai and the southern part into the Tapi and Godawari. The annual surface water availability after accounting for flow to other states at 75% dependability is 8.15 million hectare meters (ham) with a developed irrigation potential of 2.06 million ham. Total ground water resources have been estimated at 5 million ham and about half of this is used for irrigation. Over the past two decades the growth in irrigation has mainly been through ground water sources while tank irrigation has declined. In 1998-99 2.4	holdings. The state has various soil types (alluvial, mixed, red and black) spread all over but the highly fertile deep black soils are limited to some areas of the Malwa Plateau and Nimar Plains. In 1998-99 the gross sown area in MP was 66.2%, forest land 27%, non agrarian land 6%, pasture land 5.5% culturable and unculturable wastelands 7.2% and the rest economically unutilizable lands and orchards and gardens.

Comment [mvk8]: Rakshat - Another calculation given in the MP report tried to show that 75% of the rural population was below poverty line

State	Demographics	Climate	Poverty	Economic Trends	Water Resources	Land Resources
Maharashtra	The population of Maharashtra as per the 2001 census 96.7 million with a density of 314/ Sq. km. The literacy rate was 77.3%, the rural urban ratio 58/42 and the sex ratio 922.	The state has a subtropical monsoon climate varying from humid to hot semi-arid, which covers 73% of the state. The rainfall varies between 150mm in the rain shadow areas to 4000/6000mm in the western side of the Westrn Ghats. The normal rainfall for the state is 1000mm distributed over 60-70 days. The temperature ranges from 46°C in the month of may to a low of 11°C in December. Humidity is 60-70% in the Konkan region, 40-60% in western Maharashtra, 20-30% in Marathwada and 25-40% in Vidarbha.	As per NSSO data, during July 1999 to June 2000 the poverty level in the state was 25.02% which has come down from 53.24% in 1973-74. In absolute terms, about 25 million people live below the poverty line out of which 14 million are in rural areas.	In 2000-2001 the primary sector accounted for 14.5% of the state income, the secondary sector 30% and the tertiary sector 55.5%. There is also no major difference between the work participation rates of urban and rural females with the figures being 34% and 33% respectively.	million hectares were being irrigated through ground water sources, 1.9 million hectares through canals, 0.13 million hectares through tanks and 1.9 million hectares through other sources.	The Maharashtra Water and Irrigation Commision estimates that in 1999 the combined surface and ground water potential of 12.6 million hectares with surface water contributing 8.5 million hectares. The level of ground water development is 30.39%. Also 50.45% of the rural areas have access to tap water as compared to 95% urban areas.

Comment [mvk9]: Rakshat – I am not too sure if this figure totals up to the total irrigated area of the state! The Source is Department of Agriculture, GOMP

State	Demographics	Climate	Poverty	Economic Trends	Water Resources	Land Resources
Rajasthan	As per the 2000-2001 census the population of Rajasthan was 56.5 million with a population density of 165/ Sq.km. The literacy rate was 61.03% and the sex ratio 922	The normal rainfall in Rajasthan is 573mm with the western and eastern parts, divided by the Aravalli range, having normal rainfall of 311mm and 704mm respectively. The temperature varies between a night low of 0°C in winter to a day high between 45-50°C in summer. Average wind velocity is 1-19km/hr but this increases during April-June. Rajasthan is prone to thunderstorms and dust storms during May to September. The state has been divided into 10 agro climatic zones.	As per Planning Commission/GOI estimates in 1993-94 20% (16.2 % rural and 33% urban) of the population was living below the poverty line	In 2001 the primary sector contributed 32.11% of the Net SDP, secondary 27.04% and the tertiary 40.85%. The corresponding workforce figures are – primary sector 68.23%, secondary 15.79% and tertiary 15.98%. The per capita income (at constant price, 1993-94) has increased from Rs. 7164 in 1994-95 to Rs. 8272 in 1999-2000. Growth in employment over the last decade has been negligible (0.8%). Interestingly 41% of rural females participate in work compared to only 9% of urban females.	Except for the regions in the Chambal basin, Rajasthan has internal drainage with no rivers flowing to the sea and is prone to acute water scarcity. In 1995-96 only 32.35 of the cultivated area was under irrigation. Open wells and tube wells contributed 66.9% and canals 28.6%. The total utilizable groundwater for irrigation in Rajasthan is estimated to be 11028 mcm out of which 6494 mcm is being exploited. Nearly 21% of the state's irrigation potential is concentrated in two districts, Ganganagar and Hanumangarh, which have extensive canal networks.	

Comment [mvk10]: Rakshat – We need to check this figure. Poverty should be around 23-26% and not 20%

Comment [mvk11]: Rakshat – Another figure in the same report gives 10028 mcm and ho do we compare mcm to hectare metere (i.e. how many meters in a hectare)