



1. Women and health: the overburdened ones

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B. Vulnerable groups

1. Women and health: The overburdened ones

1.1 The work burden: water and fuel

Way back in 1879, noted social reformer Helena Blavatsky had warned that unless the necessary steps were taken to restore the forests especially those in the hills and mountains tops in India, Indians will get ruined and ultimately extinct. She said, “While every patriot Hindu bewails the decadence of his country, few realise the real cause. It is neither in foreign rule, excessive taxation, or crude and exhaustive husbandry, so much as in the destruction of its forests. The stripping of the hills and drainage slopes of their vegetation is a positive crime against the nation, and will decimate the population effectively”. Referring to her trip North of India, she lamented, “It required no poets fantasy, but only the trained forecast of the statistician, to see in this treeless sun-parched waste the presage of doom”.¹

Indeed, the disappearance of forests in India is causing an untold suffering to large populations immediately dependent on the forests. Deforestation is changing the habitats of disease carrying insects and creating favourable breeding conditions for devastating diseases like malaria and river blindness. Scientists, however, are yet unable to understand the changes in the distribution of insects and the implications of this change (*Box: Parasites move in when forests are cleared*).

Box 1: Parasites move in when forests are cleared

Deforestation is changing the habitats of disease carrying insects and creating conditions favourable for the spread of devastating diseases such as malaria and river blindness. Most of the changes are due to logging, mining and migration, all of which result in the clearance of dense forest. Yet much of the change is going unrecognised because too few scientists have the skills to identify the insects involved. Failure to monitor the changing conditions is also resulting in costly control programmes and unforeseen outbreaks of the diseases.

Diseases present in the undisturbed forest may not constitute a threat as man may not be the prime host, or the vector may live in the higher strata of the forest so that it would normally meet a potential a human victim. But as soon as the preferred host animals disappear or as the ecology of the forest is altered, the disease may suddenly break out. For instance mosquitoes or sand-flies which used to feed on primates, rodents and other forest animals find fewer potential animal hosts and have a greater tendency to feed on human beings. Finally the concentration of settlers without adequate sanitation creates additional health problems, mainly the proliferation of intestinal parasites.

Epidemiologists have already shown that settlers, miners and migrants entering forest areas are at risk of contracting malaria. But less is known about the changes in the population of insects that spread the diseases. Scientists are beginning to identify changes in the distribution of mosquitoes and blackflies in Southeast Asia, West Africa



and the Amazon basin. But the analysis of the insects is complex and neglected. For example, only two laboratories worldwide – in Italy and South Africa – are skilled in identifying by examining the chromosomes the various mosquitoes that spread malaria in Africa.

River blindness or onchocerciasis afflicts some 17 million people mostly in Africa. It is caused by filarial worms which are spread by a blackfly *Simulium damnosum*. The worms that cause the worst disease and are most often linked with blindness are transmitted mostly by the blackfly found in the savanna regions. Now these savanna flies are spreading South into areas of cleared forest in Liberia, Ghana and Cote d'Ivoire. In addition people from the savannas of Mali and Northern Guinea are mining further south and could bring blinding strains of the worms with them. While in most of the region the incidence of river blindness has fallen due to WHO's control programmes, the situation is unpredictable according to experts from UK's Liverpool School of Tropical Medicine.

Malaria, which affects more than 267 million people worldwide, is caused by four species of the parasite genus *Plasmodium*. It is spread by a large variety of *Anopheles* mosquitoes, all of which have different habitats, different ranges, different susceptibility to infection with the parasite and different capacities to infect people. Yet the study of these insects is seriously neglected.

Malaria increased dramatically through the 1980's in Brazil because of people moving into forest regions. Along the Transamazon Highway in Brazil, up to a quarter of the population develops malaria each year. Much of this increase is because of the influx of people who lack immunity to the parasites and are then exposed to the most dangerous of the *Plasmodium* parasites, *P.falciparum*. The situation is likely to deteriorate further because of conditions that favour *Anopheles darlingi*, a mosquito that spreads the parasites efficiently. This species breeds in pools of water created by new settlements and road construction, in open cast mines and on eroded land after trees have been cleared. It is rarely found in thick forest but prefers the areas around homes. It also flies much farther than other anopheline species in the area. Deforestation "has greatly favoured" a population explosion for this species, says Molyneux.

In Thailand malaria is spread mainly by *Anopheles dirus* and *Anopheles minimus*. The more dangerous *A. dirus* likes dense forest. *A. minimus* prefers more open land and was nearly eliminated by the spraying of homes with pesticide in the 1960's and 1970's. But the disease is increasing sharply in parts of Thailand. Much of the increase is due to the spread of drug-resistant strains of malaria parasites, but some scientists argue that plantations for coffee and rubber have worsened the situation by providing a new habitat for *A. minimus*.

In Indonesia, migrants from Java are being encouraged to settle in forested areas of Borneo where malaria is endemic. Although houses are built in clearings some 500 metres from the forest, the mosquitoes that spread the disease can fly as far as 3 kilometres. During the 1980's the prevalence of malaria increased sharply in this population.²

Deforestation is also taking a heavy toll on the health of rural women in India. In the mountainous and desert regions where dependence on forests for fuelwood and



fodder is the highest, increasing loss of forest cover means women spend longer hours gathering fuelwood and fodder, going further and further away from home and coming back with heavier loads. The loss of forest cover also means drying up of water resources, leading to longer hours spent collecting less water (*Box: Headloading of water*). This enormous work burden is resulting in reproductive problems like abortions and miscarriages, shorter life span, mental illness, anemia and muscular problems. Groups working on women's issues have neglected the health implications of workload. Even the government's developmental programmes have ignored the need to target women with programmes of assistance to alleviate problems of fodder and fuelwood shortages, on the contrary, their policies of reservation and increasing governmental control of forests have adversely affected them by depriving them of their meagre subsistence.

Box2: Headloading of Water

Deforestation reduces the availability of water. In the hydrological cycle, forests play an important role in the transpiration process, that is, of converting water into vapour which again comes back in the form of rain. The lack of forests reduces the recharge of water back

A study conducted in Sualbaadi a village near Almora, Uttar Pradesh showed that the women walk 10 to 14 km everyday to get water. Worse, as the jungles were being cut, women have to traverse more rugged terrain. The result: An increase in deaths by falling and of skull and backbone injuries. A medical examination of 200 women between 18 and 42 years from different castes and communities from Hawalbagh block showed that 80 per cent of women were suffering from anaemia, backache and malnutrition - disorders connected with household drudgery.³

Water resources and transport facilities are detrimentally insufficient in the Banaskantha, district located in the North of Gujarat and is bordered to the west by the Rann of Kutch and by the Thar Desert to the north. It is an arid land locked region with 1375 villages and 5 towns. Banaskantha derives its name from the Bans river which originates in the Aravalli Mountain Range to the north. While the Banas River is dry and fails to provide water for most of the year, it floods the villages bordering the deserts during the monsoon season.

According to 1998 study conducted by the Self Employed Women's Association (SEWA) in Banaskantha, women have to walk anywhere from one to four kilometers to collect one beda (10-15 litres) of water. In one village, where the pipeline has failed to provide water, the villagers are entirely dependent on the government tanker for their water needs. If the tanker fails to arrive, the women walks 7 miles to another village to fetch water. Depending on the number of family members and how many of those are responsible for collecting water, women make anywhere from two to seven trips to the water source every day.

In villages that are dependent on the governmental tanker for their water requirements, the women wait for the tanker to arrive before they can tend to any other tasks. They do not tend to any household or income generating activity for fear of missing the tanker and thus their daily supply of water. In one instance, a woman was left waiting until 5:00 pm before the tanker arrived, thus sacrificing the whole day's work and income. In most of the villages in the Junagadh district of Gujarat, the Gujarat Water Supply and Sewerage Board provides water to the village. But not in the



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summer as the source dries out completely. The quantum of water in the handpumps reduces to hardly 20 per cent. "I was nearly exhausted as it took nearly 20 minutes to fill a can of 2 liters", laments Shailja Kishor, programme officer, Aga Khan Foundation who visited Junagadh to collect some samples of water.

The consequences of head loading are significant. Head loading, especially in the severe heat causes chronic backache, foot pains and fatigue. It is also injurious to the head as it can cause numbing of the brain, One woman in the village commented that if she didn't have to head load water, she might be able to think as clearly and effectively as the SEWA organisers. In Banaskantha, young girls often accompany their mother in order to help them carry water as a result of which they do not attend school. Further, they suffer from chronic nutritional deficits. Head loading also places limits on the amount of water available and therefore its use is restricted to the most essential. Bathing is not given much priority as villagers go up to a week or more without bathing. The lack of sanitation, in turn, has detrimental effects on the health of villagers. ⁴

Box End Source: Self Employed Women's Association, SEWA Report

Fuelwood-forest interaction

According to data provided by the Forest Survey of India, the total requirement of fuelwood in 1996 is estimated to be 152 million tonnes for only the rural areas of the country. In the forested rural areas of the country, the annual household consumption of fuelwood is around 78 million tonnes for a population of 184 million, whereas, it is 74 million tonnes for 513 million which lives in the nonforested rural areas. In contrast 17 million tonnes of fuelwood is available from the forests of India every year which assumes that the percentage production of fuelwood from various types of species/forests is 30 per cent on average.⁵ On this basis, it is clear that the demand for fuelwood is about 9 times or in other words much higher than the amount of fuelwood available from the forests of India.

Table 1. Source-wise energy consumption in the household sector for rural areas

Type of energy	% share of energy form	% share of source of supply of each energy form		
		Purchased	Collected	Home grown
Electricity	0.6	100.0	0.0	0.0
Oil products	16.9	100.0	0.0	0.0
Coal products	2.3	65.1	34.9	0.0
Firewood	68.5	12.7	64.2	23.1
Animal dung	8.3	5.1	26.2	68.7
Others	3.4	8.9	61.0	30.1

Source: Ravinder Kaur, Women in Forestry in India, 1991.p24

A closer look at the distribution of per capita demand of fuelwood reveals that this demand is as much as four times higher in the forested rural areas compared to the nonforested rural areas implying a greater dependence of forests in the former region.



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Within the forested rural region, the average per capita annual consumption ranks the highest among hilly and mountainous states such as the northeastern states, Jammu and Kashmir, and the hilly tracts of Himachal Pradesh and Uttar Pradesh (see Table 1). Indeed, in the hills and mountains, where agriculture is not prosperous, people depend more on firewood for their household work. In comparison, the average per capita consumption in other states such as Andhra Pradesh, Madhya Pradesh, Maharashtra, Karnataka and Tamil Nadu, Bihar, West Bengal and Orissa is relatively lower than that in the hilly states. However, larger numbers of people are dependent on forests here which makes the annual consumption of fuelwood very high in these states. ⁶

Table 2. Annual household fuelwood consumption in forested rural areas of India

Name of State	Average per capita annual consumption (kg)	Projected Population dependent on forest (million)			Total Annual Consumption		
		1996	2001	2006	1996	2001	2006
Andhra Pradesh	190	33.2	36.9	40.9	6.3	7.0	7.8
Arunachal Pradesh	423	0.8	0.9	1.0	0.3	0.4	0.4
Assam	338	7.0	7.8	8.6	2.4	2.6	2.9
Bihar	369	13.3	14.7	16.3	4.9	5.4	6.0
Himachal Pradesh							
i) Hill	689	2.6	2.9	3.2	1.8	2.0	2.2
ii) Plain	550	0.6	0.7	0.8	0.3	0.4	0.4
Jammu & Kashmir	949	6.5	7.2	8.0	6.2	6.8	7.6
Karnataka	406	9.3	10.3	11.4	3.8	4.2	4.6
Madhya Pradesh	576	30.4	33.7	37.4	17.5	19.4	21.5
Maharashtra	318	11.6	12.8	14.2	3.7	4.1	4.5
Manipur	1320	1.5	1.6	1.8	2.0	2.1	2.4
Meghalaya	712	1.6	1.8	2.0	1.1	1.3	1.4
Mizoram	1159	0.4	0.5	0.6	0.5	0.6	0.7
Nagaland	1299	1.1	1.2	1.4	1.4	1.6	1.8
Rajasthan	391	4.1	4.6	5.1	1.6	1.8	2.0
Sikkim	1182	0.4	0.4	0.4	0.5	0.5	0.5



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Tripura	814	2.6	2.9	3.2	2.1		2.6
Uttar Pradesh							
i) Hill	652	1.8	2.0	2.2	1.2	1.3	1.4
ii) Terai	514	2.2	2.5	2.8	1.1	1.3	1.4
iii) Plain	592	2.5	4.6	5.1	2.4	2.7	3.0
West Bengal	653	8.6	9.5	10.6	5.6	6.2	6.9
D & N Haveli	312	0.1	0.1	0.2	0.1	0.1	0.1
Gujarat	146	4.4	4.9	5.4	0.6	0.7	0.8
Haryana	51	1.3	1.4	1.5	0.1	0.1	0.1
Kerala	150	9.7	10.8	11.9	1.5	1.6	1.8
Orissa	523	14.6	16.2	17.9	7.6	8.5	9.4
Punjab	91	0.9	1.1	1.2	0.1	0.1	0.1
Tamil Nadu	172	8.3	9.3	10.3	1.4	1.6	1.8
UT's	91	0.7	0.8	0.9	0.1	0.1	0.1
	(Av.539 kg)	184	204	226	78	87	96
T o t a l							

Source: Anon 1996, Fuelwood, Timber and Fodder Firms Forest of India, Forest Survey of India, Dehradun, p 8.

But the need to protect the tree and forest cover should not driven just by the annual consumption of fuelwood rather it is greater in those regions where the dependence of firewood is highest and where material such as cowdung and crop residues are not available as alternatives to fuelwood and fodder. It is therefore most important to protect the tree and forest cover in the desert and hilly mountainous states. According to a National Council of Applied Economic Research (NCAER) study, more than 80 percent of rural households in hilly and desert states use firewood. In states such as Andhra Pradesh, Maharashtra and Tamil Nadu, annual consumption of firewood is lower than that in Bihar, West Bengal and Orissa, however a far greater number of households depend on firewood in the former states. Whereas, in the plains (Bihar, Orissa and West Bengal), where agricultural production is good, the share of firewood in household consumption is one-third, the remaining being about equally shared by cowdung and crop residues. With agriculture being good, people either have stalks to burn or they have considerable amount of crop residues which they can feed to cattle, which in turn increases cowdung availability. Thus people are not so dependent on it in agricultural prosperous areas (see Table 2).⁷

Table 3. Firewood usage in rural India

States	Percentage of households using firewood
Tripura, Nagaland, Kerala, Arunachal Pradesh, Meghalaya, Manipur, Andhra	90-100



Pradesh, Himachal Pradesh, Tamil Nadu, Karnataka, Mizoram	
Madhya Pradesh, Rajasthan, Sikkim	80-90
Orrisa, Gujarat, Maharashtra, Goa	70-80
Haryana	60-70
Uttar Pradesh	50-60
Bihar, Punjab, West Bengal	40-50

Source: Anil Aggarwal et al (ed.) 1999, Energy in *State of India's Environment*, The Citizen's Fifth Report, Centre for Science and Environment, New Delhi, Part I, p 310.

Given that there is a greater need for fuelwood in certain parts of the country, it is troubling to see that forests are disappearing faster in the states where it is needed the most for sustenance. According to the State of the Forest Report, 1997, total forest cover reduced from 63.96 mha to 63.34 mha from 1991-93 to 1993-95.⁸ The loss of forest cover, in turn, reduces the availability of firewood, and affects the work burden and health of women.

The existing forest cover in the hill areas of the country is only 36.8 per cent, which is far below the intended goal of the forest policy.⁹ According to data from the State of the Forest Reports, the forest area in most of the northeastern states such as Arunachal Pradesh, Manipur, Mizoram, Meghalaya has remained the same or gone down marginally from 1991-93 to 1993-95.¹⁰(7, p 113) But what is alarming is that more than 55-70 per cent of forest cover is open forests and shrubs in these states.¹¹ Open forests, as compared to the dense forests, have a low percentage of tree cover within the range of 10 to 40 per cent and are therefore considered to be degraded forests.

Andhra Pradesh, Maharashtra, Madhya Pradesh and Tamil Nadu, where large number of households depend on fuelwood and where there is also a significant portion of hill cover, have seen heavy deforestation in 1993-95. Dense forest cover in these states has been consistently declining since the early 1970s.¹² Forest conservation efforts in these states have been the worst. In these states open or degraded forests cover a greater portion of dense forests (see Table 3). This trend can be observed even in plain states such as Punjab and Bihar, however, in these states the situation is not as so alarming, more so, because the dependence on forests for fuelwood is comparatively lower.

Why is this degradation taking place? Many blame women saying that forests have been preserved in areas where women are not allowed to encroach the forests for firewood. But women interact most closely with the forests, and their use of its resources has always been need-based, minimal and therefore sustainable. "The rapacity of timber contractors, some of whom are sent by the government, smugglers and ill-conceived government policies has taken away people's ownership of forests", argues Jashodhara Dasgupta of Sahayog, a research and activism group in Almora, Uttar Pradesh. Few disagree that flawed government policies on forest resources have resulted in excess deforestation. Illegal timber felling, rise of commercial plantations such as teak and eucalyptus that are not fuelwood friendly, clearing forests for large development projects are some of the predominant reasons that have led to the loss of forest cover in India.

Table 4. Status of forest cover in Indian states



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States	Dense cover (%)	Open forests and shrubs (%)
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90 – 100 per cent households use firewood		
Mizoram	20.62	72.8
Nagaland	21.03	65.1
Manipur	22.11	59.9
Meghalaya	18.03	55.5
Tripura	17.35	36.9
Arunachal Pradesh	64.67	17.7
Assam	19.8	11.4
Andhra Pradesh	8.4	11.3
Himachal Pradesh	17.2	8.6
Tamil Nadu	6.6	8.6
Kerala	21.8	6.3
Karnataka	61.23	6.3
Jammu & Kashmir	4.95	5.6
80 - 90 per cent households use firewood		
Sikkim	34.14	16.1
Madhya Pradesh	18.7	11.7
Rajasthan	1.08	4.8
70 - 80 per cent households use firewood		
Orissa	16.76	16.75
Maharashtra	7.7	9.7
Goa	26.9	7.2
Gujarat	3.2	4.1
60 - 70 per cent households use firewood		
Haryana	0.08	0.09
50 - 60 per cent households use firewood		
Uttar Pradesh	7.8	4.1
50 - 60 per cent households use firewood		
Bihar	7.6	8.7
Punjab	1.0	1.96
West Bengal	43.1	1.5

Source: Anon 1997, District-wise Forest Cover, *State of Forests Report*, Forest Survey of India, p 40-54.

1.2 The impact on health

A central question to ask is that if deforestation is occurring in states where the demand for fuelwood is high, and is resulting in an increase in the work burden of women then what is this change doing to their health. Unfortunately, “no serious study has been undertaken in India on the health implications of women’s work burden”, point out environmentalists. Whatever studies exist, are “fragmented, isolated and the sociology of health and environment is not taken into account”, corroborates Dr. Saliil Basu, Health Anthropologist and former director of the National Institute of Health and Family Welfare at the National Conference on Health and Environment organised by the Centre for Science and Environment in New Delhi in July 1998. Concentrated efforts need to be carried out, he says, to understand the ecology of arid, drought and desert regions, the



coping mechanisms undertaken by the inhabitants and the effect of ecological degradation on the health of the people”.

Box 3: Sheer Drudgery (sources for this – SOE 1984-85, Salil Basu paper)

The extent of work burden of women in various parts of rural India is well documented. In a study on Garo tribe of Meghalaya, the ratio of male to female investment in labour in shifting cultivation was calculated to be 100:136 days per year. A study on the Kondhs in Orissa revealed that women put in an average of 14 hours per day as compared to 9 hours put by men and still not given due recognition. “Even women in advanced stages of pregnancy, were required to work in the agricultural fields or walk great distances to collect fuel and minor forest produce”, notes health anthropologist Dr Salil Basu. A study among the Pauri Bhuniyas of Orissa showed that 52 women as against 17 men in a sample of 268 persons suffered from diseases related to malnutrition. As a result of deforestation, additional workload and less fertile soil, the availability of food for the tribal family was reduced.¹³

In some Karnataka villages, 46 per cent of all human hours are spent in agriculture, industry and domestic work are contributed by women. While men and children contribute 37 per cent and 17 per cent, respectively. In Pura, Karnataka women make 172 trips in a year to gather 1.74 tonnes of firewood every year, each household spends on an average of 2.51 hours daily and each trip is about 8.54 km. A study of plains of western Uttar Pradesh, shows that even pregnant women there spend 14 to 16 hours working day. In a study of Dwing village in Chamoli district, Uttar Pradesh, one or more members of each household daily walk 5 km steep uphill and spend six to ten hours on the job. The average daily time spent by each household is 7.2 hours and an old widow often takes up to 10 hours. In 75 per cent of the households, only women go out to collect wood. generally, three trips are made every four days though many women go daily. In the Roli village in Sabarkantha district, Gujarat women spent four to six hours collecting fuelwood out of a total working day of 14 to 15 hours.¹⁴

Women thus form the largest work force in rural India at home and outside. Overall, out of the total population of 311.1 million women, nearly 256 million are from rural India, of them about 39.6 million are main workers and 17.7 million are marginal workers. Of the main workers, 85 per cent are in agriculture and of them 90 per cent are agricultural labourers. There are about 69 million labourers in India whose dependence on natural resources is vital.¹⁵

The impact of deforestation has been mainly in terms of firewood and water scarcity and consequent increase in women’s drudgery. In rural areas, firewood is largely (68.5%) consumed of all the energy forms. Of this (12.7%) is purchased, (64.2%) is collected and (23%) is home grown.¹⁶

The availability of firewood and water is another crucial determinant of the quantum of work for women (See box: less available, more work).

Table 5. Time spent by women on household activities in different parts of India (hrs/day)

State	Household activity (hours per day)				
	Fetching	Fuelwood	Fetching	Grazin	Making dung



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	water	collection	water & fuelwood gathering	g animals	cakes
Eastern U.P.	1.0-3.9	-	-	-	-
Western U.P. (pregnant women)	0.8-3.0	-	-	0-3.0	0-0.5
Karnataka	1.0-1.4	0.4-2.6	-	0.5-1.0	-
Himalaya	-	4.0-7.2	-	-	-
Gujarat-Rajasthan border	-	-	6.0-9.0	-	-
U.P. Hills depleted	-	4.0-5.0	-	-	-
Gujarat depleted plain	-	4.5	-	-	-
Maharashtra (hilly forest area)	-	4.13	-	-	-

Source : Citizen's Report - State of India's Environment , 1982 Swaminathan 1984, Agarwal 1985a, Dasgupta & Maiti 1986, Reddy & Batliwala, Nagbrahman & Sambrain 1986

At the macro-level, the National Family Health Survey (NFHS) conducted by the Ministry of Health and Family Welfare in 1992-93 provides data that is indicative of the problem. If the percentage of pregnancies ending up in spontaneous abortions or stillbirth is a reasonable indicator of health implications of work burden, majority of the states that depend the most on firewood have very high rates of spontaneous abortions and stillbirths. According to NHFS data, in most of the states where 90 per cent of the households depend on firewood, 1 to 2 out of 20 pregnancies does not result in a live birth. This proportion is even higher for women in their early reproductive period, 15-19 years, across states such as Tamil Nadu, Assam, Jammu & Kashmir and Himachal Pradesh. In Tamil Nadu, for example, almost 25 per cent of pregnancies in this age group end up as failures, that is, 1 out of 4 pregnancies does not result in live birth. In states like Punjab, West Bengal and Bihar, the proportion of pregnancies ending in live birth is comparatively higher.

Box 4: Mercury pollution caused by deforestation



Deforestation can lead to chemical pollution in the air and water which, in turn, can affect aquatic systems and the health of the people. Experts have raised an alarm over such a phenomenon in the Amazon basin in South America where a high rate of deforestation is leading to high mercury levels in the environment.

High levels of mercury have been found in the blood of fish-eating people in the Amazon, where emissions from gold mining activities has been traditionally identified as the cause. But now, heavy deforestation in the region by fires is being recognised as contributing to this environmental problem. This is because high mercury levels have been observed in fish from areas well away from the mining activity and it has been measured in the blood of residents living hundreds of kilometers away from the mining operations. Further the presence of mercury in timber and the nature of its volatility at temperatures that resemble forest fires allows high levels to be released from combusted wood into the atmosphere upon burning. Some 90 tonnes of organic mercury from the biomass are estimated to be emitted annually to the atmosphere in the Amazon and precipitated in the aquated systems which rapidly gets converted to methylated forms which are highly toxic. This actually may be a conservative assessment and may be more than six times this rate.

Deforestation in the Amazon is between 35,000 and 50,000 square kilometers per year, producing mostly cattle pastures. These figures are for 1987 and 1988, respectively, and the estimates may be higher now. It is estimated that 17.6 gm/hectare of mercury is emitted into the atmosphere every year. Considering that 50,000 was burnt in 1988, 88 tonnes of mercury was emitted into the atmosphere that year (26% above the estimate for mining emissions). The total area consumed up to 1991 is estimated at 404,000 square kilometer. So more than 710 tonnes of mercury have been released from this source. These calculations are based on conservative estimates for the amount of mercury present in wood.

Mercury has an affinity for organic substances in soil. Mercury levels in raw humus can range from 0.2 ppm to 1.9 ppm. A Canadian study found relatively high levels of mercury in soil that was not near a source of mercury contamination confirming that organic substances have the capacity to take up mercury from any source and further channel it into the food chain. During forest fires, temperatures of the order of 650 to 1100 C are attained. Mercury compounds are highly volatile even at lower temperatures when they are in an organic form. This allows almost 90 per cent of mercury to get lost when biomass is burnt, as mercury in wood is present in organic form.

Traditionally, mercury emissions from informal mining operations have been identified as a potential epidemic in the Amazon region. These operations expanded in the 1980s in Brazil as a consequence of poorly conducted agricultural policies, increased inflation and high unemployment. Mercury is used to amalgamate gold and high losses of mercury take place when the amalgam is distilled in open pans. About 80 per cent of the losses are emitted directly into the atmosphere while the remaining is discharge with amalgamation tailings to watercourses.

In India, little is known about the distribution of mercury in the flora and fauna including forest wood. Further, no estimations have been made on contributions of forest wood combustion to mercury pollution in the environment.¹⁷



Table 6. Percentage of total pregnancies ending up in spontaneous abortions and stillbirths in Indian states among rural women, 1992-93

States	Spontaneous abortions	Stillbirths	Total
90 - 100 per cent households use firewood			
Mizoram	3.5	3.7	7.2
Nagaland	1.1	2.3	3.4
Manipur	5.0	1.6	6.6
Meghalaya	2.4	1.6	4.0
Tripura	4.4	2.9	7.3
Arunachal Pradesh	3.7	2.5	6.2
Assam	4.7	2.9	7.6
Andhra Pradesh	3.6	3.2	6.8
Himachal Pradesh	6.0	2.7	8.7
Tamil Nadu	6.6	2.8	9.4
Kerala	6.1	1.8	7.9
Karnataka	4.6	2.0	6.6
Jammu & Kashmir	5.3	2.5	7.8
80 - 90 per cent households use firewood			
Sikkim			
Madhya Pradesh	2.8	1.7	4.5
Rajasthan	3.1	2.7	5.8
70 - 80 per cent households use firewood			
Orissa	3.6	2.7	6.3
Maharashtra	3.6	2.0	5.6
Goa	6.6	2.0	8.6
Gujarat	4.4	1.2	5.6
60 - 70 per cent households use firewood			
Haryana	6.0	2.7	8.7
50 - 60 per cent households use firewood			
Uttar Pradesh	4.8	2.2	7.0
40 - 50 per cent households use firewood			
Bihar	3.8	2.5	6.3
Punjab	3.1	3.4	6.5
West Bengal	3.3	2.5	5.8

Source : Anon, 1992-93, National Family Health Survey, International Institute for Population Sciences, Bombay



B. VULNERABLE GROUPS

1. WOMEN AND HEALTH: THE OVERBURDENED ONES

Table 7. Age proportion of total pregnancies ending up in spontaneous abortions and stillbirths in Indian states among rural women, 1992-93

States	Col 2	15-19 years	25-29 years	35-39 years	45-49 years
90 – 100 per cent households use firewood					
Mizoram	11	13.5	7.5	6.6	6.2
Nagaland	2	0.05	4.0	2.6	4.9
Manipur	6	6.7	5.1	6.4	8.7
Meghalaya	5	0.05	4.7	4.6	3.7
Tripura	1	7.6	8.5	7.5	5.6
Arunachal Pradesh	4	8.9	3.8	6.3	10.2
Assam	0	13.3	8.0	7.2	5.5
Andhra Pradesh	7	8.9	5.5	6.4	5.8
Himachal Pradesh	8	16.4	10.2	7.2	8.7
Tamil Nadu	9	24.5	10.9	9.1	6.6
Kerala	3	15.9	8.4	7.0	6.6
Karnataka	10	9.6	7.2	6.0	5.4
Jammu & Kashmir	12	15.1	9.9	7.9	6.0
80 - 90 per cent households use firewood					
Sikkim	14	-	-	-	-
Madhya Pradesh	12	5.5	4.5	4.0	3.3
Rajasthan	13	10.6	7.0	5.4	4.2
70 - 80 per cent households use firewood					
Orissa	15	4.7	7.6	6.2	5.0
Maharashtra	17	5.0	5.3	4.9	5.8
Goa	18	7.8	9.7	8.5	8.6
Gujarat	16	8.3	4.8	3.6	3.4
60 - 70 per cent households use firewood					
Haryana	19	12.2	8.8	8.4	6.4
50 - 60 per cent households use firewood					
Uttar Pradesh	20	7.4	7.4	6.7	7.4
40 - 50 per cent households use firewood					
Bihar	21	9.6	7.0	6.1	6.5
Punjab	22	15.5	7.3	6.5	4.1
West Bengal	23	11.4	5.4	5.3	4.2

Source: Anon, 1992-93, National Family Health Survey, International Institute for Population Sciences, Bombay



B. VULNERABLE GROUPS

1. WOMEN AND HEALTH: THE OVERBURDENED ONES

The NHFS data is only indicative. Obviously, there is an urgent need for good data collection to assess the extent to which work burden is a causative factor in such problems. Disturbed by the lack of data which can point to linkages between work burden and health effects, also hoping that the government machinery will one day get its act together and start thinking about this issue, Centre for Science and Environment sent its researchers to rural villages in desert and hilly states such as Rajasthan, Assam, Nagaland, Tamil Nadu and Uttar Pradesh to assess the magnitude of the problem. Rajasthan, where the lack of water and wood likely imposes heavy work burden on women was chosen to provide the picture in the arid and semi-arid areas. Uttar Pradesh, Assam, Nagaland and Tamil Nadu were selected to represent hilly regions of various parts of India where heavy forest degradation is likely aggravating the problem of work burden. A picture that emerges depicts a bleak future for women and almost no future for coming generations.

Table 8. Plight of a Pregnant Women (A day in the life of an eight month pregnant woman in rural India, in hours)

Sleeping	5.0
Grinding grain	4.0
Childcare	2.3
Animal husbandary	3.0
Other household work (washing, cleaning, dusting, etc.)	2.3
Fetching water	1.3
Food preparation & serving	3.0
Handicrafts	2.0
Others	1.1

Source: World Bank

Box 5: Less available, more work

In the Kumaon and Garwhal districts of Uttar Pradesh (UP) and Mandi and Solan districts of Himachal Pradesh (HP), life depends precariously on agriculture which is rendered unproductive due to high altitude, harsh terrain and severe winters. In the districts of Himachal Pradesh the consumption of firewood is high, whereas in UP its consumption is less. But despite the difference, the average time spend in collecting it does not vary significantly between the two states, as it is more easily available in Himachal Pradesh.

In contrast, water is not easily available in Himachal Pradesh. About a third of the women in Mandi and a fifth in Solan make more than 12 trips per day, while for those for UP, the number of trips is considerably less. The source of water is less than 1 km away from the households in almost all the villages of UP, whereas in Solan the water source is generally far, over 20 per cent of the people travel more than 2 km for it. As a result a much greater proportion of women in HP spend more than 3 hours a day to collect water, whereas the proportion is much lower in UP.¹⁸



Table 11. Index of firewood availability		
	Mandi and Solan, H. P.	Almora and Pauri, U. P.
Average firewood consumption per household	550 kg	322 kg
Average collection time per household	3.7 work-hours	3.9 work-hours
Average firewood collection per work-hour spent	149 kg	83 kg
Source: Anon **, <i>DST Project S & T for Women</i> , Development Alternatives, New Delhi, p 14.		

1.3 **A case study in Uttaranchal**

The Himalayan region of Uttaranchal covering 12 districts points to an alarmingly high rate of spontaneous abortions and even shorter lifespan. Added to this are frequent cases of women being possessed by spirits, attempting suicide or running away from homes. The diminishing forest cover and associated work burden of women is much to blame. The region ranges in altitude from 200 meters to almost 800 meters which occurs within distances of 150-200 km. This causes fairly rugged terrain with the exception of some wide river valleys. The climate has a monsoon rainfall pattern, which ranges from over 1000 mm to 3000 mm and more in some areas. Rapid variations in elevation have given rise to a richly varied flora and the vegetation is mostly the mixed temperate Oak Forest. However the forest cover which should be 66 per cent for this region is diminishing at an alarming rate.¹⁹

At 28, Ghanti looks about 50. Her peaches and cream Kumaoni complexion started fading soon after the birth of her first child at 18. Today forced to scrounge for fodder, water and fuel in the mountains besides looking after a family of four children and an alcoholic husband, Ghanti is drained of any zest she had for life.²⁰

Ghanti's is not an isolated case. Most women in the interiors of Kumaon have to have to collect food, fodder and water from the mountainous terrain and forests. For them, a 20-hour workday is common. Apart from household chores like cooking, cleaning, caring for the children and elderly, women are responsible for plethora of tasks like collection of fuel wood and water, making hemp from rope, conserving foodgrains for the next season, carrying the wheat to the water-driven panchakkis (water mills) for wheat flour etc. Women carrying loads of wood and fodder on their heads weighing up to 15 kg, and resting on the roadside is a common sight.²¹ The migration of men to urban areas is another important factor that has further increased their workload. A study of three villages of Kumaon region of Uttar Pradesh shows that due to male migration, which on an average is 0.9 persons per household and 2.33 persons in households with five persons each, women work load has increased tremendously and they now have to put in extraordinary amount of time in the fields in addition to fetching fuel and fodder.²²



B. VULNERABLE GROUPS

1. WOMEN AND HEALTH: THE OVERBURDENED ONES

Another study in the Syuta village nestled in a small watershed of Alaknanda river in Chamoli district showed that women die as early as at the age of 35 mainly due excessive work load and fatal fall while collecting and carrying fuel and fodder in the difficult hilly terrain. A study revealed that only three women of the village reached the age of 55 whereas majority of men’s lifespan was above 55. Women put in 59%, children 26% and men 15% of the total human hours at work. Children put in double the work hours of men, and women work nearly four times more than men. ²³

Comparative work division of men and women (%)

Work division	Men	Women
Animal Husbandry	32	68
Fuel & fodder	22	78
Fetching water	23	77

Source: Anon 1997, *Health Companion*, A Quarterly Newsletter on Women’s Health, Issue IIIrd, May.

Box 6: Little Women

Not much eastward of Uttar Pradesh in Nepal, where fuelwood accounts for 97.6 per cent of the total biomass energy consumption the rest coming from crop and animal wastes, rural women are so busy with their daily chores that they are forced to give local beer to children so as to keep them quiet while they get on with their domestic work. Fuel-related work of women has one major effect in the incidence of chronic lung disease and resultant heart damage. But it has yet a little known effect. In rural Nepal it is found to be related with armspan. This may be because Nepalese women in hilly villages carry firewood in a big bamboo basket carried on the back, held by a rope around the forehead. Probably the excessive weight lifting on the back causes the flattening of the intervertebral column.

Another study conducted among Tamang women has shown a high incidence of uterine prolapse. These women start working from third day of delivery onwards because of their tradition, culture and male domination. One of their main task is to collect and carry heavy woodload which may be resulting in early post-partum period and thus responsible for the high incidence of prolapse²⁴

In Asia, acquisition and use of biomass fuel may take up anywhere between three and nine hours of a woman’s day, depending on the availability of biomass resources. In Lombok, Indonesia, women spend about three hours each day cooking and four hours each week collecting dead wood or agricultural residues to be used as fuel. In areas of Kenya, women spends seven hours a day on the same tasks. Needless to say, as biomass resources become more scarce, women’s workload increases. More time and energy must spent in fuel collection, processing and use. Besides the time and energy spent, this daily dependence on and use of biomass has a number of negative health effects.

Unfortunately, precise correlation between the use of biomass fuels and health consequences has rarely been pinpointed. This is due to large numbers of confounding factors and modest resources available for such research. ²⁵



B. VULNERABLE GROUPS

1. WOMEN AND HEALTH: THE OVERBURDENED ONES

The major source of fuelwood in Nepal is the countries forest which is deteriorating at a very alarming rate due to the overwhelming energy demand of households and many agro-based industries are also heavily dependent upon wood. It has been estimated that had about 6.7 million hectares of forests and shrub land coverage in 1964, which has declined to 5.9 million hectares in 1993-94, or 36.8 per cent of its land surface. Forest land is depleting at an annual rate of 2.4 as a result of over exploitation, illegal encroachment, resettlement and expansion of agricultural land. Again, these forest resources are homogeneously distributed, as districts situated in the middle mountain region have enough resources in comparison to the Terai districts and the Siwaliks area. On average, rural women are compelled to collect fuelwood from existing forests situated at a horizontal distance of more than 6 km from the farms. Like India, development programmes in forestry in Nepal have led to the closure of grazing grounds and forests which has produced additional hardship rather than relief for the women. ²⁶

In 1996-97, a comprehensive study was carried out by Jashodhara Dasgupta of Sahayog, a research and activism group in Almora district, found the proportion of spontaneous abortions to be 30 per cent, 5 times higher than the average rate reported from the National Family Health Survey of 1992-93. The study involved over 1,000 women in ten locations across 12 districts. ²⁷

From 1972 to 1992, forest cover in the region went down from 29 per cent to 24 per cent. Forests are being reclaimed into agricultural land, cut for road making and damaged by excessive resin tapping and forest fires. “The rapacity of timber contractors, some of whom are sent by the government, smugglers and ill-conceived government policies has taken away people’s ownership of forests” notes Dasgupta. Women interact most closely with the forest, but their use of forest resources has always been need-based, minimal and therefore sustainable, she adds pointing to the decreased access of women to forests. Adds Ratna Devi of Village Tola, “our jungles have been destroyed by timber maffia, we never stopped them, we thought they belonged to the government”.

Table 9. Forest cover in 12 districts of Uttar Pradesh

Category of land	Per cent of total area of Uttarakhand in 1972	Per cent of total area of Uttarakhand in 1992
Poor forest	9.3%	9.8 %
Medium forest	15.1%	10.9%
Good forest	4.4%	4.1%
Total	28.8%	23.8%

Source: Jashodhara Dasgupta, 1998, Paper presented at the National Conference on Health and Environment organised by the Centre for Science and Environment in July.

“Women work up to the last day of pregnancy and return to work within a month. Load lifting stresses the internal organs to such an extent that the uterus collapses downward, sometimes coughing, sneezing and squatting brings it out”, said Jashodhara



Dasgupta. The Sahayog study noted that just after childbirth women get back to their grueling schedule lifting heavy loads of wood, manure and grass. It is then not surprising that these women suffer from such a high abortion rate. Some 17 per cent of the women studied by Dasgupta had some form of uterus descent.

“Men are kings, whereas we are just passing our time. When will the day come when all our work will get over. We will travel in the bus”, adds Ratna Devi. “It’s just that our parents didn’t kill us on our birth, they just brought-us up like cattle and married us off at a tender age of 10-11 years”, she said. Some 47 per cent of the women in the age-group of 15-45 years were found to suffer from joint problems like pain in knees and backache whereas 65 per cent suffer from painful heels as they are continuously walking on steep, uneven hilly terrain heavy loads of wood on their back. 34 per cent of the women were chronically anemic and about 67 per cent had low levels of hemoglobin. “Women come for treatment for white discharge, backache, common disease, weakness, uterus prolapse, irregular bleeding (heavy, twice a month) and skipped menses”, confirmed Sujata of the Health Care Centre at Panuanaula village.

Table10. Health problems and work burden (hill region)

Type of health problem	Reasons for occurrence
Bodyache, pain in claves,joints,shoulders, bent backs, backache etc	Due to constant posture of bending,carrying heavy loads on backs and walking in uneven difficult terrain
Breathing problems- Cough, lung congestion, tuberculosis, respiratory diseases	Cooking of food in poorly ventilated kitchens, heavy workload, poor diet, aneamia, weakness, difficult terrain
Digestive disorders- Gastric troubles like burning sensation in the chest, stomach etc	No fixed schedule for meals due to long repetitive working hours, tea at infrequent intervals on empty stomach, liberal eating of chilies
Trauma- Wounds,sprains, head injury, and fractures etc which can leave them maimed for life if not treated instantly.	Fall from steep cliffs/trees while working/walking, attack by wild animals and fracture of body parts leading to death or cripple for life due to lack of proper care
Weakness and fatigue, chronic aneamia	Lack of nutritious diet, repeated pregnancies. child births, heavy workload
Problem of reproductive tract, prolapse of uterus, miscarriage, menstrual disorders, abortion, premature death of children, still births, neonatal,infant and female mortality	Lifting heavy weight, heavy physical strain during pregnancy and after delivery

Source: Jasodhara Dasgupta & Abhijit Das 1998, Health effects of women’s excessive work burden in deforested rural areas of Uttarakhand, A Paper Presented at the Conference on Health and Environment, Centre for Science and Environment, SAHAYOG, Almora, Uttar Pradesh.



“If you sleep in the night even for 5-6 hours, then parents-in-laws say Jo sovat hai so khovat hai, Jo jagat hai so pavat hai (one who sleeps, loses everything in life). Due to lack of sleep I sometime doze while making chapatis. My children say, Aye mummy you will get burnt”, said Anandi, 55 of Village Danya. But my husband unaware of my condition and workload would come back home drunk with his friend and would ask for food. If enough is not left for him he would hit me, calling me names before his friend.²⁸

According to Dasgupta, the women of Uttarakhand are under continuous mental stress especially when compounded by anxiety regarding the sustenance of the household. Forests provided a place of refuge where women could go in groups and recharge their emotional and physical battery, says Jashodhara Dasgupta, “But now the trek to gather fuelwood and fodder is getting longer and longer, there is really no scope for getting this type of sanctuary”, she says. This gets aggravated due to large-scale male migration to urban areas. There does not exist any means of entertainment or relaxation to relieve their tension and society does not permit them to be seen taking out time to rest or for personal recreation. Another study in the Rohru town of Uttar Pradesh found women as victims of mental illness. The study found that an overwhelming majority (52 per cent) of female respondents had at least one somatic or psychiatric symptoms which was significantly higher than males (41 per cent). The case rate was estimated to be as high as 67 per cent in women of low caste and those living in joint families.²⁹ One US study has found a significant relationship between deforestation and mental stress in birds³⁰ (*Box: Deforestation and stress*).

Box 7: Deforestation and stress

Researchers have shown for the first time that disturbing a wild bird’s habitat by logging forests can measurably increase the animal’s stress. Pointing to this phenomenon, a study carried out by an animal physiologist, Samuel Wasser of the University of Washington, Seattle and noted wildlife biologists suggests that the northern spotted owl, a species that lives in old-growth forests in the northwestern United States, may be at threat due to increasing deforestation.

Wasser and his colleagues measured levels of the stress hormone corticosterone in fecal samples collected from 16 pairs of spotted owls nesting on the Yakama Indian Reservation in Washington and from about 150 other owls scattered across the Pacific Northwest. They found that male owls living within 0.41 kilometers of a major logging road or a patch of forest that has been clear-cut within the last 10 years had corticosterone levels almost two times higher than those of owls living more than 3 kilometers away. They also found that males living near clear-cut areas had significantly higher corticosterone levels than those living near areas that had been selectively logged with methods that leave some trees standing. While female owls did not exhibit the same stress pattern, the researchers did find that hormone levels in all females even those not nesting, rose during the 45-day period in which young owls get ready to leave the nest.

The study, although preliminary, suggests that government regulations regarding deforestation need to be revamped to protect endangered species. For example it may be necessary to restrict timber harvest during reproductive season of birds. “It appears to be that 45 day period when the young are popping their heads out of the nest”, notes Wasser. His work has been questioned by scientists from the US Forest Service who are of the opinion that the sample size was too small for the



researchers to conclude that logging could be a factor for the measured stress differences. Further they say there is no evidence that stress translates into a significant effect on reproduction or survival. Wasser, however, believes that future studies will confirm the link between chronic stress and impaired reproduction already seen in laboratory studies.

The technique of monitoring fecal samples of birds may help biologists to monitor how owls and other endangered species are faring under the government's forest conservation's plans. This method of measuring stress in an animal is unique as it overcomes the problem faced by biologists doing work in this area. While biologists can monitor an animal's stress by measuring stress hormones in the blood, capturing a wild creature and drawing its blood can itself trigger a powerful stress hormone.³¹

1.4 Rajasthan: the environment connection

A colourful photograph of a Rajasthani woman carrying water in the middle of the desert. That is what most travelogues and books on Rajasthan carry to depict the state. But if one were to delve deeper into the popular image of women in Rajasthan, the picture emerges with quite different hues. From the sandy northwestern Rajasthan to the hilly areas of southern Rajasthan, the women are malnourished, heavily bogged down by work, and ill. "Almost all the women in rural Rajasthan are anemic," says Preeti Ojha of PRAYAS, an NGO working in the rural areas of Rajasthan. Reproductive health is one major issue for these rural areas.

According to P C Veerwal, Chief Medical Officer (CMO), Pratapgarh District Hospital, southern Rajasthan, the most common diseases are leucorrhoea, anaemia during pregnancy, infertility, dysfunctional uteral bleeding, Many have to undergo hysterectomy, he notes. Sexually transmitted diseases (STDs) and abortions are major risk factors. They are accompanied by other ailments such as back pain, stomach aches, headaches. The women of Gyaspur village in Deogarh, Pratapgarh, complain of a pain on one side of the head. While anaemia during pregnancy is common among women between 20 to 38 years of age, hysterectomy is common among women between 35 to 65 years of age, notes Veerwal.

If on the one hand, the structure of the rural society, lack of health education and facilities, resources, poverty etc. can be held responsible for these health problems, there are other determinant factors contributing to it, and they are overlooked. One such factor is environmental degradation, especially deforestation. "Deforestation can be termed as a major reason for the burden on women, although other factors branch out later," says Sharad Iyenger a medic by profession and executive director of Action Research and Training for Health (ARTH), Udaipur.

Narendra Gupta of PRAYAS, an NGO working with rural women, points out that the tribal belts of southern Rajasthan are classic examples of increase in the woes of the rural folk due to deforestation (*see box: deforestation and health of local community*). He had spent considerable time in these areas as a practising doctor, and has seen the transition. The Dungarpur and Pratapgarh areas, where the Meena tribals inhabit, were heavily forested. "In the last thirty years, all the forest have been cut down. In the Dungarpur and Deogarh areas, in the last ten years, I have seen the forest receding by 2 to 2.5 kilometres from the villages," says Gupta. According to him, since then, the areas facing constant droughts and famines, have never seen a good time.



BOX 8: Deforestation and health of local community

A study conducted, as part of a community health programme, in the villages of Pratapgarh subdivision of Chittorgarh district of Rajasthan by PRAYAS, an NGO working in that area since 1980 observed that the incidence of communicable diseases was significantly higher in villages which were deforested compared to the villages which had forests around them. According to the study, the frequency of treatments for diseases like diarrhoea, malaria, bronchitis and night blindness was much higher in the deforested villages. Explaining this discrepancy, Dr. Narendra Gupta of PRAYAS postulates that deforestation could be leading to more communicable and nutritional diseases due to lack of fresh water, recurrent floods and droughts and increase in dust level (pollution level) and overcrowding. Pointing to the significance of this study, Gupta explains that if deforestation influences the distribution of diseases then it should have significant implications for the way health care delivery services are planned and managed in regions passing through various forms of deforestation.³²

Table 11. Incidence of disease due to deforestation: Rajasthan study, 1991

Disease	Forested village (n=4195)	Deforested village (n=4892)
Bacterial & other diarrhoea	1430 (37.09%)	2304 (47.09)
Malaria	1417 (33.7%)	2079 (42.49)
Cough & fever in infants	235 (5.6%)	298 (6.09%)
Bronchitis	1518 (36.19%)	2710 (55.39%)
Breathlessness in old persons	88 (2.09%)	93 (1.9%)
Night blindness	14 (0.33%)	993 (20.29%)
Conjunctivitis	520 (12.4%)	882 (18.03%)
Wounds & boils	524 (12.5%)	319 (6.52%)
Headaches & body pains	1551 (36.98%)	2058 (42.06%)
Anemia	281 (6.7%)	477 (9.75%)

Box End Source: Narendra Gupta, 1998, Deforestation and health of local community, paper presented at CSE National Conference on Health and Environment, July 1998.

The local people were dependent on minor forest products. They used to cut fuelwood and sell it in the markets. “Planting trees has never been a tradition of theirs,” says Gupta. But he agrees that they never would have been able to clear a vast area of its forest cover. What really affected the forests is a different story. “It all started when the government started leasing out the forests to the contractors in the late 60s,” says Chandan Jain, who works with AASTHA, an NGO based in Udaipur.



“What the government did was to earn revenue from the timber that was collected. The whole operation was done through an association called the Vyapar Mandal. However, the contractors took an additional share of profit by felling on their own and this became a big business. The whole system got corrupted and everybody started felling,” explains Jain. “In the forested tribal belt of Rajasthan, a posting of a forest official would cost a bribe of at least Rs 2,00,000,” says Gupta. There were also reports of the anti-corruption bureau nabbing forest officials with a huge amount of assets.

The tribals were left with no forests. “There is no rainfall as before, there is no agricultural production as before, there is no water as before. Everything has worsened,” says Thavra Meena, 75, of Pyarjipatar village in Deogarh, Pratapgarh. A lot of people also claim that just three kilometres away, in a village named Bhutia, where there is a thick forest cover, there is good rainfall and good cultivation, a fact which can be seen in a visit to Bhutia.

The more the lack of resources, the more is the work burden. To make matters worse, the RIICO has identified the Dungarpur area as a priority area for industrialisation, says Jain. This will not only create health problems by creating unfavourable environmental conditions but will lure village folk specially women to work in these industries without improper facilities. “All the existing health problems like tuberculosis and reproductive health problems will aggravate with more industries and mines”, he says. Jain points out that the existing textile industries, soapstone and marble mines etc. already has a tremendous impact on the health of the women.

“Poverty and lack of resources have become a part of life now,” agrees Thavra Meena. His stories of forests and hunting in that area sound prehistoric now. One can only see hillocks after hillocks, all barren devoid of any vegetation called a tree. Deforestation has also made the land infertile. That means more work with less productivity. More work is required to meet the demands of a growing population in even when the land distribution per person is decreasing.

The story is not quite different in the arid areas of Bikaner and Jaisalmer. Except that in the forested areas the work burden is to a great extent human induced and in the desert areas it has been a part of life, as the villagers say. Although unaware of the reasons, the village women admit that the work burden has increased and health conditions have deteriorated. Since the area was cleared of trees, one major problem the women faced was that of firewood.

The work pattern is as tedious for daily survival. “The women wake up at dawn, do all the household work and cook and leave for the fields or tend to the cattle (people who have agriculture go to the fields, others who have other occupation, tends to them such as cattle rearers tend to the cattle). They come back in the afternoon eat something and go out to collect firewood and fetch water. Coming back in the evening, they cook for the family again. They never get a moment’s rest till they sleep,” explains Kalavatibai, 50, of Chakraika village in Bikaner, the everyday work pattern of the rural women. “Women here spend around six hours at least 5 km of walks a day to collect firewood,” says Hira Bai, 55, of Gyaspur village, Deogarh.

On an average, a village woman in Rajasthan spends one fourth of the year, that is 2190 hours, walking a total of 1825 km every year just to collect firewood, if Hira Bai’s words are to be believed. They no longer get it at their backyard as their grandmothers used to. “A huge waste of time,” says Preeti Ojha of PRAYAS. They cannot even burn



the cowdung because they have to use it as manure - they cannot afford to buy fertilisers.

With the cattle herding communities in the deserts of Jaisalmer the picture is equally grim. They start their day milking the cattle. Then comes the long walk to fetch water. In some villages, the nearest water source is about five to six hours walk away. "It takes half a day to fetch water and half of it is consumed by the carrier herself," says Kalavatibai. Only a few villages are fortunate to have handpumps. Firewood collection is no pleasure either. A tedious search for dried bushes.

A search for energy amid receding resources. As days go by, and consumption of resources increase with the population, the women have to go further and further to collect the essentials. Half a day to fetch water, half a day to collect firewood, half the life doing both, or maybe more. "It is a part of our life," says Kalavatibai. Rest, compared to the relentless work, is very minimal - about six hours in 24. They never get a break. "A whole life's energy is spent in less than half a life," says Preeti Ojha. She has been working in a drinking water project in the water scarce district of Churu.

The scarcity of water have also led to a lot of health problems, point experts. "Lack of personal hygiene due to lack of water is also the root cause of major problems, mainly of reproductive health" says Sharad Iyenger. And this also is a contribution of deforestation, he says. Washing is not very frequent among the rural women and even during menstruation and after delivery of babies, they use minimal amount of water. What they use is sand, resulting in infections, and this doubled with ignorance, lack of resources and indifference of the malefolk deepens the problems. Lack of water makes the villagers use the same water for different purposes. Contamination of drinking water often leads to gastro-enteritis and jaundice. "Gastro-enteritis is a major killer here, mainly among the children," says Sharad Iyenger.

The women's nutritional status is quite low. Green vegetables are not abundant in the desert districts. In the once forested areas are different, deforestation has led to the disappearance of several species of nutritious value. The villagers recall bygone days when they had a lot of green vegetables. "Fruits are not available. Food supply from the forests have come down," says Gupta. Explains Preeti Ojha, "Deforestation has led to the lack of nutrition and this has resulted in a high infant mortality."

Malnutrition, along with pregnancy at a very young age has also led to low birth weight among the babies, states Kirti Iyenger of ARTH. According to her, the birthweight of the babies are one-third of the normal. Heavy workload during pregnancy can prove dangerous. "We have seen a lot of cases of spontaneous abortions," says Joni Gameti, who works with PRAYAS in Deogarh. "Death rate of babies are at least 2-3 times more than the general mortality rate of infants all over India," says Sharad Iyenger. A Lot of villagers also claim death of both the mother and child during pregnancy also happens quite a lot.

Reproductive health is abysmally poor. Kirti Iyenger also points out that infertility is a growing problem and it needs to be addressed with priority. Abortions are also common. Veerwal points that in five months, he has encountered at least 50 cases abortion. Frequent pregnancy is also a reason for weakness, and also abortions. Since they have started working in Udaipur, they have seen about a thousand cases of women with problems of reproductive health, points Kirti Iyenger. "Most of them are 16 to 17 years of age," she notes. Leucorrhoea, which is a white discharge from the vaginal tract, is very common. "About 30 to 60 per cent of the women have leucorrhoea, some



infectious, some not. And it is found mostly in married women between 16 to 30 years of age,” says Sharad Iyenger.

Chotibai of Bakusar village in Bikaner, a north western desert district agrees with Sharad Iyengar. “White discharge is quite common with the women here,” she says. She has been working with Upper Rajasthan Milk Union Limited (URMUL) on the health of village women. Chotibai points out that blood related problems and problems during pregnancy are very common in the area. Due to lack of hygiene, there are a lot of infection related problems. Cases of prolapse are also found in a fairly good rate due to lack of hygiene and heavy manual labour during and immediately after pregnancy, points Sharad Iyenger.

“A women has to work here without stopping even for a breath until she down on the bed with illness,” says Khemraj Chaudhary, a social activist, now working with PRAYAS. The patriarchal society adds to the woes of the women. “Our menfolk do not even ask about our health. If we sit for a moment, we have to take a lot of scolding and beating. And it is worse when they are drunk,” says Thauribai of Gyaspur village. All the women shyly nod in agreement.

“There is always a threshold of work,” says Gupta. And the women in Rajasthan seem to have crossed it. All this is taking its toll. States Gupta, “all communicable and vector borne diseases are intense in the deforested areas.” “Yahan par kamjori bahot hai, (Weakness is very common with the women here)” says Tapobai, 55, of Piyarjipatar village. This can be heard in every village. “Since the women are anemic, the loss of energy weakens the immune system, and they become very susceptible to infectious and communicable diseases,” says Sharad Iyenger. Be it any disease, the women and children are the ones to get infected immediately, he says.

Deforestation is also having other far reaching impacts. As the land is degraded in the villages without any scope of a good cultivation, the people are moving more and more towards the towns in search of work. “Landless labourers are also a product of deforestation,” says Gupta. According to the women of Piyarjipatar, lot of their men have gone to the towns to find work and that leaves the women with even more responsibilities. And not only men, the women also accompany them to work as labourers. “This has made them very prone to sexually transmitted diseases because a lot of them also indulge themselves in illegal sex trade,” says Sharad Iyenger. It is more risky because the use of protective measures is almost unknown. This has led to the corruption of the rural society, he comments.

Workload and constantly living under the shadow of poverty also takes toll of mental health. “The conditions under which the rural women of Rajasthan are living also lead to depressions, schizophrenia and behavioural changes. Unstable state of mind leads to further problems like irregular menstrual periods etc.,” he says. “The sense of cheerfulness have disappeared from the people of the deforested rural areas,” says Gupta. One can very well see the perpetual tensed expression in the women of the villages. All the women look older than their actual age.

But do they get a better life in the urban areas? “No,” says Anjum Syeed of AASTHA. “All these migrants end up in the filthy slums living in inhuman conditions,” she says. The slum dwellers are wallowing in filth and diseases, and the suffering is definitely more than what they have in the villages, says Anjum. To the villagers, the question is of survival, not being healthy. “When you don’t have even two meals a day, who cares about health?” asks Chuknabai, 30, of Piyarjipatar village.³³



1.5 **Tamil Nadu: of mothers and daughters**

In Tamil Nadu, women are in danger of becoming an endangered species. A major issue is infanticide which is prevalent in Salem and Dharmapuri districts. But so is work burden. Either on the one hand, the anti-girl child attitude highly prevalent in the low economic groups forces women to abort. If this is not the case, increasing pressure of work offers no other choice.

The anti-women trend in Tamil Nadu is frightening. It is manifested in the highest abortion rates amongst the various states of India. According to the National Family Health Survey of 1992-93, one out of every four births in women in the age group 15 to 19 years end up in an abortion or stillbirth.³⁴ What is frightening is that, “the anti-girl child attitude is not confined only to the lower caste and low economic group as it were”, says Dr Gabriele Dietrich, Professor of Theology and director of the Centre for Social Analysis in Madurai. It is also prevalent in the middle class. In Tamil Nadu, she says, female infanticide increased in Usilampati with the building of the Vaigai dam and green revolution agriculture. Bride price then substituted dowry and sex selective abortions begun. However, in recent times what is disturbing is that how modern equipment and facilities are being put to use to execute an old practice”.³⁵

“The majority of women in rural areas have induced abortions - that is Medical Termination of Pregnancy (MTP). I have found bleeding disorders too”, said Dr Chitra of Chitra Sampath Hospital, Gandhi Road, Salem district of Tamil Nadu.

But for those who survive the situation is no better as they are forced to work to keep their home fires burning. Eriyur, which is nearly 110 kilometres from Salem, in Pennagaram Taluk in Dharmapuri District has nearly 100 families depending only on collection of fuel wood from the nearby forests Thengalkaadu and Karadu. Kannamma, 30, and Rathinam, 25, both of Eriyur Village, said they go seven kilometers into the forest to collect fuelwood. “When we return, the forest guard would threaten us and seize our axe and sickle, unless we pay him Rs. 100 to Rs. 150. We resort to loans to tide over such difficult days. It takes days or weeks to pay back such loans”, they said. The menfolk do not contribute anything to the family, as they spend their earnings in drinks. The burden and responsibility, therefore, falls on the working women to feed the children. The children who get the free noon-meal served in the school, said the quality of the meal is so poor that you can find worms in the rice.

Says Rasathi, 30, another labourer, we leave by 8 in the morning and we return only by 5 in the evening. We would take rice Kanji before we leave and there would be no food till we return home. We often get pains in both the legs, both hands, hip and the back. We do have headache and muscle cramp on these days.” According to the women, there is no water shortage as such, and the wells are full, and thanks to the borewell pipes installed at different places. The maximum distance they travel for water is less than one km.

Amenorrhoea, which is the disruption of the menstrual cycle, is found among these rural working women, adds Dr Chitra. Added to the heavy work burden is the lack of proper nutritious food and Vitamin B deficiency which makes them anemic, said J Sumathy, motivator and Village Health Nurses, Eriyur. Dr V M Ganesan, Medical Officer, Primary Health Centre, Eriyur, confirmed that that 150 persons visit the doctor per day. 50 per cent of them are women workers - 90 per cent of these are in the reproductive age group and 10 per cent requiring geriatric care. “What is sad”, said J Sumathy “is



that 50 per cent of the women, too, drink. Illicit arrack is freely available.”. It is likely that this is an increasing trend in women to help them overcome their mental and physical stress. In Eriyur for women it is a choice between being born and the right to life with misery.³⁶

1.6 Assam: backlog of illness

“Work load literally breaks my back. But we have to do our work.”, says Tuloi Ngate from Dharikathi, a small Mishing village in Assam. Maternal mortality rate is one of the highest in Assam, 450 per 100,000 live births. The reasons for women’s failing health in Assam is intensity of workload resulting from the lack of forest cover for fodder and the lack of water resources. It is also because of several factors that pervades the region such as –

- 1) Absence of efficient public health service system along with peoples’ own lack of knowledge on personal health care and public sanitation;
- 2) Frequent child birth among women and with no decrease in work load.
- 3) Fear and mental pressure among those who live in insurgent hit areas.

Assam, with a population of 22,414,322, has seen a drastic decline in its natural resources. Much of the environmental degradation stems from infrastructure projects, extraction of minerals for larger markets or industries and widespread settlements in virgin areas and Char lands by migrants from Bangladesh, in particular. Large-scale timber felling and smuggling is going on in Kokrajhar and Sonitpur district. According to data from the State of the Forest Report, Assam lost about one per cent of its forests within a matter of few years – 1991-93 to 1993-95. Crops are failing and potable drinking water affected by industrial pollution, emanating from an oil refinery into the Tunia river at Bongaingaon. The historical sites of Chandringa in Dhubri District and Rajkoshini Pahar of Goalpara have been affected because of heavy extraction of granite. Rural inhabitants have become major victims of environmental changes in the northeast.

East Dharikathi, is a village in Assam that is experiencing loss of forest area, heavy flooding and physical hardship of its people. Of the 126 women interviewed in Dharikathi, 50 had miscarried which is about 40 per cent according to a 1998 study conducted by North East Network and Tezpur District Mahila Samiti. While according to government of India’s NHFS data, the rate of spontaneous abortions and stillbirths is some 8 per cent for all of Assam. The study also found women to suffer from a number of reproductive problems like bleeding disorders, irregular menstruation and abdominal pain. Dr L C Das of the Public Health Centre in Charduar says that the utter lack of knowledge of personal hygiene among the Mishing community have contributed to infections and chronic disease such as malaria, gastro-enteritis, jaundice and tuberculosis.

“Women work so hard that there is no energy in them to think of bettering their individual health”, remarked Das. Women of Dharikathi are involved with household work, agriculture labour, crafts production and firewood collection. But fire wood collection is a major activity of Mishing women. “They watch over the house while we go away for work looking for firewood and fetching water,” said Dalimi Ngate. Babies are looked after by elder female siblings. Says Dimbeswar Papag, “Women’s work is to be done by them only. After all it is a traditional activity. Firewood collection is one of them.”

A total of 6 hours is spent to go into the jungle, across the river and bring back the wood, covering a distance of 5 kms. Of the 126 women interviewed, a total of 109 women collect firewood from the forests, Only 17 men go regularly to the river for the



same activity. During floods and heavy rain women are seen blocking logs that may happen to flow down the river Bhorelli. These are drawn to the river bank after which the men cut the wood for transporting to their homes. The amount of firewood required per days is two basket full per day. Firewood is required only for cooking. The requirement is more during winter months when woods is used for keeping themselves warm.

While it is mainly women who collect wood, men have started to use bicycles to carry logs of wood for commercial use. One of the reasons is because cultivable land have decreased and whatever is left is often raided by elephants from the Nameri National Park. They sell firewood in the Balipara market, the commercial hub of these villages. Firewood collection in Assam is done by village people from their own land, road sides or nearby reserve forest areas.

Table 12. Reproductive Health in Dharikathi Area: Paleng, Gorgaon, Bahbari villages

Type of Illness	No. of Women	Percentage
Anaemia	91	72
Backache and swelling	23	18
Profuse bleeding	22	17
Abdominal pain	44	35
Irregular menstruation	33	26

Source : Womens empowerment in health and economic issues in the North East region of India, 1998, Monisha Behal and Tezpur District Mahila Samiti (TDMS) Health Unit Study sponsored by the MacArthur Foundation (India Program).

It is worth noting that all women in Assam do not collect firewood. It is only among the plains tribals and minority population that women do this job. Interestingly, just across the bank from Dharikathi, men in the Kazaranga belt cut firewood for their homes. “We don’t feel wood cutting and carrying firewood is women’s work. It must be a tradition because I never saw anyone in the village, let alone my mother or grand mother ever carrying firewood on their heads.” In Jharobari, Kamrup district women belonging to the Koch-Rajbangsi community do not collect firewood. Says Dharani Das, “it is matter of shame if anyone saw my wife collecting firewood”.

But Dharikathi’s women continue, and will carry on fetching twigs and branches for their cooking till the day a policy is introduced to relay the ‘waste’ gas from Digboi oil fields to these areas few hundred kilometres away from each other. But that’s another story.³⁷

1.7 Nagaland: ray of hope

From 1991-93 to 1993-95, forest area in Nagaland has reduced from 14.291 to 14.221 mha. More than 60 per cent of Nagaland’s forest area is degraded adding to women’s chores in the collection of fuelwood and water. “Deforestation took place in the mid 1980s. It was done primarily for commercial purposes. Trees cut down are mainly Pine and Bonsom”, notes K Z Mero, Chairman of the Village Council, Chizami Village, Phek District. “With the deforestation, the women’s workload has become heavier. Sometime back in 1996, the Village Council passed a rule that women should not be involved in carrying logs because it is the work of men” he says. “But that was not successful because the social groups in the village did not see any harm in the extra income that was now coming from women log-loaders”, he laments.



Yet there may be some sign of hope. Many natives of the state agree that the work load of Naga women has increased with deforestation. In fact, male participation in agriculture work is virtually absent because of the present political turmoil and growth of militancy in the state. "Deforestation has affected women who now have to go further to look for firewood" says Zavepa Vese, Village Development Board (VDB) Secretary from Luzaphuhu village, Phek District Nagaland. But the same people also provide evidence of efforts in people's participation to address the problem. "Afforestation projects have been taken up by the village authorities. People are given free saplings which are planted in specific areas. The community is expected to take care of this area till the plants are mature enough for commercial/consumption purposes" adds Vese.

The state government owns 2 per cent of land while the rest is held by villagers, either individually or communally. Nagaland's villages are run by Village Development Boards and the Village Council. VDBs came around 1978 under cause 12 of Section 12 of the Nagaland Village and Area Councils Act. Organised groups of village elders chosen by consensus (also known as village councils) select members of the VDBs. At least one woman is a member of the VDB representing the women of the village. Government funds are normally channeled through VDBs for development work such as afforestation projects, providing tin roofs to poor homes, establishing community buses and the like.

A bilateral project called Nagaland Environment Protection and Economic Development (NEPED) is operating all over Nagaland with the objective of conserving the natural forest from being used for jhum cultivation. It is making an effort to transform major portions of land, presently under jhum into agro-forestry, and making the present shifting cultivation methods more sustainable, productive and profitable. Each village has two test plots supplied by the community where various farming and planting activities are being undertaken. According to Mr Vezopa, Village Council Chairman, Sumi Village, Phek District, village authorities and youth organizations have taken up the task of preserving forest area which started 3 years back with 6 villages. The NEPED team is also working with them. In addition, the Nagaland Timber Association has given the village people saplings for afforestation.

But the problems of Naga women do not end here. A study conducted in Chesezu village in Phek district found 19 women out of 100 had miscarried. The study also found that 22 suffered from weakness, 31 from backpain, 13 from abdominal pain and 4 had constant headache. "Females constitute 80 per cent of all patients", adds Dr Wemeru (M 29) Private doctor in Pfutsero town, Phek District. Many doctors in the area agree that heavy work load and less intake of food has led to gradual decline in health. "Females constitute 80 per cent of all patients", adds Wemeru.

"My husband has very little concern about family needs. Now my children are grown up and they help me in collecting firewood and also look after the household activities when I am out on work". says Wekhape-u, (Age: 37, with 6 children), Chizami Village, Phek District. Women end up spending 16 to 18 hours in household and outside work.

The effects of heavy burden are perhaps lesser because there is access to public transportation. Neizulo-u, (Age 57, a widow with 4 children), Chizami Village, Phek District said she collects firewood from the land which belongs to the clan. Every passing year she has to go further and further into the valley to look for firewood covering on an average 4 kms. She transports the wood back home by a truck which costs her Rs. 300



per trip. 2 thunks of firewood lasts 6 months for her family. She does wage labour in other's fields in order to pay this money. "I collect firewood from clan's land which is very far from my house. So I have to hire a truck in order to reach home. As I do not have any other means of earning, I take money from relatives and go to their field to work. Though my husband does help me in cutting the wood, most of the carrying is done by me." said Neiwetshu-u (32 with 2 children), of Chizami village, Phek District.

Says Dr Neisakho (M 40) Govt. Doctor, Civil Hospital Pfutsero, Phek District, "most of the common illness of women are cramps, backache, numbness, and general weakness." Clearly the situation in Nagaland is not completely rosy but many shades better than other parts of India.

1.8 The way ahead

What do the field reports tell us? That the situation of work burden and associated health problems in rural India is horrendous to say the least. All the reports point to severe reproductive health problems in women. In Uttarakhand, there is evidence that women are even becoming victims of mental problems. The anti-women trend in Tamil Nadu poses a serious threat to the survival of women. The added work burden almost makes it certain that women may become an endangered species. The situation in Assam is also bleak. People's participation in Nagaland to preserve forest cover could be a reason why the situation in Nagaland is somewhat better, although there is evidence that deforestation and lack of forest cover is posing health problems.

Clearly, if the issue is not addressed with a war footing approach, coming generations are at serious threat. Simple. They may not come at all. There are three levels at which the government can address the problem. (1) Reduce deforestation (2) Take measures to reduce the work burden and (3) better manage the health status of women. But although these are solutions its implementation is possible only if several ministries are sensitised about the seriousness of the issue and play a role in addressing the problem. Further, there is need for a coordination mechanism which can coordinate and network with the entire government machinery to implement solutions.

Promoting afforestation is a big challenge for the Ministry of Environment and Forests to take up. This would need changes in the government policy. This can be done by "strengthening the local natural resource management through elected bodies like Van Panchayat and ensuring that at least 2 to 3 members are women" proposes Dasgupta. The State of India's Environment –Fifth Citizen's Report has documented studies about village communities in India, especially in Orissa, the Chotanagpur region of Bihar, and the Panchmahal district of Gujarat who have in recent years begun to undertake forest protection to their biomass needs on their own initiative without the intervention of any governmental or non-governmental agency. In the Tehri Garhwal region of Uttar Pradesh one study shows that the people of 140 villages were voluntarily protecting vast areas of forest land most of which was government-regulated reserved forest land. ³⁸(SOE5 chapter on forests) All of this scattered evidence shows that people are themselves responding to the firewood crisis, but in every case the role of women has not been central to the issue.

Even the government has started various development programs, but none have so far addressed the problems related to women's work load. It is now well known that in the 1980s, various forest departments under the government of India started farm



forestry programmes under the social forestry programme. It was successful in a few regions of the country – districts of western Uttar Pradesh, Haryana and Punjab, select districts of central Gujarat, Karnataka and West Bengal. Between 1980 and 1988, some 10 billion trees were planted by farmers on their farmlands. These trees contributed some 25 million tonnes of firewood annually which is far higher than the amount of firewood supplied by all of the country's forests.³⁹ (SOE5 chapter on forests) But in large parts of India this programme suffered a serious setback when the government of India reduced the import duties on pulp and timber in order to reduce pressure on Indian forests. Numerous farmers pulled out their young saplings, others going into farm forestry refrained from doing so and those who had full-blown trees sold a lot of their wood as firewood. It is not clear what is the status of farm forestry in India today and the extent to which it is promoting self-sufficiency in rural homes to meet their basic needs of firewood. In fact, the government's other social forestry schemes like switching to cash crops have been counterproductive to women's interests, undercutting their income. Even the projects of National Wasteland Development Board have failed to touch the problem of scarcity of resources needed by local people, much less promote self sufficiency for tribal women in regard to meeting their basic needs. Their projects have mainly stressed on large scale production of crops particularly monoculture, for the benefit of large farmers.

Environmentalists and researchers have been arguing for a while now that women should be included in decision making processes from the onset of the evaluation of any project's conceptualisation to the implementation and evaluation stages of forestry projects. Past experience from the Chipko movement has shown that women get empowered in the process of such participation and will likely question other sources of exploitation. Chipko women were actively fighting alcohol sales and consumption in their communities. Indeed from a local perspective these issues are tightly woven. For instance "alcoholism leads to women's economic and physical exploitation and alcoholism also leads to indebtedness which often terminates in land alienation. Altogether an outcome of these processes is increased workload and declining health and social status of women and their children" argued Syracuse University researcher Andrea Finger Stich in her 1991 paper *Shrinking forests in India: Impact on tribal women*.⁴⁰ Acknowledging these interrelations, projects need to be started on health and water related issues which also link up to forestry and ecological concerns.

Science and technology can play a very important role in alleviating this problem. According to Asha Das, Former Secretary in the Ministry of Human Resource Development and Department of Women and Child Development, there is an urgent need to take a look at the kind of technologies women require in their households in terms of transportation and energy in order to reduce their work burden. There is a small programme in the Department of Science and Technology on science and technology for women. But it is not innovative and whatever ideas exist, the ability to disseminate them to the field is lacking, point out environmental experts. A serious programme in this field could play a serious role in reducing women's work burden. For instance, an efficient solar water heating system developed in villages could go a long way in reducing the quantum of wood required for heating water in the hilly and mountainous states.

Similarly, women's needs should be taken into account when planning transport activities in rural areas. The SEWA study brought to notice the need for adequate



transport facilities for the rural women of Banaskantha. One viable option would be to provide animal carts, argue SEWA workers.

There are several alternatives that can be worked out to reduce women's' headloading burden. For example, reviving the common water resources would be a sustainable solution. Effective harvesting of rain water has been a technique used for many years, in for example, in parts of Gujarat. These methods can be revived to reduce the women's time and energy to a negligible amount. Finally the health effects of women can be better managed by developing a strong communication strategy for preventive education and promote health seeking behaviour and equipping and building capacities of government health care.

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Box 8

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Box 4

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