

## Article

# Sujala watershed project and its impact on rural energy management - A study in Hosadurga Taluk of Chitradurga District

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Accepted 20 May, 2009

Water is a natural resource without which life cannot be sustained. Watershed development is to ensure the availability of drinking water, fuel wood and fodder and helps in raising incomes and employment opportunities for marginal and small farmers, landless laborers and also socially marginalized groups through improvement in agricultural productivity and production (Rao, 2000). It is very certain that the watershed development programmes have ushered in the 'green agenda' in the villages but more changes and improvements are required yet is also a fact of life right now, for the stakeholders of the programmes. Sujala is a unique and innovative programme of rural development is not in doubt. Women find an increasing role in development that there are activities that make their lives a little more comfortable than ever before is certainly brought to the fore, for example, indoor pollution control, through the use of gober gas or LPG and increased kerosene availability, has implications for making women relieved of age-old drudgery through seemingly the most acceptable green practices. The greenery of the village communities has gone up in thickness, depth and density is borne clearly out by the third component. Watershed plus with its focus on, say, green agenda, is indeed a tool for rural development. An attempt is made to analyse the impact of Sujala watershed project on rural energy management in selected villages of micro-watershed areas of Hosaduraga taluk in Chitradurga district.

**Key words:** Hosadurga, Sujala watersehed, rural energy management, socially marginalized groups and fuel wood.

## INTRODUCTION

Man and his environment are interdependent. Any change in the surrounding environment directly affects the people living therein. A degraded environment results in a degraded quality of life for the people. Thus, a program to reduce poverty and improve the standard of living of the people must be aimed at improving the environment they live in. Environmental degradation does not recognize administrative and political boundaries (for example, village, taluk, district and so on).

The watershed plus approach of incorporating a range of activities, puts pressure on both the natural and human resources for their timely execution. Though the diverse activities may add value to the project, it is often at the cost of innovation. Community watershed projects,

currently under implementation, demonstrate the need to trim the number of activities in response to the geographical, social and economic conditions and bring in innovative approaches to ensure the revival of the community and utilization of its human and natural resources on a sustainable basis.

There is an urgent need to arrest the process of degradation of land and water resources resulting in the growing importance of watershed development and management as an integrated approach to achieving rural development through proper management of natural resources in most developing countries (Deshpande and Narayanamoorthy, 2000; Rajasekhar, 2002).

The rural energy consumption scenario in India is dominated by the domestic sector, which accounts for nearly 75% of the total energy consumed. In rural areas, the bio-resources such as fire wood gathered from forests, animal dung and crop residues are the prime

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end-uses for cooking and water heating in domestic sector (Heltberg, Arndt and Sekhar, 2000).

Women and children from these families often spend hours in each day for gathering cow dung and wood-hours they might otherwise be able to spend on productive work or education. Their health is damaged by the smoke given off by these fuels. Their environment may be damaged as they chop down trees for wood. The problems of rural energy have long been recognized.

Many research studies concentrated mainly on consumption pattern of rural energy in various sectors of economy at macro level but adequate research studies are not made in different sources of energy and their management at grass root level particularly conventional energy management in rural areas. The present paper tries to highlight the availability conventional energy sources, consumption pattern and related issues in selected villages of micro watershed areas in Hosadurga taluk of Chitradurga district.

In recent years, India has looked to Sujala watershed development as a way to realize hopes for agricultural development in the rain fed and semi-arid areas. By capturing scarce water resources and improving the management of soils and vegetation, watershed development has created conducive environment for higher agricultural productivity, while conserving natural Resources, most importantly land and water and also helping in rural energy management.

Campel and others (2003) stated that the energy ladder is a community concept in models of domestic fuel choices in poor countries. The concept of rural energy ladder is underlying that the households face a range of energy supply choices, which from least to most technically sophisticated. Nearly 80% of the present energy consumption in rural areas is mainly based on conventional energy sources such as firewood, cow dung and crop residues etc, In a developing country like India, there is a need to improve the use of natural resources and in particular, the scarce resources such as those of energy and water. As pointed out earlier, the rural sector in India largely uses conventional energy sources and the availability of data on conventional energy sources and their production and consumption pattern are very scanty. Most of the empirical studies that have been done on determined of fuel transitions have linked too many factors such as income, access to electricity, and forest scarcity to fuel substitution. Davis (1998) says that changes in fuel choices are not in smooth transition from fuels to electricity but it will have a continual switching between a set of different combination of factors such as income, settlement size, family size, population density, price or personal costs of obtaining fuels, availability of and accessibility to modern fuels, efficiency of equipments used, etc using non-commercial sources of energy leads to indoor air pollution in rural kitchen. In India, the main energy sources are fossil fuels and fuel wood (coal 40%, petroleum 15% and fuel wood 34%)

with 59% of energy used for power generation. India is among the 10 fastest growing economies in the world. The proportion of fossil fuels used is expected to rise to 74% of total energy use by 2010, with a corresponding increase in CO<sub>2</sub> emissions to 1646 million ton (Raj Kumar, 2000).

It also true those policymakers, governments, NGOs and the private sector should concentrate on improving the use of traditional fuels, such as wood and not just on promoting modern energy, such as electricity. It stresses the importance of designing policies and projects with local people rather than imposing schemes from above. It shows, for example, how the environment can be protected by giving farmers responsibility for managing forests. Rural energy presents the bank with an important challenge. It should be a key part of our work, whether we are discussing country assistance strategies, energy sector reform, or new investments. While the bank can play an important catalytic role, real progress in tackling these issues is critically linked to the adoption of the needed policy and institutional reforms, mobilization of local entrepreneurial and NGO resources and development of innovative rural energy delivery and financing mechanisms.

To understand the possible solutions for providing energy service to the rural population in the countries, consider first what is known about the problem. Around a third of all energy consumption in the country comes from burning wood, crop residues and animal dung. Such bio-fuels are mostly used in rural areas, though wood is also used as a fuel by the urban poor. Gathering firewood and dung takes time that could be devoted to more productive activities such as farming. The recent study in the hill areas of Nepal showed that even in areas with fairly good supplies of wood, women need to spend over an hour a day collecting fuels. In areas where wood was more scarce, the chore lasted about 2.5 h a day. Moreover, most bio-fuels need to be collected in large quantities. They are a highly inefficient means of cooking compared with fuels such as liquid petroleum gas (LPG)-used by wealthier households. A kilogram of wood, for example, generates a mere tenth of the useful heat for cooking delivered by a kilogram of LPG. Bio-fuels can also damage people's health, because they give off smoke that contains many hazardous chemicals. Studies of rural areas show that smoke levels inside dwellings often far exceed safe levels recommended by the world health organization. Cooking with bio-fuels does not cause health problems everywhere, but in houses that have poor ventilation it can be as dangerous as smoking cigarettes.

A study in Gambia, for example, examined the health of 500 children under 5 years old. It found that children who were carried on their mothers' backs as they cooked in smoky huts were 6 times more likely to develop acute respiratory illness than other children. Studies of women in Nepal and India exposed to biomass smoke-but who

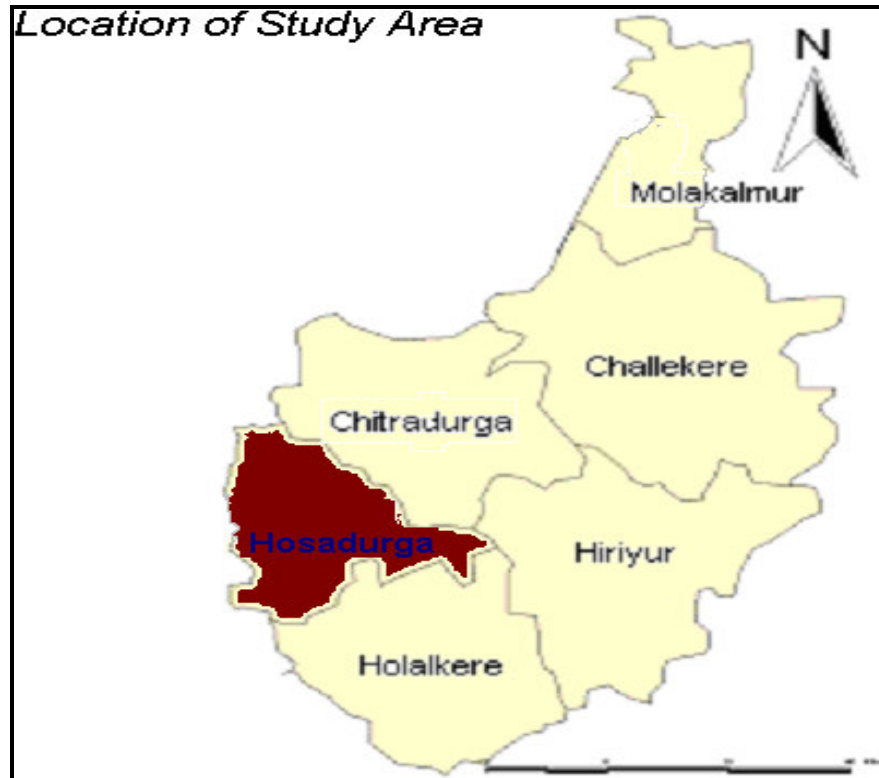


Figure 1. Location of study area in the central parts of Karnataka.

did not smoke themselves-found that their death rate from chronic respiratory disease was similar to that of male heavy smokers. The use of biofuels can also damage the environment. The search for fire wood often involves chopping down local trees. As trees disappear, fire-wood has to be sought further and further away. Using dung and crop residues as a fuel reduces the amount available for use as a fertilizer for growing crops. Such problems are avoidable. Farmers in many areas use bio-fuels in sustainable ways. But in many other areas the gathering of bio-fuels ranks together with logging and the clearing of land for agriculture, as a cause of deforestation. In the northern Chinese county of Kezuo, for example, people have already cut down most of the trees around the farm lands. Poorer households are now turning to even less efficient fuels such as straw and dung. Without electricity, moreover, poor households are denied a host of modern services such as electric lighting and refrigeration. To an extent, some of these problems are being alleviated.

The problems of rural energy should certainly not be dealt with in isolation. Poverty and dependence on bio-fuels go hand-in-hand. As household incomes rise, people normally switch to modern fuels, if these are available. Higher-income countries also depend much less on bio-fuels than do poor countries. The best schemes for improving rural energy may therefore fail if other policies prevent economic growth.

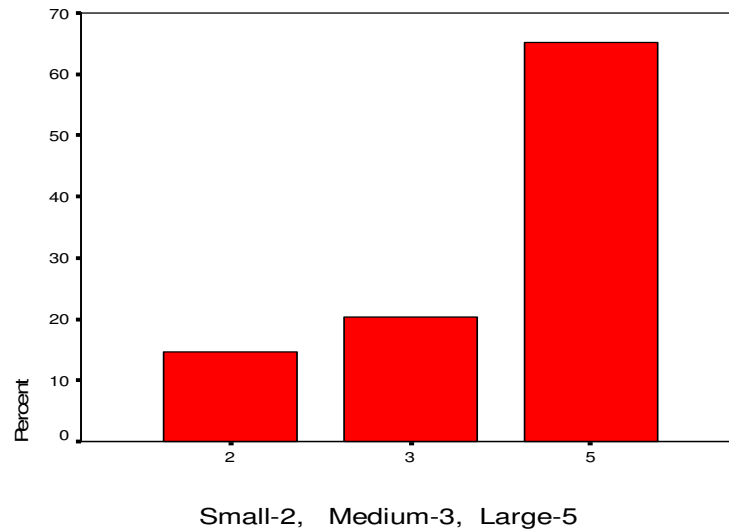
## STUDY AREA

Chitradurga is one of the important districts located in the central parts of Karnataka. It lies between  $13^{\circ} 34' N$  and  $15^{\circ} 2' N$  latitudes and  $75^{\circ} 37' E$  and  $77^{\circ} 1' E$  longitudes. The district is surrounded by Davanagere and Bellary districts on the north and Anathapur district on the east, Tumakur district on the south and Shivamoga and Chikkamagalure districts on the west.

The district has a stretch of small hill ranges which divide the district into 2 segments, one is the Nethravathi river basin with Challakere, Hiriur, Molalalkalmuru and other parts of the district with hill ranges covering Hosadurga, and northern parts of Molalkalmuru and eastern parts of Hosadurga taluks. There are 10 micro watersheds in Hosadurga taluk of which 2 micro-watersheds are selected for the study, based on area random sampling, considering relief features, area under irrigation, soil condition and so on. The collected data has been analyzed by using factor analysis and drawn the inferences are based on the results of the analysis (Figure 1).

## RURAL ENERGY MANAGEMENT IN HOSADURGA TALUK

Rural energy management is one component that is



**Figure 2.** Bar chart showing Fuel Wood Availability in Hosadurga taluk.

rather external to the SWSDP, although concerted efforts have been made to improve the situation in the rural areas as part of the watershed plus approach. There have been great improvements in kerosene availability in the area, with 14% of the farming households reporting large improvements, 35.9% moderate improvements and 47.6% small improvements. In regard to gober gas availability, the same pattern cannot be said to have repeated for there have been small improvements according to 82.3% of the households, moderate to 3% and large to only 2.3% of the families.

### FUEL WOOD AVAILABILITY

Availability of LPG gas is yet another small favoured /improved rural energy element. Exception, however is the availability of fuel wood which greatly improved for 63.4% of the households, moderately for 19.8% and in limited ways for 14.3% of the households. As a combined result of all these, indoor pollution control has only seen small improvements in 85.5% of the houses, moderate in 6.2% of the houses and large in 1.6% of the cases. Despite opportunities available, introduction of renewable energy sources/technologies has also found very low favour with 85% of the farming households reporting small improvements, 5.5% moderate improvements and 1.1% large improvements (Figure 2).

### FORESTRY DEVELOPMENT AND RURAL ENERGY MANAGEMENT (GOBER GAS, LPG AND KEROSENE AVAILABILITY)

Although a reduced dimension retained, unlike the main and the bipolar, the third component provides support for

a 'green agenda' among the stakeholder-farming communities. The components of watershed development represented in this third principal component are forests, pastures and fodder development (with 4 elements) and rural energy management (similarly 4 elements). Social forestry (0.741, 61.1%), field hedging (0.628, 60%), improvement in grazing/pastures (0.586, 51.1%) and agro-forestry (0.505, 47.2%) are the elements loading significantly in a component explaining away a variance of 8.066% (eigen value 6.534) which is still relatively large. While social forestry and improvement in grazing /pastures are economical livelihood opportunities for income and quality of living improvements, field hedging and agro-forestry are activities that are crop protection measures. All of them while being part of the 'green agenda' are economic alternatives for the socially disadvantaged/deprived of the populations (Table 1). Gober gas availability (0.647, 43.7%), improvement in indoor pollution control (0.603, 59.9%), LPG availability (0.581, 39.6%) and kerosene availability (0.530, 49.8%) further accentuate the march forward of the green agenda and the use of nearly clean fuels in the rural households. However, the not very high loadings and also not very high variances explained by some the elements indicate that there is a long way to go for high level acceptances of green agenda, whether of forests, pastures and fodder development component or of rural energy management component of the SWSDPs in Hosadurga.

It is very certain that the watershed development programmes have ushered in the 'green agenda' in the villages but more changes and improvements are required yet is also a fact of life right now, for the stakeholders of the programmes. Sujala is a unique and innovative programme of rural development is not in doubt. Women find an increasing role in development

**Table 1.** Forestry development and rural energy management (Gober Gas, LPG and kerosene availability)

Sl. No.	Variable description	Loadings (Coefficients)	Communalities (%)
01	FD: Social forestry	0.741	61.1
02	REM: Gober gas availability	0.647	43.7
03	FD: Field hedging	0.628	60.0
04	REM: Improvement in indoor pollution control	0.603	59.9
05	FD: Improvement in grazing / pasture	0.586	51.1
06	REM: LPG (gas) availability	0.581	39.6
07	REM: Kerosene availability	0.530	49.8
08	FD: Agro-forestry	0.505	47.2
Variance explained			8.066
Cumulative Variance explained			31.120
Eigen value			6.534

Source: Data analysis 2009.

that there are activities that make their lives a little more comfortable than ever before is certainly brought to the fore. For example, indoor pollution control, through the use of gober gas or LPG and increased kerosene availability, has implications for making women relieved of age-old drudgery through seemingly the most acceptable green practices. The greenery of the village communities has gone up in thickness, depth and density is borne clearly out by the third component. Watershed plus with its focus on, say, green agenda, is indeed a tool for rural energy management and development.

The problems of rural energy should certainly not be dealt with in isolation. Poverty and dependence on bio-fuels go hand-in-hand. As household incomes rise, people normally switch to modern fuels, if these are available. Higher-income countries also depend much less on bio-fuels than do poor countries. The SWDP is an instrument for improving rural energy management, socio-economic and cultural transformation at grass root level.

## Conclusion

Rural energy management is one component that is rather external to the SWSDP, although concerted efforts have been made to improve the situation in the rural areas as part of the watershed plus approach. It is very certain that the watershed development programmes have ushered in the 'green agenda' in the villages but more changes and improvements are required yet is also a fact of life right now, for the stakeholders of the programmes. Sujala is a unique and innovative programme not only augmenting water and land resources and also solving energy crisis is not in doubt. The problems of rural energy should certainly not be dealt with in isolation in rural areas. Poverty and dependence

on bio-fuels go hand-in-hand. As household incomes rise, people normally switch to modern fuels, if these are available. Higher-income countries also depend much less on bio-fuels than do poor countries. Water and energy resources are so vital to achieve rural development.

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