

# Appropriate Technology Requirement and Impact Projection for Rural Women in Arid Region of India

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**Abstract:** Desert and arid area ecology preserve nature's unexplored treasures. However, in past few decades, global climatic condition has constantly eroded their ability to buffer and cope stresses conditions. Their vulnerability has increased as their custodians, a very sparse population, have been slowly and steadily migrating from these areas. The most vulnerable section of these migrating populations in slums of cities is women and children. Since these areas are usually far away from urban centers, developmental costs have deterred integrated planning initiatives. Hence, it is very important to assess the rural structure in these areas and select appropriate technological intervention from sociological and gender point of view. In this paper, three major areas have been included, (a) microfinance, (b) energy, and (c) information technology. On the basis of surveys in three representative villages and interaction with rural women, appropriate technology have been marked, which may be introduced for the development. Results indicate that women's perspective is quite different. Off-grid sources of energy, enhanced afforestation effort, and ICT intervention are more important from female's perspective against living condition, entertainment, mobile communication and economic growth.

**Key Words:** Appropriate technology, Arid areas, Sociological impact, Women drudgery

## 1. Introduction

Global climate concern, burgeoning population, and energy related issues have attracted researchers towards deserts and arid areas. Deserts offer unique opportunity to understand complex climatological phenomenon. At the same time, it also provides unique opportunity for environmental mitigation by creating carbon stock (afforestation) and a base for future energy supply (very large scale Photovoltaic applications). Nevertheless, preserving unique ecosystem of desert and arid areas – home to rare species of flora and fauna - has been also a challenge, due to mass migration of native people, who have been custodian of these. This needs a developmental strategy to provide them appropriate technology and developmental support especially in rural areas.

Agriculture still takes up a significant proportion of rural activities. However, for women, agriculture is not a question of mere production as research on rural livelihoods suggests (Bebbington, 1999). In order to understand rural structure, a broader context of the social and cultural embeddings of their actions should be taken into account. In rural development issues, often, system analysis, actor-oriented approach, actor-network approach, political economy and post structuralism dominates (Clove, 1997; Kronert *et al*, 1999; Little, 1999; Whatmore, 1999). The ecosystem approach focuses on the calorific obsession, ignores of historical factors, neglects the role of individuals, and use hypothetical or

case-specific boundary definition (e.g. Brossier, 1989; Duivenboden, 1995). Studies based upon actor network theories (ANT) (Clark and Murdoch, 1997) linkages all involved units to give the composition and shape of rural networks. By the use of ANT it is possible to analyze network compositions and how these gain strength (Murdoch, 2000). However, these have proved to be case studies rather than understanding the use of rural space in general. Rural areas continue to follow their own stubborn logics of change and stasis. The limits and possibilities in developing countries, especially in arid areas, are imposed by the structures of economy, ecology and sociology.

The relations between practice and values of rural actors are very important. 'Practice' is actions related to economic activity carried out by individual actors, and 'Values', on the other hand, are traditions, thoughts, and beliefs. Although these often are socially embedded, the focus of this research paper is females as an individual actor. All forms of external intervention necessarily enter the existing life-worlds of the individuals and social groups affected, and in this way are mediated and transformed by these same actors and local structures. Rural sociology and natural resource management along with motives, values, preferences of the females in rural set up is extremely important in decision making.

Earlier, the expansion of large-scale urban industry was believed to create new wage employment opportunities that would draw labor out of the unproductive subsistence

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agricultural sector into remunerative wage employment.

However by the 1970s it had become apparent that the strategy was not, with few exceptions, achieving this goal. It was in this context that more emphasis was placed on informal sector, comprised of self-employed microenterprises. The need to provide credit to fund informal sector activities was stressed. The term 'microenterprise' refers to small businesses owned and operated by poor people or groups of poor people with the support of sponsoring organizations. The provision of financial resources to poor communities was the most important external input to achieve this goal. It was in this context that small-scale microfinance and microenterprise activities emerged in 1970s.

## 2. Microfinance and Rural Women

Development should be viewed as a multi-dimensional process involving major changes in social structures, popular attitudes and a national condition of life from unsatisfactory to satisfactory. In arid areas of developing countries, mass migration of able labour force from rural to urban areas is a major problem. It leaves behind women, children and old age people. Rural development means greater involvement of rural women, who have hardly any credit or means of finance. Hence, micro credit, microfinance and micro entrepreneurship with women as focus remain the only hope to initiate rural development. These can be taken in the greater context of global warming, directed to carbon sequestration such as, giving right on byproducts and timber value of trees planted on public land and cared by rural women; or, providing microfinance for greater accessibility to green energy for rural lighting and cooking; or simply employment and development related initiatives.

International donors such as USAID initiated Small Capital Enterprise Sector (PISCES), Assistance to Resources Institutions for Enterprise Support Project (AIRES) to finance the earliest initiatives. Grameen Bank served more than 2 million members living in 41,000 villages in Bangladesh and had disbursed more than \$3 billion in loans (Jurik, 2005). Bangladesh Rural Advancement Committee (BRAC), Foundation for International Community Assistance (FINCA) in Costa Rica etc. are similar examples. Poor women are represented among the owners and operators of these enterprises and may become the primary recipients of micro credit.

Women comprise the vast majority of the members of microfinance and microenterprise programmes in the Global South. This is because women are the most needy and vulnerable and that the empowerment of women has been sometimes made the major goal of these programmes. Women are also specifically targeted because of their

willingness to participate and stronger commitment. It is also widely accepted that women participating in these programmes have indeed been empowered and that their status has improved. They have also strengthened cooperative relationships and mobilized social capital among peer lending groups. For these and other reasons, many development policy-makers and scholars commend these programmes and believe that they have a useful role to play in a wider, sustainable economic and social development strategy designed to eradicate poverty.

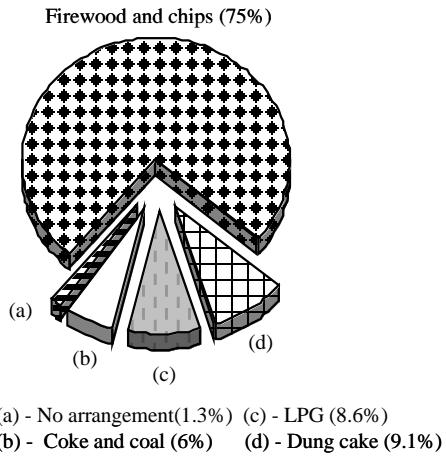
The survey showed that the incomes of households engaged in microenterprise activities increased more rapidly than others. By raising the incomes of even a modest number of low-income families, the demand for goods and services increases, and that this stimulates local production and other economic activities. Increased business activity also creates new employment opportunities, as successful businesses expand and require additional workers.

## 3. Energy and Rural Women

Energy poverty continues to adversely affect education, productivity, health and safety of 1.6 billion people in the developing world, 70% of them are women and girls. Increasing the use of energy or utilizing efficient form of energy and/or energy services helps in reducing poverty substantially. Rural areas in general and arid rural areas in particular cover a broad segment of the population. If it is to be improved beyond subsistence economy, minimum access to energy services must be ensured. However, merely introducing cheap, easily available modern energy for economic activity is not enough to ensure socioeconomic progress. Other factors are also crucial. Its utility lies in facilitating human development. The energy sector has strong links with poverty reduction through income, health, education, gender, and the environment (Saghir, 2005). In arid areas, women needs to be focused since 90% of the energy requirement is in for household sectors. In this paper technology intervention in cooking and lighting needs are only covered.

### 3.1. Cooking

The fuel source in rural areas in India is shown in **Figure 1**. In arid areas, the fuel sources used by households are still fuel wood, crop residues, and dung. Because cooking requires the largest amount of household energy, traditional fuels dominate the aggregate energy consumption for typical rural households. Gathering fuel wood and dung takes 'time', which could be devoted to more productive activities such as farming. As trees disappear, fuel wood has to be sought further and further away. Besides, using dung and crop residues as a fuel reduces



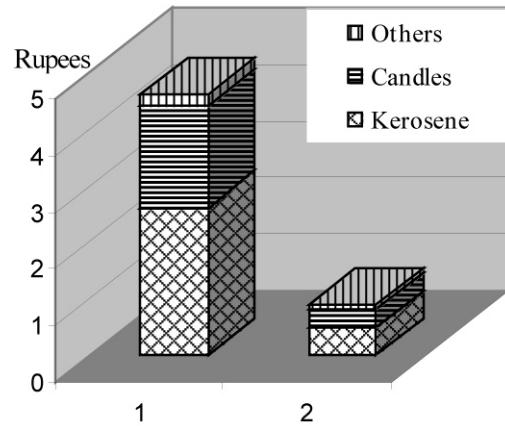
**Fig. 1.** Percentage distribution of household by primary source of energy in rural areas of India.

the amount available for use as a fertilizer for growing crops. Moreover, most biomass need to be collected in large quantities. They are a highly inefficient means of cooking compared with fuels such as liquid petroleum gas (LPG). A kilogram of wood, for example, generates ~1/10th of the useful heat for cooking delivered by a kilogram of LPG. Direct combustion of biomass also damage health since smoke contains carbon mono oxides and several carcinogenic gasses besides excessive levels of shoot. Due to this chronic respiratory diseases are common among women in rural areas. Technological intervention in terms of solar thermal and biogas plants is very important in rural areas. Jatropha with appropriate technological intervention has immense potential to be the major energy source in arid areas in future not only for cooking but also for bio-diesel.

### 3.2. Lighting

Lighting by kerosene lamp is not only expensive but also remains a major source of health problems for rural women. Electricity from diesel generators typically costs around \$0.30/kWh and light from kerosene can cost the equivalent at \$20/kWh. Even with recent advances in solar technology that makes electricity affordable to the poor (no transmission line, no diversion to big cities etc.), there has not been widespread distribution and implementation in rural communities which are most afflicted with energy poverty. A technology gender-gap that excludes women from participating in the technologically based solution of solar energy means that adoption of the technology will be slow and will be overly dependent on outside agents for implementation.

Advances in solar lantern based on white LEDs have been phenomenal in recent years. Twelve of the 16 projects that were awarded the Development Marketplace (DM) grant by World Bank in May 2008 under its initiative, ‘Lighting Africa’

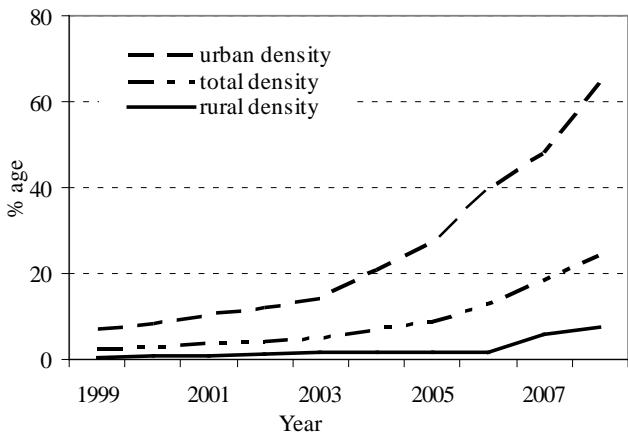


**Fig. 2.** Average Cost of lighting (1) before and (2) after introduction of WLED systems in rural areas per day.

use LED-based lighting products powered by solar Photo Voltaic (PV) application. In Africa rural community preferred solar lanterns for lighting. “Lighting a Billion Lives” initiative is being implemented in selected villages in India. Solar lanterns are found to be popular among users if these are made available on a daily basis at small amounts of money equivalent to the household’s expenditure on kerosene and candles. **Figure 2** shows reduction in expenditure due to White Light Emitting Diodes (WLED) based system. Households that were using, on an average daily basis, two wax candles at a cost of Rs.2.50 each, found the daily rental charge of Rs.3 cheaper. This rent was also found affordable by house holds using about 4 litres of kerosene per month bought at a market price of Rs.28 per litre (Chaurey and Kandpal, 2009). However, for below poverty line households that are eligible to procure subsidized kerosene of up to 3l per month at a unit price of Rs.11per litres, the rental of solar lantern was found to be unaffordable. Technological intervention for creating variable intensity WLED systems with central charging facility using fee-for-service is most suited in arid rural areas. Besides, surveys indicate that in very poor segment, individual model with three sets of lights of 0.3 Watt each and a module of 5 Watt will suit most. This system known as 1 Watt system is introduced in Nepal hilly areas and helped in educating people for Operation and Maintenance so that they could shift to higher intensity WLED system at a later stage depending upon their requirement.

### 4. IT and Rural Women

One of the most important preconditions for the full and comprehensive implementation of sustainable development is the need for a sustainable information society. The world has become a global village where people from one place learn about happenings in many other places over the globe. It



**Fig. 3. Penetration of mobiles in rural and urban areas.**

allows countries to leapfrog stages of economic growth by being able to modernize their production systems and increase their competitiveness faster than in the past. The most noteworthy example is that of the Asian Pacific economies. Information and Communication Technologies along with traditional mass media reduce the burden of traveling and exploitation. Dissemination of information has made it easy for business from a remote area, learning process, health issues and adaptation to new development with least strain.

Rural women hardly access to market and are often duped even by their family members. The penetration of even mobile technology in rural areas is negligible (**Fig. 3**). Women have practically no access. Simple access to information technology will provide them insight into the market will change their lives, as they will know when and how to sell their products and that too at what cost. This can be achieved by small self sustainable Rural Information Technology (IT) kiosk. An experiment in rural areas of hill side Nepal, such IT kiosk reduced the middle man's margin and increased the profit of rural women growing vegetables for market in Kathmandu by approximately 200%.

Introduction of new and appropriate technology in arid areas needs three components - (a) Renewable energy powered system, (b) Internet availability and support, and (c) Facility of knowledge dissemination in local language.

## 5. Conclusion

The main ingredients of development are the people themselves who should state their development goals for their own communities, and how these development goals will be achieved. The technologies can be part of these strategic tools to be used towards the achievement of the development goals. Nevertheless, it is evident that in remote areas and rural areas,

which have witnessed large scale mass migration by able labour force to urban areas, technology intervention should be women centric. Appropriate technology must be based upon availability of finance and renewable energy with ICT support.

Last year, monumental changes were marked in incorporating women's perspectives and gender concerns in the negotiating texts on climate change. Similarly in arid areas, the need of advancing women's participation should be recognized for development related intervention and new technology introduction.

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