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in den Tropen und Subtropen

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Assessment of the economic performance
of a solar thermal water pump for irrigation in semi arid India

Diplomarbeit

im Studiengang
Allgemeine Agrarwissenschaften

Fachrichtung III
Wirtschafts- und Sozialwissenschaften
des Landbaus

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Stuttgart – Hohenheim

September, 2003

Diese Arbeit wurde gefördert aus Mitteln
der Eiselen-Stiftung, Ulm

11 Conclusions

In most developing countries one of the major causes for lack of economic development is the shortage of energy. In the case of Andhra Pradesh, this impact is greatly felt in the rural areas where most of the population resides. Transport to and distribution within small towns and villages becomes extremely challenging due to low population density and high intervening distances between settlements. Power supply for agricultural purpose is insufficient and lack of energy for irrigation regularly results in crop failures with drastic consequences for many farmers.

With a solar pump, energy is not available on demand, and the daily variation in solar power generation necessitates the storage of a surplus of water pumped on sunny days for use on cloudy days. In view of the fluctuating water demand of any irrigation scheme, solar energy needs to be reserved in the form of either electricity in batteries or lifted water in a storage tank. The suitability of solar power for lifting water to irrigate plants is undeniable because of the complementarity between solar irradiance and water requirements of crops. The more intensively the sun is shining the higher is the power to supply irrigation water while on the other hand on rainy days irrigation is neither possible nor needed.

The theoretical analyses of the solar thermal system developed by Stiletto Engineers showed that this system can be a useful device in areas where power supply is insufficient. It has become obvious that the SSP can be successfully integrated into small scale farming systems. Short-term fluctuations in demand and supply should be covered by a water storage tank, while long-term variation can be accommodated by cutting the peak water demand with careful planning of cropping patterns.

The constant fall of ground water tables due to overexploitation of ground water resources is another major problem in many parts of the state.

Generally it is not economic to lift water for irrigation through very high heads because increasing the lift increases the cost, and the cost of supplying water for irrigation should not be more than the value of the additional crop that can be grown.

The concept of watershed development and management starts with the assumption that water is the most limited resource in certain areas of the semi arid tropics and that falling groundwater tables will be a serious problem, as regards increasing and sustaining agricultural production in the long run.

It concludes that agricultural production can be increased and sustained if water management is improved. Therefore, it chooses the watershed as a logical and manageable unit of the water system for its development efforts. (Adolph 1998)

If water management is to be made a truly self sustaining technology, farmers should see an economic advantage in creating and maintaining the groundwater table at relatively shallow levels. If water lifting devices based on solar-powered engines were available at sufficiently low cost to compete successfully with conventional motors, and if these were introduced on a large scale, then such devices, which operate best at heads of up to 7 m, would automatically provide an incentive to farmers to pay attention to the groundwater table and to ensure its maintenance at the desirable shallow level. (Adolph 1998)

For a successful introduction of the SSP into the Indian market, several steps have to be taken. These would need to lead from the present prototype via a small series of operational units for advanced field trials to a first batch of several hundred units for extended field trials, within and outside India.

In view of the steadily worsening energy situation and the viable alternative offered by the SSP, early support and investments in the SSP production would be desirable. It is common knowledge that our available fossil fuels are not going to last for ever and the inevitable energy shortage will hit the poor countries most. In such scenarios, products like the SSP offer hope for the future.