Towards an Integrated Self Sufficient Village Technology

One of the serious problems confronting most of the industrial countries today is the negative cost of industrialisation. Pollution and ravage of the countryside has been the end result of 150 years of uninterrupted industrial growth. In the Third World, on the otherhand due to shortages of capital, heavy industrialisation as it occurs within the Western nations for the time being at least appears unattainable. Arising from a combination of these two factors, namely of the dysfunctions of heavy industrialisation, as well as the lack of resources for heavy industrialisation in the Third World, new approaches for increasing productivity are being attempted.

A highly commendable system is the use of an integrated approach that uses easily available resources in the tropical areas like water, land and heat of the sun. In this process, by the aid of integrated techniques attempts are made to coordinate aquatic and land ecological systems in such a way so that a combination is made for the tapping maximum productive potential of both these systems. Some of these experiments, recounted here, have been tried out in Papua New Guinea at Port Moresby and have proved successful.

Objectives of the system

Some of the fundamental objectives of such a system are:-

* To conserve soil and water by a scientific method which reinforces the biologically natural cycle, avoids air pollution and provides at low cost a balanced supply of food right throughout the year.
* To isolate and destroy certain pathogenic agents responsible for many tropical diseases.
* To produce algae,fish and certain water plants to be used as food for humans and animals.
* To produce natural fertilizers which are biologically purified, and agriculture based on intercropping and diversification.
* To produce a source of energy which will be available at village level, (for certain domestic requirements such as cooking and refrigeration), and to provide energy for small industries producing agricultural by-products such as cornbeef, etc. which will serve to reduce the goods imported from outside the rural sector.

Integrated Rural Development

The system at Port Moresby of integrated rural development is based on the cycle: water — waste products — fuel — food. It is interesting to observe how the total cycle works, specially the interactive effect of Sun, Water, Algae, Fish and Duck ponds, Oyster ponds etc.

In this domestic waste, as well as animal waste enters a fermenter which due to the effect of sunand water gives out gas as a by-product. (See the June 1975 issue of the **Economic Review** on experiments in Sri Lanka on Methane production using the same process). The Methane drives a motor and eventually could provide electricity. The Methane output therefore can directly or indirectly lead to the provision of light, refrigeration, fish preservation (for fish provided by the integrated system) drying and smoking room, slaughter house, family workshop, small industry and water pumps.

The sediment from the fermenter is fed into ponds where algae breed due to the effect of sun and water. Algae thus growing in the ponds provide a high nutrient food animals which are fed into the fish and duck ponds. The output from the fish and duck ponds feed into the garden in the form of water and minerals, fertilizer which provide food for men and animals. Thus this integrated rural development technology provides for a self sufficient ecological system which gives power for domestic and industrial use, as well as food. Another noteworthy point here is that the horticultural gardens do not use pesticides and minerals with their present day high costs and high tendencies to contaminate.

The paragraphs below describe the various steps in the interlocking chain in this process.

Shelter for Animals

Octagonal in form, it is closed in by a fence and has a roof of local material, this shelter has a cement floor inclined towards the centre where the fermenter and the decanter are installed. The animals can be cattle, goats or pigs. Poultry sheds can be installed above them.

The droppings of the animals are carefully swept by a jet of water and collected and sent along the drain to the fermenter where the matter is decomposed with water and smoke and produces methane.

The chicken waste falls into another drain made of fibre glass and is sent to the fermenter in the same manner without any contact with the animals below.

Fermenter

This circular fermenter is made of fibre glass and has a capacity of 1000 gallons. It daily produces methane gases for about 60 kw/h. Simple pipes take the methane to places where it can be used for cooking, lighting and for feeding a small electric motor used for pumping water, etc.

The decanter is also circular and is made of fibre glass and has a capacity of 1000 gallons. It has a fibre glass cover which can be taken off twice a year cleaning. It has a pipe for aeration. The purifying filter is constructed in blocks of cement. It only functions intermittently when the animal shelter is washed. It can take 500 gallons.

Algae Ponds

These three ponds which are shallow are made so as to enable the maximum penetration of sunlight which permits an intense cultivation of algae. The bottom of the pond is made of clay and covered by 10 cc. of sand in order that fine colloidal particles should not prevent the penetration of sunlight. The algaes are collected every afternoon and mixed with other cattle food, or dried in the sun for further use.

Fish and Oyster Ponds

The 20 fish ponds are smaller than the algae ponds but with a layer of sand. These fish ponds are 61 metres x 5 metres and 1.5 metres deep, and are constructed in a long and narrow manner designed to facilitate "fishing." Different species of fish can be reared together or separately. One estimates that these ponds can produce more than 10 tons of fish alone. These fish can nourish both humans and pigs.

Small water plants can be collected from rivers and placed in plastic tubes of 10-30 cm. in diameter where they grow rapidly. The oyster ponds are made of fibre glass.

Horticultural Gardens

The water coming out of the fish ponds and tubes, which are rich in minerals, are conducted to the garden by underground pipes. As we have seen, a careful choice of rotation of crops enables one to obtain 10 suceessive diversified harvests, without recourse to pesticides and chemicals, with the exception of a minimum quantity of manure when transplanting paddy.

In this way, one can cultivate for example, rice, wheat,sugar cane, many vegetables and a large variety of soya beans.

Industry

One conceives that under such a system the cost of fuel production will be low. One can also see that this fuel can be constantly replaced. If one desires more methane one will have to rear more cattle, which will mean more fish. If water is available in sufficient quantity, industrialisation is possible.

Logically, one begins with refrigeration for the preservation of fish and water plants; the waste of the fish mixed with vegetables can be used for feeding cattle.

One can turn then towards many other industrial projects such as a slaughter house, an oil refinery, the making of margarine, sauces, soap, paints, plastic, candles, paper, ropes, brushes, cosmetics, disinfeeants, insecticides etc.

This combined integration of diverse activities can reduce malnutrition and rural under-employment. When self-reliance in these products is achieved in the rural area, commercial change can be progressively extended.