

BAKLANDESH is one of the most densely populated countries of the world with enormous environmental and sanitation problems. Water borne and diarrhoeal diseases, poor sanitation coverage, chronic malnutrition and high child morbidity are the major impediments to development. Traditionally rural population extensively use open water bodies for bathing and other domestic chores which are highly contaminated from rural waste water. These water bodies contain an alarming degree of fecal matters, domestic, agricultural and cottage industry run off. Majority of the urban and rural communities do not have any collection and treatment systems for their waste water. Modern waste water collection and treatment systems existing in developed countries are prohibitive in construction and operation cost, requiring large capital investment. Countries like Bangladesh with their critical development priorities and resource constraints can hardly afford to invest in proper management and treatment of their waste water.

Lemnaceae based waste water treatment system has several advantages over other systems such as:

1) The duckweed system is low cost to construct and profitable to operate.

2) It is an organic and environmentally friendly system that uses appropriate technology managed and operated by the community users.

3) Existing resources like fallow/derelict water bodies, waste water, excess labour are productively used bringing enormous benefits.

4) It intensifies natural eco-systems without degradation of the environment. In fact natural agriculture park like conditions are created out of marginal fallow land, appealing to human, birds and animals.

5) Through nutrient recovery from waste water a high quality duckweed biomass crop is produced which in turn increases protein production for the community mitigating nutritional problems.

6) Potential for creating employment for the community bringing economic benefits to the people.



Community Management of Environmental Sanitation (Duckweed Based Waste Water Treatment)

Lemnaceae (Duckweed) is a macrophyte or a small aquatic plant, occurring naturally in most water bodies. Under favourable conditions duckweed vegetatively multiplies rapidly feeding on nutrient from the growth media. Duckweed crop contains 35-45 per cent protein by dry weight and is rich in other minerals like Beta-carotene and Xanthophyll. Regular harvesting of Duckweed from the growth media actively removes nutrients from the water body.

PRISM is operating a duckweed waste water treatment system in Mirzapur, successfully treating Kumudini Hospital Complex's waste water representing 3500 users, for the last four years. The treatment standards both chemical and microbiological achieved consistently meets strict EPA (Environmental Protection Authorities) standards.

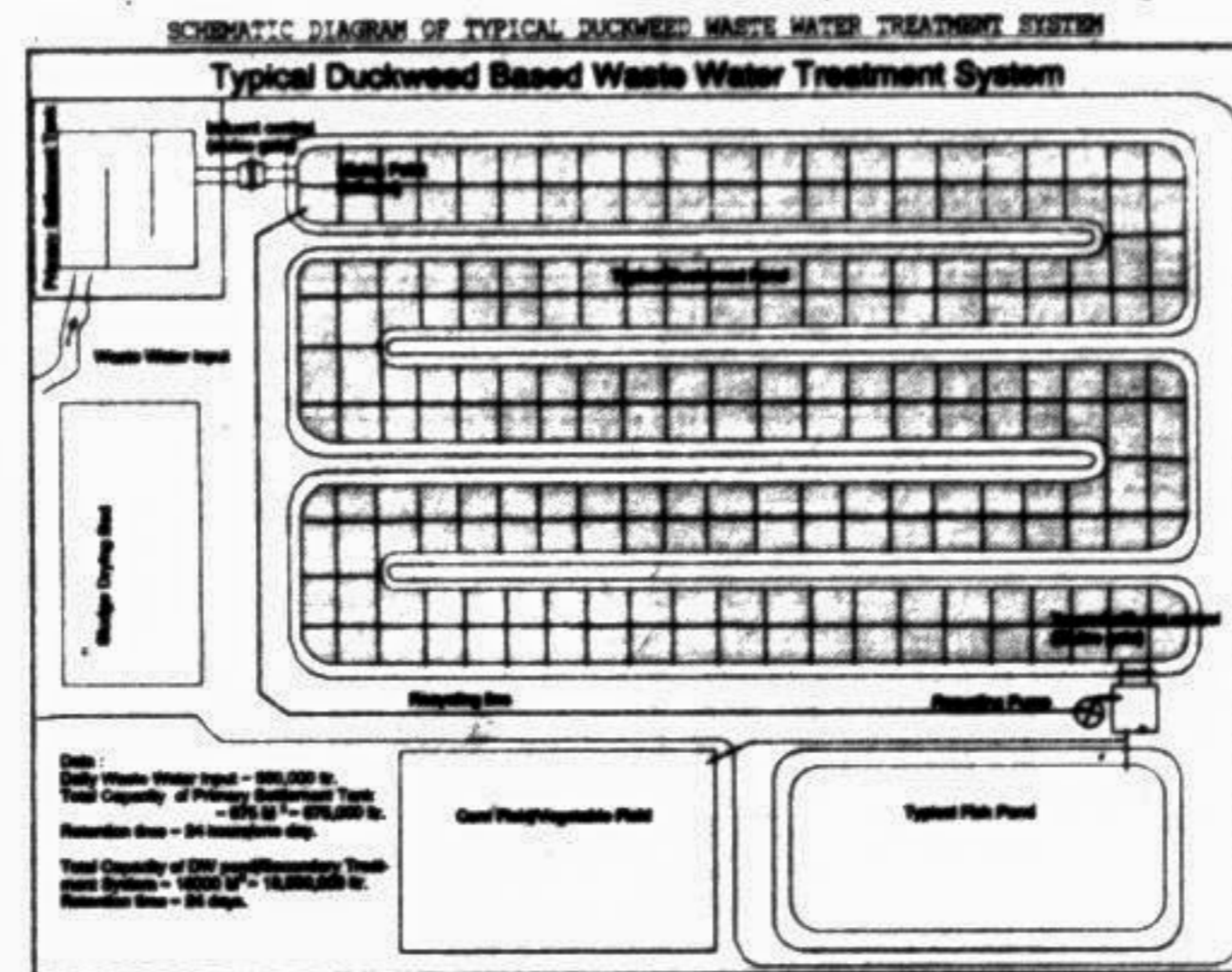
Elements	EPA standard (for USA)	Achieved results from Mirzapur DW Waste Water Treatment System
Ammonia	≤ 1 mg/l	0.5 mg/l
Nitrate	≤ 1 mg/l	1.0 mg/l
Phosphate	≤ 1 mg/l	0.2 mg/l
pH	7	6.7
TDS	≤ 10 mg/l	1.78 mg/l
BOD	≤ 10 mg/l	8.56 mg/l
Total coliform count	≤ 100/100 ml	100/100 ml



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Should be analysed for toxic elements and heavy metals. If found, disposed off in the recommended manner. If not, used as agricultural manure.

Secondary Treatment (Duckweed Plug Flow): Duckweed plug flow consists of a shallow pond system designated to allow effective cultivation of duckweed and incremental treatment of waste water stream. As such, the system must enable efficient harvesting and maintenance of duckweed crop, while also preventing short circuiting of the waste water flow. Maintenance of efficient duckweed growth requires even distribution of a thick layer of plants across the entire lagoon surface. This has the additional effect of shading the water below from sunlight preventing algal bloom. Continuous farming of duckweed involves proper management of temperature, sufficient nutrients availability, pH of the water, crop stabilization, density of standing crop and wind protection. Earthen berms, peripheral crop and bamboo grids



are used to protect crop from wind effect and maintain desired density. The size and capacity of the duckweed la-

agoon is dictated by retention time of 20-22 days which is needed for significant pathogen removal. From a typical duckweed waste water treatment system daily harvest of 600-800 kgs/ha is easily achieved. In Bangladesh and countries with similar climatic conditions year round duckweed farming is sustainable. Daily duckweed harvest can be applied as fish feed without processing and after drying as feed ingredients for poultry and cattle.

Tertiary Treatment: Lemnaceae plants do, nevertheless, provide a complete waste water treatment engine. Starved Lemnaceae plants - i.e. plants unable to find sufficient nutrients to maintain rapid growth - undergo a remarkable metamorphosis: plant protein drips below 20 per cent; fibre content goes up; roots become long and stringy; fronds become larger and discoloured; and most importantly, they begin processing huge amounts of water in their search for sustenance. In the process, they absorb - as ash - virtually everything still present in the waste water. Tertiary treatment is achieved in the last leg of the lemnaecae plug flow system.

Fish pond: Fresh duckweed crop harvested from lemnaecae waste water treatment system is best utilized as fish feed without processing. In Mirzapur polyculture of carp are being successfully conducted primarily on duckweed feed at the rate of 10 ton/ha/year. Consequently fish farming based on duckweed feed is a profitable and compatible activity with lemnaecae based waste water treatment system. Fish pond of equal capacity as the lemnaecae plug flow system suitably upgraded is used for rearing carp. Use of duckweed feed reduces risks in intensive fish culture by maintaining pond water quality at the same time supplementing essential vitamins and minerals in fish feed preventing diseases. Treated effluent from waste water treatment system can also be used for irrigation of fish ponds. Combined duckweed based waste water treatment and fish farming ensures considerable revenue for the system to sustain waste water maintenance and management by the community.

The typical treatment results achieved by duckweed plug flow system (see the table).

Gono Unnayan Prochesta (GUP)

GONO Unnayan Prochesta, in short GUP, has been working since shortly after the war of independence of Bangladesh. At the initial stage GUP assisted the distressed communities in areas where Pakistani Army repressions were very severe in Rajshahi (Thana of Madaripur district, 117 miles South West of Dhaka). The initial assistance was supplementary feeding for thirty three thousand mothers and 33000 severely malnourished children. The relief and emergency supplementary feeding continued for one year. This was followed by help building houses and in the rehabilitation of hundreds of skilled people in their own profession. GUP had to undertake massive relief, rehabilitation and works programme immediately after the 1994 flood and famine. Thousands of people were benefited by these services. Similarly GUP had to undertake massive relief operations after 1996 and 1998 flood and after 1991 cyclone. Thousands of families were benefited by these services. Immediately after the 1991 cyclone people of Rajshahi area donated truck loads of rice, daal and Sarees and lungis and the bakery at Rajshahi produced high protein biscuits to be distributed to the cyclone victims of Chittagong. GUP did not have to wait for any airlift for any high protein biscuits from abroad at a very critical time.

The comprehensive community health programme well known as JSS Jono Shasthya Sheba being the oldest of the programmes, has a broad based vision to ensure sustainable healthy environment where everybody in the community will have complete physical, social & spiritual well being leading towards a just & peaceful society. The JSS programme, has over the years, launched various inter-related components under 2 district and separate divisions:

(1) Resource & outreach unit (2) Medical service unit.

The Resources and outreach unit is mainly responsible for mobilization, organization building and community participation for the improvement of the status of health the people through health education and for monitoring and evaluation of the impact of the services of the Village Health Volunteers, TBAs, Paramedics and the Village Health Committee.

The Medical service unit covers the curative aspects through a unique 30 bed children health centre, MCH Care, Immunization, TB Control, Pathological tests and outdoor services. Promotion of traditional & herbal medicine is emphasized with a herbal unit in the programme which is supported by a kaboraj.

GUP is also committed to work for the cause of women development, gender equity and against exploitation. To assist the economic development of the rural women GUP has taken projects under women and children development programme. These are batik, handicrafts, bakery, food processing, Day care centre, improved oven and type training centre, workshop, seminars and training programmes.

Recently GUP has established hatchery in Bajitpur of Madaripur district with the financial assistance of British High Commission. At the initial pilot phase the annual production of the hatchery has been over 200000 fingerlings. These have been released in the ponds of the Samity members.

World Vision

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trines and giving curative healthcare. In 1994, about 3,779 children received EPI vaccines from the child survival projects before their first birthday while a total of 20,701 women of child bearing age were immunized against tetanus in the same period.

World Vision also responds to critical health needs of individuals, especially children through Social Welfare Outreach Project in Dhaka.

Providing Dignity to Women

World Vision is committed to helping women gain proper place in the society and redressing injustices they face in the male-dominated society. Our women development and girl child programmes promote gender issues, provides educational and skills training and ensure credit facilities for poor



women. World Vision also places emphasis on involving more women in leadership and management positions.

Mitigating Emergencies

Responding to emergencies is one of the World Vision's prime objectives. It provides rapid response to victims of war, floods, drought, famine and cyclones giving them life-saving assistance of food, shelter, clothes and medical care. After the devastating cyclones of April 1991, our relief and rehabilitation assistance totalled Tk 11,07,88,560 (US\$ 3,077,460). World Vision has also built 11 cyclone shelters along the coastal area at a total cost of Tk. 7,60,00,000 (US\$ 1.9 million).

Our Finances
World Vision's funds come mainly from individual donors known as sponsors.

A World Vision loan enable to raise chicken to bring economic solvency to family.

living in many different countries in the world. Besides this, World Vision also receives financial resources from government aid agencies such as Overseas Development Assistance (ODA), AIDAB, USAID and CIDA.

We have recently started to raise funds in Bangladesh through various means such as sales of T-shirts, greetings cards and 20-hour famine programme. We are also looking forward to acquire individual sponsors in future to support our programmes to help thousands of poor children in this country.

For the last 23 years World Vision has been a beacon of hope for thousands of distressed and despairing people in Bangladesh. Our vision is to work towards a society transformed through practical expression of love, a society in which all people will be able to meet their basic needs of body, mind and spirit.

A Quiet Revolution

Continued from Page 11 (US \$1,500). Proshika defines a self-sufficient group as one that has savings of at least 60,000 Taka, needs no outside credit and where members are earning at least 1,000 Taka (US\$25) a month. Proshika is carrying out a study on self-sufficiency and estimates that at least 300 groups are now self-sufficient.

A national task

The rapid transformation of the situation of samity members from stark poverty to solvency has had an effect on people both within and outside Proshika's intervention areas. Seeing the development process at work has brought a shift in people's views about group formation and NGO activities from an extremely negative to a positive position.

"Although I am a poor marginal farmer, I did not wish to join the Proshika samity in my village," says Abul Kalam Azad, a wiry man in his 30s from Bihar Uttar Para village in Shibganj. "I could not believe that the poor could ever do anything." But as the years went by, Kalam's opinion changes. "I felt like a fool as I found that the samity members were all working on income-generating projects with Proshika loans. Then I also wanted to be a member of the samity. But the members said they did not want to increase

their membership." Kalam was undeterred. "I myself started a samity a year back with my brothers," he says. "I just copied the activities of Proshika and started with three Taka a week savings per member." Slowly, other villagers joined him and the membership of Kalam's group increased to 15. "We already have a 2,000 Taka [US\$50] fund from our weekly savings. When the fund gets a little bigger, we will start projects like cow-fattening or buy a rickshaw van."

Khodeja Begum of Gobinder village, Singair, was prevented by her husband, Halimhad, from joining the samity. "He said NGOs corrupt ladies and... suck out money from the poor," explains Khodeja. After a few years, Halimhad changed his mind and himself insisted that Khodeja join the women's group. "But to join the group, I had to deposit the equivalent savings of every existing group member," says Khodeja, "and I do not have that much money." She is now waiting for a new group to be formed in her village.

Ramizuddin Ahmed, former chairman of Singair Union and a local jotdar, says: "When Proshika first started their group formation here, we were sceptical about their activities. We thought that the NGO and the poor would

together create anarchy in the village. But soon we found out that the groups were doing good things. Unemployed men and women who used to loiter around, some of them engaged in petty theft, became productive and socially conscious. So we now try to help them whenever we can."

The secretary of the Singair Union branch of the Communist Party of Bangladesh, advocate Mohammed Abdul Huq Khan, finds Proshika's approach quite different from his own party's line of thinking. "Proshika does not influence the people politically. Rather it is helping the left-outs of society," he says. "But I think it should discuss its development programmes more openly with local leaders and politicians and should seek their participation in development."

"My notion about NGOs was that they make people dependent on loans and that most of their money is wasted on Pajeros [four-wheel drive vehicles]," says an official in the thana administration. "But my experience in Singair, Dhamrai and other places is different from what I used to think. Proshika is turning the hands of the poor into productive tools. Now I believe, without NGO intervention it is impossible to eradicate poverty in our country."

"We are politically antagonistic to NGOs because we see them as the new East India Company," declares Mohammed Abdul Kader, general secretary of Singair

Thana Jatiya Party (the third largest opposition party in the country). "But what I find here is that Proshika is giving new life to the poor. Nobody in society had ever bothered to look at them, but now, these poor are overcoming their poverty. This is a national task done by Proshika."

Dusk

Fifteen men are gathered in the open space in the centre of Azimpur village after dinner. The light from the kerosene lamp dances on their shiny work-tired faces. Tonight is the Azimpur Shramik Samity's meeting to discuss what new projects the members should start next year. One says they should buy a power tiller, but many disagree because this involves too much money. After some discussion it is agreed that they will go for small businesses and vegetable gardening.

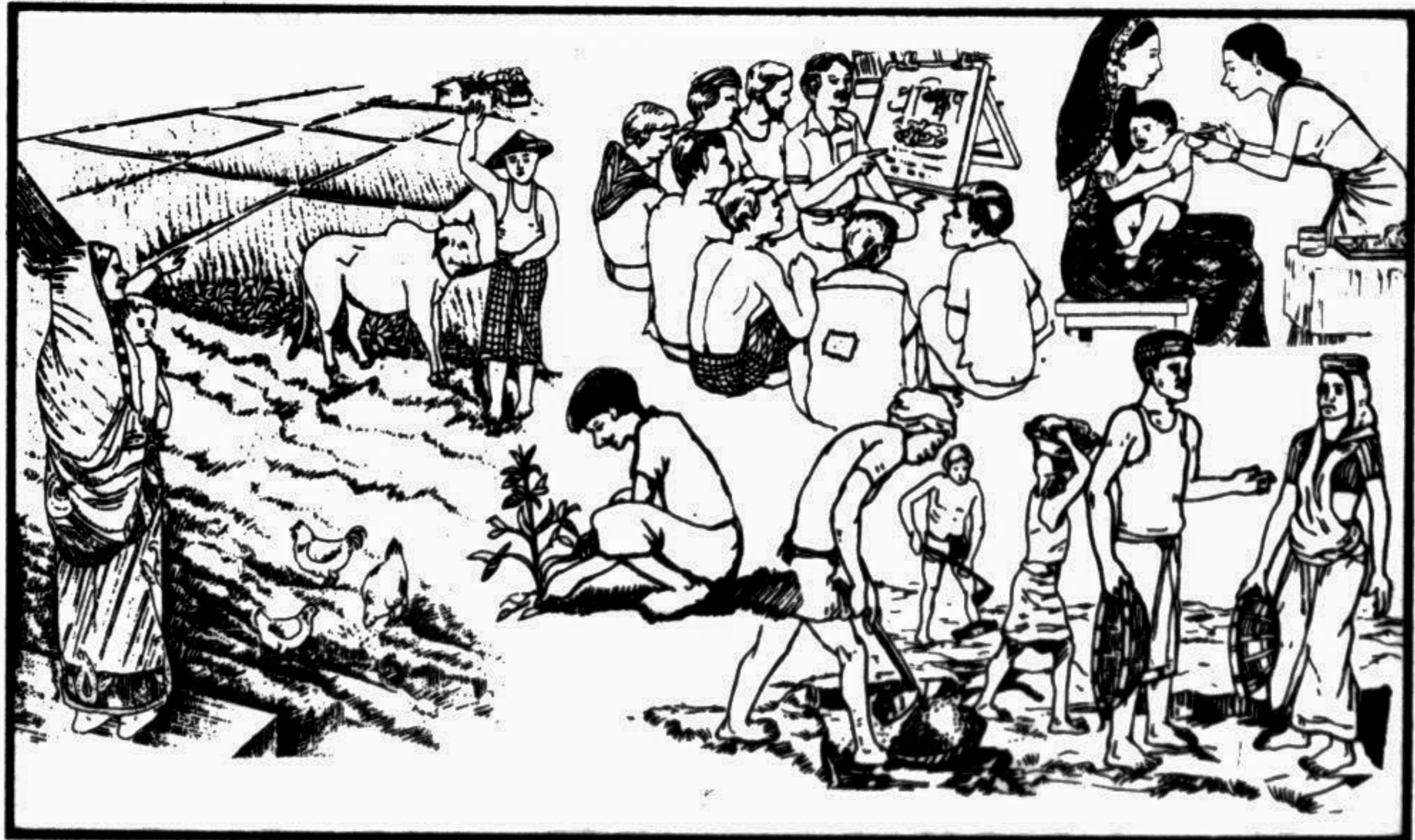
After about an hour, the men return to their huts to sleep. They have come a long way from poverty and nothingness. But for the villagers of Azimpur, there is no looking back any more.

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Marching hand in hand - towards making a just society
We are promise bound to contribute to the nation building

And

Let the coming years be filled with peace and contentment



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