

Night Soil as an Economic Resource

11.1 LABOUR AND ORGANIC RESOURCES IN THE INDIAN SUB-CONTINENT

*John Briscoe*¹

Utilizing human excreta

Human excreta are seldom conserved in the Indian sub-continent, but cow dung (*gobar*), crop residues, vegetable wastes, and water weeds are used for various purposes in the frugal village economies—for cooking food, fertilizing crops, feeding animals, and constructing buildings. Recognizing that traditional practices were often wasteful, scientists long ago devised methods for the efficient production of fertilizer and methane gas from these materials. By contrast, conventional economic planning has considered these issues to be unimportant, though the so-called 'energy crisis' is forcing some revision of this attitude.

Change is also taking place in the health ministries of poor countries. After decades of frustration with the disinterested response of villagers to latrine programmes, health planners are hoping that people who are given the means for producing fuel and fertilizer from their excreta may change their defecation habits.

The use of human excreta cannot be considered in isolation from the use of other organic materials. Human excreta will usually be digested with these materials, first because the quantity of excrement from one person is small and consequently the products are, on a per capita basis, small—and second, because human excreta is rich in nitrogen and can be mixed with carbon-rich matter to obtain carbon-to-nitrogen ratio suitable for efficient digestion.

So we know that resources are being used inefficiently, and that the technologies for improving these efficiencies are available; the problem is one of implementation. Some of the relevant technologies, particularly composting and the production of biogas, have attracted much interest as 'appropriate technologies', and in India, biogas is given official support with soft loans and subsidies for those investing in the equipment. But it is the farmers with most land, not the poor, who are benefiting, and there are many signs that the thrust for appropriate technology is coming from the top, and only helping those near the top. It is an imposed technology² when seen from the villager's viewpoint, and it is not always appropriate to the social and economic arrangements of the rural poor.

When I first went to India, I thought that appropriate technology was something new and very bright. I was brought down to earth in talking to Indians who had been around at the time of Gandhi and who had been thinking about the need for technology to be appropriate in the same terms thirty years ago.³ In speaking with them about why they had failed, I found that there had been nothing wrong with their ideas, which often had high-level support in the government. The problem was that nothing was ever done to change the institutional arrangements that blocked the progress of these technologies. I think that the lesson we can draw from Vietnam and China is that, in these two countries, appropriate technologies are applied in parallel with the institutional changes that could make them work. To ignore these factors is to risk joining the 'stampede to quick solutions'⁴, oblivious of the reaction of local people to new, apparently beneficial opportunities.

In fact, what we shall find is that the 'appropriate technology' of biogas production from waste is only appropriate to those farmers who have broken out of the traditional economy into the market economy. When looked at in that context, it emerges that biogas production and other improved waste recycling schemes may even act to impoverish the rural poor—the very people who the advocates of appropriate technology would most like to help.

One reason why these facts are not recognized is that our thinking is often influenced by the neo-classical economists' way of comparing different technologies, for example, in cost-benefit analysis. But the economists' approach is only appropriate to the market economy; it is not very useful for dealing with non-commercial resources⁵ such as wastes, especially within the traditional economy.⁶ Indeed, to understand the traditional economy, we need a different approach—and the key to that is to understand the way labour is organized. In this context, labour organization is 'only another word for the forms of life of the common people'⁷.

This means that we need to understand certain social relationships in the community, and how they have developed historically, if we are to understand how that community uses the available resources.

'Customary' payment and resource use systems

The agricultural system which is referred to as 'customary' or 'traditional' in the Indian sub-continent is of relatively recent origin. Starting with the permanent settlement of Bengal in 1793, the British promulgated a series of radical land tenure ordinances. These succeeded in dissolving the ancient ties and usages of the villages, 'assessing and parceling out the lands which from time immemorial had belonged to the Village Community collectively.'⁸

Under the system that was created by these measures, social equilibrium depended on the surplus produce of peasant farmers being transferred to powerful local 'patrons'⁹ in return for some minimal security.¹⁰ The revolutionary effect of the changes of land tenure was that now, 'patron-client relationships stemmed directly out of the possession of differential rights in land'¹¹. All those working for

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a landowner, whether as tenants or servants, or as 'independent' artisans, tended to become his clients.

What are the benefits to patrons and clients of these relationships, which are still the norm in many parts of the sub-continent?

For the landowning patrons as a class this system provides a means for extracting the surplus value of labour while simultaneously ensuring social equilibrium. For individual landowners, too, there are benefits. Bigger landowners lease out land to tenants and sharecroppers in part to reduce their management problems and in part to assure a supply of labour during planting and harvesting when manpower shortages are common¹².

Poor villagers foster ties with powerful patrons as a way of reducing risk and improving stability. An ideal patron not only provides his clients with work and income, which is customarily paid in kind at the time of harvest, but also helps them in every way he can. 'He intercedes on the client's behalf with officials of local self-government bodies or co-operative societies, to secure for him a benefit or contract, introduces him to a lawyer or doctor, advances him a loan to meet an emergency, and tries to influence decisions in his favour in disputes.'¹³ He also looks after 'the welfare of the client's children, particularly in the way of education and employment'¹⁴. A well-off person courts unpopularity if he does not maintain his side in these relationships, or if he neglects to sponsor village events and carry out community work.

Peasants have few options for meeting their needs for fuel, fertilizer, fodder and construction materials and their economies are consequently frugal in their use of organic materials.¹⁵ The per capita availability of many of these resources is declining rapidly over large areas of the Third World.¹⁶ In rural Bangladesh, the scarcity is manifest. Fuel collection has become a major task for women and children¹⁷; the number of *bichas* (village trials) arising from disputes over the ownership of trees, crops residues, and other fuel sources is large and increasing.¹⁸

The distribution of these scarce resources is governed by those mechanisms which control the distribution of food and other valuable commodities. A traditional landowner in Comilla District, for instance, may neither compost all of the available rice straw nor burn the straw on the field, where the ash is valued as fertilizer, but is expected to allow clients to clear a prescribed area of the harvest paddy field. Similar privileges may be extended for the collection of *gobar* from the cows of the rich. So a programme for the utilization of human excreta with the dung from a farmer's cows and the straw from his fields may not be attractive to the farmer, since the benefits may be insufficient to warrant the risk of damaging his customary relationships.

An awareness of these distributive mechanisms allows one to appreciate that when villagers are unenthusiastic about an innovation which urban or foreign 'experts' have thought up, 'it is because the latter are insensitive to the full implications of the innovation at the village level'¹⁹. The villagers live in complex, multistranded relationships with each other and with landowners²⁰. To use straw or dung in a new way may threaten some part of that relationship. To use night

soil, however, would not affect the relationship; the rich might object to it on grounds of ritual purity, but the poor would probably welcome it²¹. Innovation seems to work best when it involves something entirely new, and does not involve any attempt, 'to change the traditional methods and techniques of production'²². Thus there may be fewer barriers to introducing the use of human excreta than to altering the customary uses of rice straw and *gobar*.

Current changes in the resource use system

With the adoption of high-yielding crop varieties and mechanization of agriculture, the 'traditional' system has begun to disintegrate. In Purnea District of Bihar, as land values rose five-fold²³, payments in kind, sharecropping and the employment of permanent labourers gave way to money wages, owner cultivation and the hiring of daily labourers²⁴.

These processes are also under way in areas where there have not been dramatic increases in productivity, which is the situation in Bangladesh²⁵. There, the decline of the traditional system and the rise of the market economy has led to a dramatic polarization in rural society. In the decade since 1966, about 15 per cent of households have increased their incomes, while the percentage of landless to total households has increased from 18 to 38 per cent²⁶. Real agricultural wages have declined by nearly half, and nutritional standards have fallen drastically.

The causes of these changes

The customary system provided a channel through which rich and poor could reach their respective goals of power and security. A change now in the opportunities of patron and client alters the relative bargaining position of the two parties and consequently tilts the balance in the customary relationship: the terms of the relationship may change, or the ties may even be dissolved. In Bangladesh, several factors have contributed to the tilting of this balance against the poor, including:

- (a) the impact of high-yielding crops,
- (b) increased income from non-agricultural sources,
- (c) decline in the availability of slack resources such as unused land, common pasture, and free fuel,
- (d) changes in labour supply and demand.

It is probably the last of these which has had the biggest effect on Bangladesh.

With regard to high-yielding crops, if everyone has equal access to the new technology, modern agriculture offers the possibility of improving the lot of all. Since the demand for labour increases with the adoption of high-yielding crop varieties, even the landless could be better off. The hitch is, of course, that even in the better co-operatives in Bangladesh, the rich have access to new inputs which are denied to most of the small landowners and the landless²⁷. Differential access to resources increases the squeeze on those who do not have access to the new technology—people are forced to sell land, sharecroppers' rents rise, and cultivators are evicted as landowners realize that it has become more profitable to work the

land themselves.²⁸ Market mechanisms are strengthened and traditional relationships decline.

In parts of Bihar, this process is associated with the introduction of new seeds and fertilizers, but in Bangladesh, where these innovations have played a much smaller part²⁹, similar changes are occurring for other reasons. One factor has been a low rate of growth in agricultural production³⁰. At the same time, employment outside agriculture has barely increased, so in fact, the share of agriculture in total employment *increased* to over 80 per cent³¹ in 1968. The result was that by the late 1960s, many more people in the agricultural sector were producing only slightly more than at the beginning of the decade. Real agricultural wages inevitably fell. And the widening gap between the supply of labour and a decreasing demand is probably the primary factor in changing the system of labour organization in agriculture.

In the 1970s, Bangladesh exhibits characteristics common to all societies which have been subsumed into the cultural system of the market economy—labour is sold, land is rented, and capital is freely invested³². In disposing of a man's labour power, 'the system is disposing of the physical, psychological and moral entity "man" attached to that tag', and it is clear that, 'robbed of the protective covering of cultural institutions, human beings are perishing'³³.

The consequences for the use of organic resources

There is little reliable data on the use of non-commercial resources, so it is difficult to assess how the rise of the market economy has affected this. But there are some indications. Thus some mention was made above of a village in the Comilla District where traditional landowners provided their clients with straw. In the same village, farmers who have acquired land through recent purchases, who farm their own land, and who pay money wages, burn the crop residues which they cannot use themselves. The disintegration of the traditional distribution system is endangering the stable combination of resources which had previously underwritten a minimal livelihood.

In India, 40 000 'gobar gas' plants have been installed under a government programme. The programme has been most successful where new seeds are widely used, particularly in 'progressive' areas of Gujarat and Haryana. Of their own accord, over 30 per cent of the biogas plant owners in Haryana have attached latrines to the digesters³⁴, suggesting that when customary norms have broken down, proscriptions against the use of human excreta may no longer be stringent.

Two surveys of gas-plant owners in Gujarat have been conducted. One showed that the individual families who own gas plants had, on average, 26 acres of land and 10 cattle. According to the other survey, most of the owners had 'an annual income of more than \$1100 and a large number had an annual income over \$2800 and their primary occupation was agriculture. They were literate and nearly 40 per cent of them had subsidiary occupations such as business, or service.'³⁵ The advantages of using biogas within this rather successful group have been at the expense of the poor, for whom the gobar excreted by the cattle of the rich was previously available as a basic fuel.

The findings of the differential adoption rate among big farmers, depending on whether they had subsidiary occupations, accords with the theory presented in this paper. Those whose traditional ties have been severed are able to mobilize their resources for their own purposes more easily than those whose relationships have a stronger traditional component.

Traditional ties are breaking down rapidly in many areas, with the result that the use of local resources is often 'rationalized' in a limited and capitalistic sense. Adoption of improved technologies for the use of these resources is hastening the deterioration of the resource base of the poor. The use of human excreta might shore up this base, but the Indian experience shows that unless programmes are explicitly tailored for the poor, they are likely to exacerbate an already inequitable distribution of resources.

11.2 BIOGAS SYSTEMS AND SANITATION

*S.K. Subramanian*³⁶

The present status of biogas systems

Biogas systems have lately received considerable attention as a tool for decentralized approaches to development. They have been supported both as a means of fuel and fertilizer substitution, and as an aid to sanitary improvement.

However, the potential significance of biogas systems in meeting some of these needs is less than clear. On one hand, the installation of nearly 40 000 individual biogas plants in India and the use of biogas for fuel and lighting by over 17 million commune peasants in Szechuan³⁷, the most populous province in central China, together give an encouraging scenario. On the other hand, the Republic of Korea has decided to halt its programme after having earlier supported nearly 27 000 family-size biogas units³⁸, and this gives a more negative impression. This paper presents further contrasts and perspectives, based on a recent survey of biogas systems in Asia³⁹.

Most of the biogas plants in India, Korea, and other Asian countries operate either on cattle dung or pig waste. However, some units in India operate on the combined digestion of human night soil and cattle waste, and a small number, usually in large institutions, operate with night soil alone. Digestion of other wastes, including plant residues, algae, and other biological wastes, is being studied as a means of augmenting animal wastes, and spreading the benefits over a wider social spectrum.

The monthly production of biogas from one person's night soil would only be around 1.0 cubic metre, depending on dietary habits, whereas the monthly gas consumption for cooking would be around 4 to 5 cubic metres per person, assuming efficient burners. This explains why biogas plants using night soil are

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