

Atkins, P.J. (1993) Towards a macro-spatial interpretation of Operation Flood, pp 150-156 in Sargent, J. & Wiltshire, R. (Eds) *Geographical Studies and Japan* Folkestone: Japan Library

Operation Flood (OF) is a major dairy development project whose aim is to provide sufficient cheap, pure milk to match the hitherto frustrated latent demand in India. Dairy products are highly valued by Indians but in the recent past supplies have been restricted and retail prices high. The purpose of this short paper is to outline some geographical insights on the structure of this scheme. Further discussion of OF has been published elsewhere (Atkins 1988, 1989a, 1989b).

Milk production

There is no specialist dairy region in south Asia and, although milk is the second most valuable output of the sub-continent's agriculture, it has hitherto been essentially a by-product of arable farming. Bullocks and buffaloes are the main energy source for ploughing and female bovines have been valued mainly for their male offspring. Traditionally most of their milk has been for calf rearing and any surplus consumed on the farm. Livestock are fed on crop residues, weeds and wayside grasses which are of low value and would otherwise be waste, and as a result the yields of India's 250 million bovines are very low. Until the last decade or so most urban supplies were procured from close to the markets by small-scale, informal sector middlemen. Supplies were inadequate, especially in the summer lean season, and quality was often poor due to adulteration and souring. The inefficiency of this system was evident in the 1980s when shortages led to rationing of milk in some metropolitan centres.

In 1970 OF was conceived with the aim of meeting the shortfall by importing skimmed milk powder (SMP) and butter oil (BO). The idea was to reconstitute the SMP, sell the milk to urban consumers, and then use the counterpart funds for building up a rural supply infrastructure of primary village co-operative societies, processing plant and transport facilities. OF has fallen into three historical phases:

- OFI (1970-81) concentrated on Bombay, Delhi, Calcutta, Madras and eighteen of the milksheds with most promising potential for development.
- OFII (1978-85) was to cover 160 cities of over one million population, and ten million rural producers.
- OFIII (1985-94) is a planned expansion to 450 towns and cities, 50,000 dairy societies, 176 milksheds, and an average procurement of 13 million litres per day.

Some of OF's targets were over-ambitious from the outset or have not been achieved because of local political or organizational difficulties. Results so far are partial, but nevertheless impressive. The following maps seek to illustrate selected geographical aspects of OF in the mid-1980s.

Figure 1 is a map of the mean daily procurement per village dairy co-operative member in kilogrammes, averaged over the year 1985/6, intended to illustrate OF's spatial selectivity. As anticipated from the regional distribution of India's milch animals, OF's supply is highest in the milksheds of Gujarat, Rajasthan, Maharashtra and coastal Andhra. It is surprisingly low, however, in the southern cone of the country. One reason for this that in Tamil Nadu large numbers of poor farmers and landless labourers, without any real resources for milk production, join their local co-operative in the hope of betterment. Apparently their certified

society membership is one necessary qualification for acquiring credit to buy a milk animal, but many remain dormant or marginal members and contribute little or no milk. It would be interesting to see data on active/dormant membership of dairy co-operative societies (DCS) in the various milksheds.

This rural production is supported at the District Union level by the supply of various services. In Figure 2 we see the location of cattle feed factories which have been built to provide balanced, compound feed to supplement the milch beast's traditional diet and boost yields. Gujarat has done well but other parts of the country have as yet seen less investment. There seems to be a problem of the underuse of existing facilities, although conclusions about overcapacity would be premature since several factories have only just started production.

Figure 3 is a record of the artificial insemination programme in India. OF provides a high proportion of AI in some districts especially, as Figure 4 shows, for cows. The relative neglect of buffaloes in states other than Gujarat is a source of concern. A growing dependence upon the imported genes of high yielding cattle from other parts of the world may lead to problems similar to those experienced in the early phase of the Green Revolution in grain. Heat stress is possible in animals with one third of their blood from temperate latitudes, and the offspring bullocks are less suitable for ploughing than their native cousins. Cows, whose milk is not as rich as that of the buffalo, are expensive to keep because they need heavy feeding. Foreign cattle are also more susceptible to diseases endemic in India and therefore expose the farmer to an unknown risk.

Processing and transport

Figure 5 shows chilling and processing capacity provided by District Unions and State Federations. The construction of these facilities has been a priority of Operation Flood and four regions seem to have benefited most: the north west cluster from Delhi to the Punjab, Gujarat, Maharashtra and Tamil Nadu. A fierce debate has raged about the appropriateness of the high technology employed in these plants, the foreign machinery installed and the input of overseas consultant expertise.

India's remarkable array of ecological and socio-economic niches makes the planning of any nationwide scheme like OF an uncertain process. Inevitably there will be some regions with surplus milk and others with a deficit, but linking them into a trading network requires the sort of physical infrastructure and organizational skills which are lacking in most developing countries. India's National Milk Grid (Figure 8) seeks to overcome the problem of establishing a balancing mechanism for perishable commodities like liquid milk by providing intra- and inter-regional connections of mutual support. Both road and rail transport are involved, focusing supplies initially on the larger cities, but now spreading down the urban hierarchy. The most spectacular achievement is the regular tanker train plying the 2,000km from Anand to Calcutta.

Social context

Critics of OF accuse it of neglecting the poor. They see the scheme as an opportunity for already prosperous rural producers to enhance their wealth and power. The available evidence for testing this hypothesis is sparse, but we do at least know that the participation rate of small and marginal farmers and landless agricultural labourers in dairy co-operatives is approximately in proportion to their representation in the wider rural community. This suggests

that, although OF is not specifically setting out to target the rural poor, it is at least attracting an unbiased cross-section of producers, more than can be said of other, similar large-scale development programmes. Figure 7 records the percentage of Dairy Co-operative Societies in each district comprising scheduled castes, scheduled tribes, and other backward castes. The proportion is high in Tamil Nadu, for reasons explained above, and also in a southern strip of Uttar Pradesh and the tribal districts of south Gujarat. Performance in other parts of the country looks disappointing, but really one needs a further map showing the fraction in each area who have joined: only then can the actual and potential figures be compared.

Figure 8 plots the percentage of female members enrolled in DCS. The result is a depressingly polarised map, with women in the north apparently allowed to play little part in OF, and their sisters in the south in only a marginally better position. This reflects the well-known underlying cultural realities of Indian society. OF has a moral duty to enfranchise women economically wherever possible.

Conclusion

OF is a mirror of the ideology of Indian modernization: it has many positive aspects and some serious weaknesses that must be addressed. In the final analysis it must be remembered that the experience of Gujarat is unique, with its mix of favourable physical circumstances and spontaneous growth. To expect the transplanted Anand 'model' to take root in other, dissimilar contexts is geographically naive and one anticipates the need for a greater flexibility of planning structure if OF is to have a truly nationwide scope. The OF authorities have yet to establish a Geographical Information System which could provide the basis for a sound spatial strategy and the assessment of spatial outcomes. There is an urgent need for the type of database that would allow both daily monitoring of the National Milk Grid and the longer term modelling of the changing spatial structure of OF.

References

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- Atkins, P.J. (1989a) 'Operation Flood: dairy development in India', *Geography* 74, 259-82
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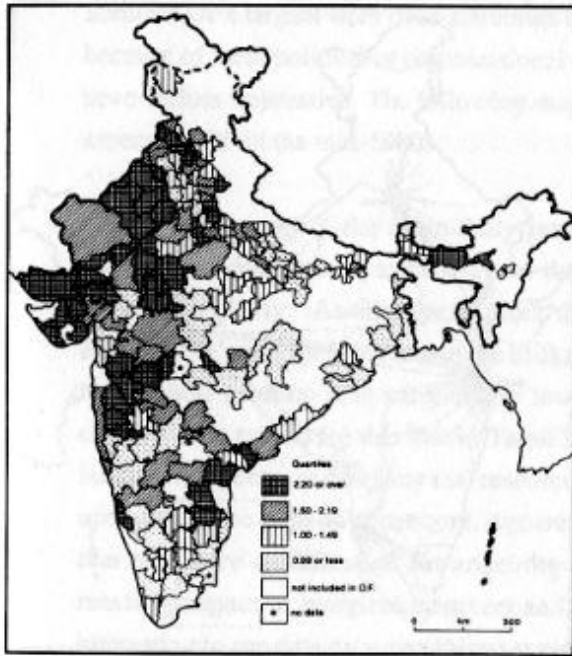


Fig. 1

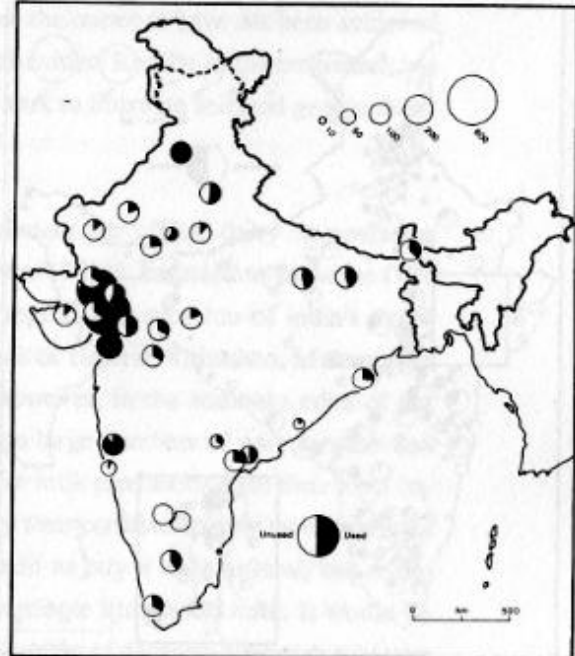


Fig. 2

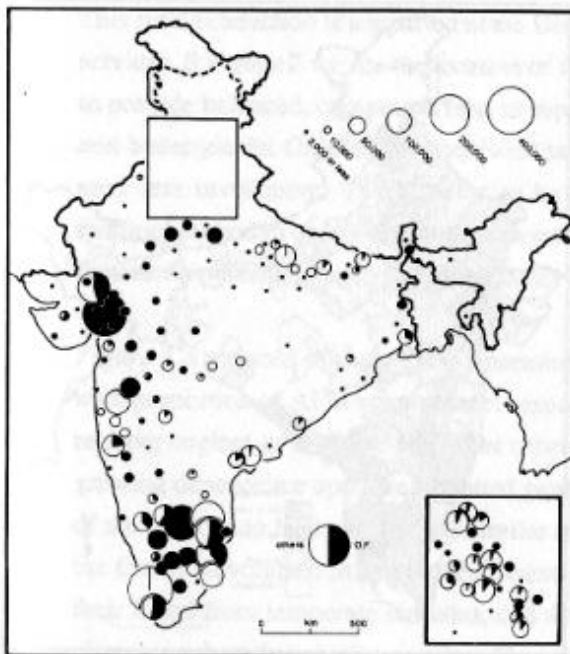


Fig. 3

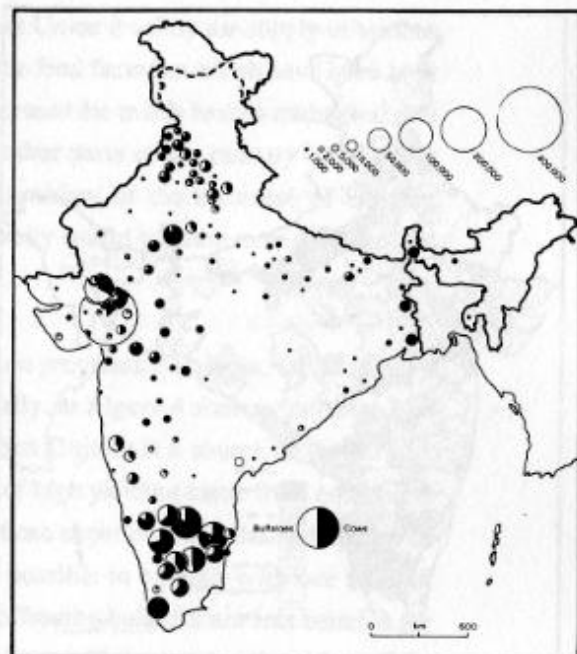


Fig. 4

1. Mean daily procurement (kg) per dairy co-operative member, by districts (1985/6)
2. Cattle feed manufacturing capacity, by districts (tonnes per day), and its utilisation (November 1986)
3. Artificial insemination under Operation Flood and other schemes, doses per district (January-November 1986)
4. Artificial insemination of cows and buffaloes under Operation Flood, doses per district (January-November 1986)

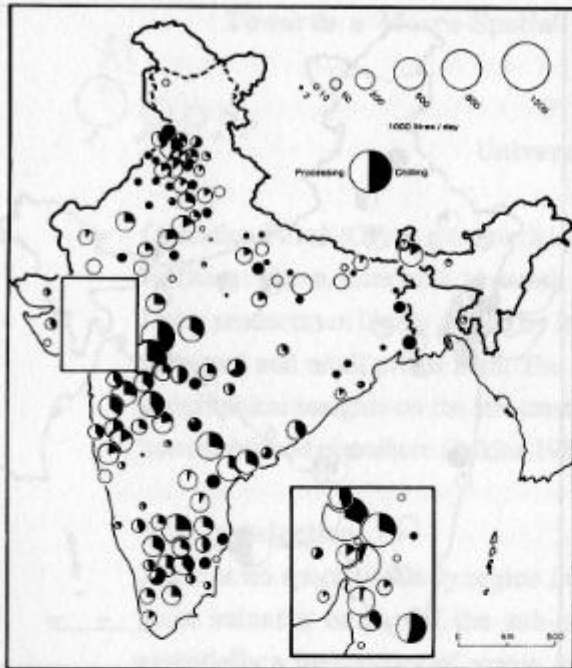


Fig. 5

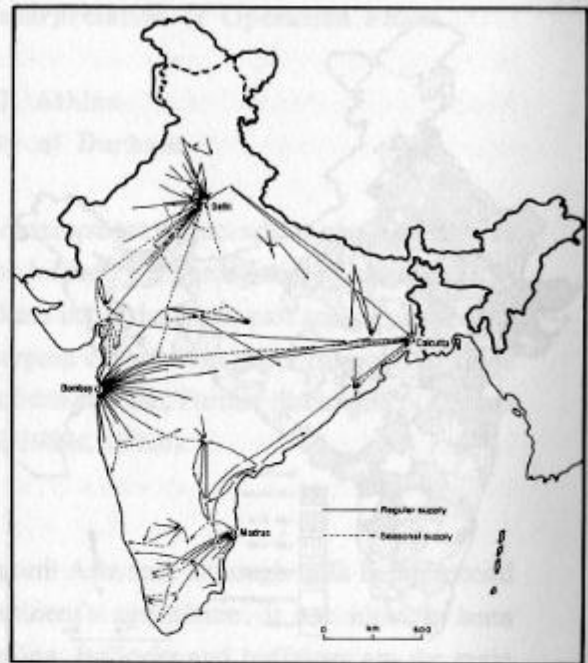


Fig. 6

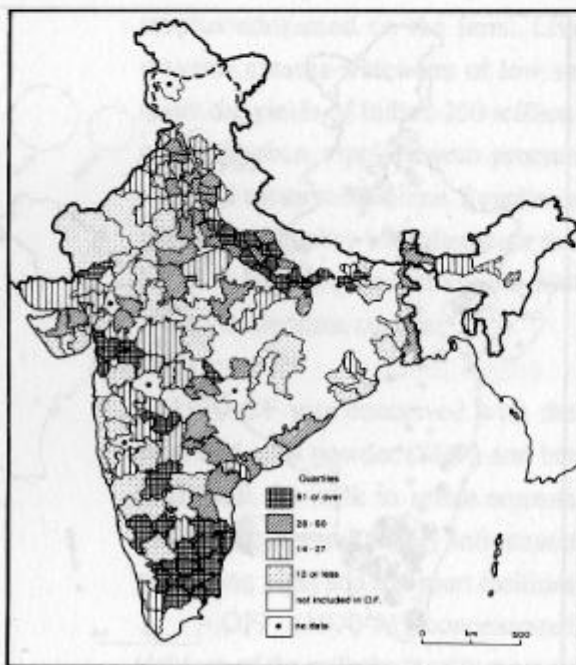


Fig. 7

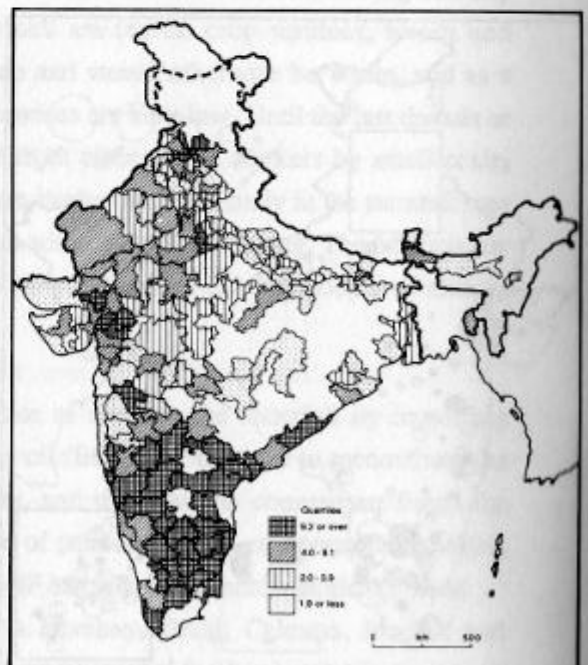


Fig. 8

5. Chilling and processing capacity 1986, by districts (thousand litres per day)

6. Operation Flood's National Milk Grid

7. Percentage of scheduled castes, scheduled tribes and other backward castes in the membership of dairy co-operative societies, by districts (October 1986).

8. Percentage female membership of dairy co-operative societies, by districts (October, 1986).