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**Orangi Pilot Project, Karachi, Pakistan.** A low-cost sewer system by low-income Pakistanis.

Building Community: a third world case book, Ed. Bertha Turner, Building Community Books, London, 1988

# A low-cost sewer system by low-income Pakistanis

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## Orangi Pilot Project

Sponsor:  
International Development  
Research Centre (IDRC)  
Canada.

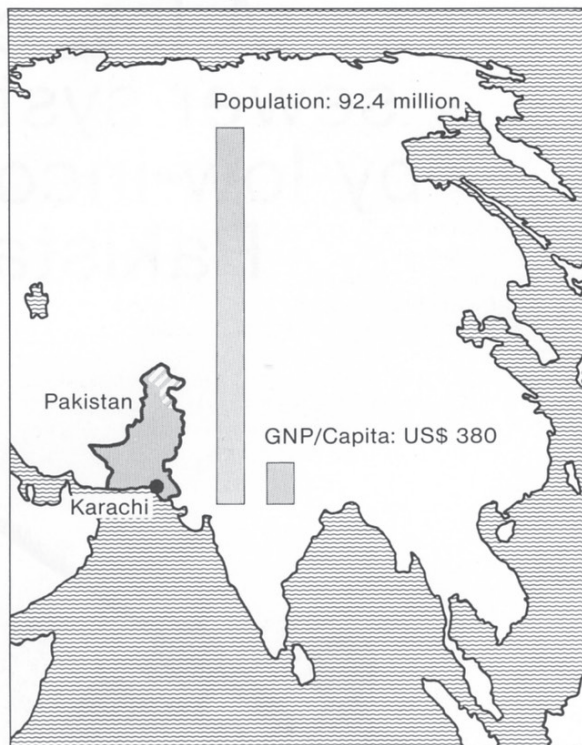
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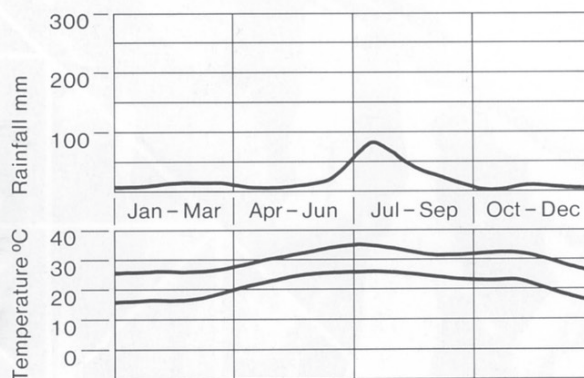
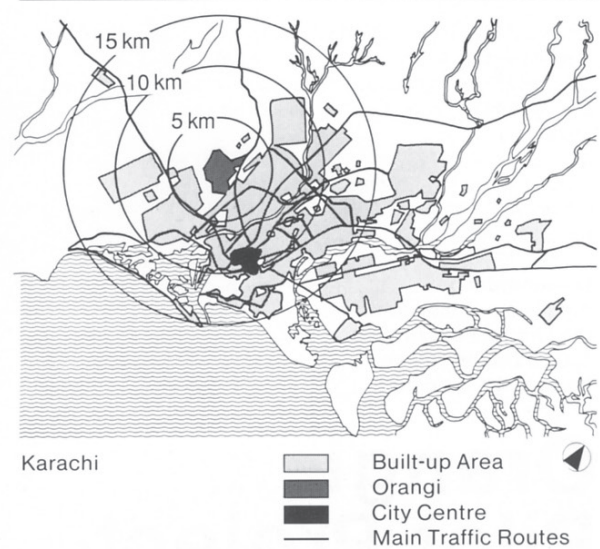




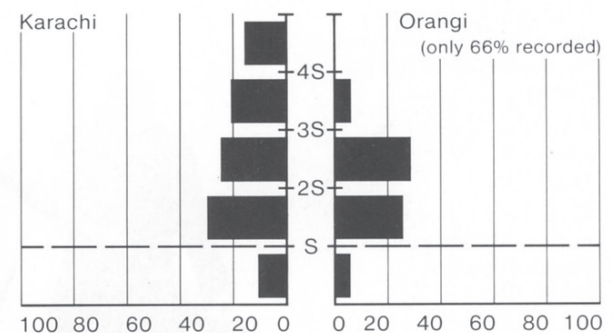
ORANGI



Population Karachi (1985): 6.2 million  
Population Orangi (1985): 700,000



Climate Graph Karachi (4m)



Percentage Distributions of Population by Income Level  
S=when 85% of household income must be spent on food





#### Abbreviations

|     |                              |
|-----|------------------------------|
| OPP | Orangi Pilot Project         |
| KMC | Karachi Metropolitan Council |

Orangi Pilot Project (OPP) is one of two major community-based sanitation projects in Karachi. The other, the Baldia Soakpit Pilot Project, also generates social development but differs in the technology used - an individual soakaway.

#### Two in three live in self-built settlements

Orangi (population 700,000) is typical and the largest of Karachi's 362 'katchi abadis'. About 4 million people, two-thirds of Karachi's population, live in these unauthorized squatter- or owner-built settlements. Orangi's settlement

began in 1965. Like most of Karachi's citizens, the residents have been building their own houses on initially unserviced land bought from illegal developers, with materials obtained on credit from small local manufacturers and suppliers. Most labour is locally contracted by the households.

Orangi's average household income, Rs1,000, is one third lower than in Karachi as a whole. Most households have two earners each providing the equivalent of an official minimum wage—just enough to feed a family, with nothing left over for housing, clothing, the journey to work and other essentials. Under 5 per cent in Orangi earn even less than one minimum wage, as against 10 per cent in Karachi as a whole.

Before OPP began, primitive forms of excreta disposal, poorly laid drains and the lack of rainwater drainage created a dangerously insanitary environment increasing social conflict as well as disease and mortality.

*Orangi from the roof of OPP offices*



PHOTO: JOHN F.C. TURNER

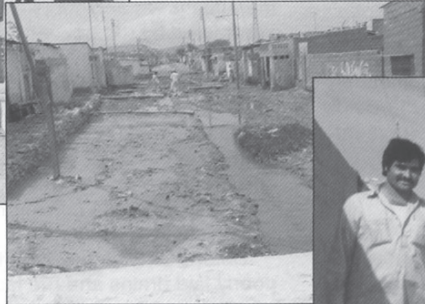
ORANGI



*The lanes were open sewers...*



*... flooded in the rainy season*



*Lane residents often installed drains...*



### **Sewers as a vehicle for local development**

#### **Sewer line costs for 20,000 households reduced by nearly 80 per cent**

Since 1980, Dr. Akhtar Hameed Khan's OPP has enabled low-income people to finance and install sewers serving 20,000 homes housing some 200,000 people for Rs28.5 million. The same works carried out by government contractors would have cost nearly five times as much. The people invested their time and Rs27 million or one month's average income per household served. OPP has invested Rs1.5 million in research, equipment and technical assistance, thanks to Aga Khan Abadi, President of BCCI, the Pakistan-owned Bank of Credit and Commerce.

Based on previous experience and convinced that it is possible for low-income populations to install their own systems at an affordable cost, Dr. Akhtar Hameed Khan started working in Orangi in 1980. Using simple technologies that people can appropriate and develop themselves, work and organization began with the lanes, democratizing the commonly exploitative local leadership and improving neighbourliness along with health and self-confidence.

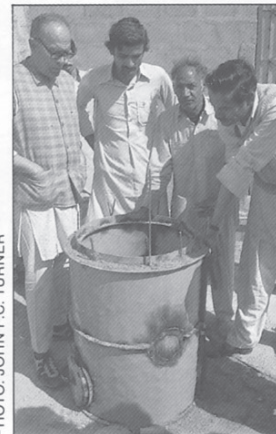


PHOTO: JOHN F.C. TURNER

*Akhtar Hameed Khan (left) discusses steel form for casting manholes with the local designer and fabricator.*





### People first

How was so much accomplished by poor people with such beneficial side effects? The answer lies in the methods employed by the OPP Programme:

1. Community organization and participation in the designing and management of the programme;
2. Appropriating and adapting technology to allow people themselves to carry out the works with reduced costs (by scaling down standard engineering design and practice) and, thereby,

3. Maximizing the use of local resources: personal savings and initiative, manual and managerial skills, complementing and developing them with the provision of expert assistance.

These three aspects of the OPP approach increased people's self-respect and self-confidence as the environment (and property values) improved; along with incentives to co-operate and invest. Conflicts generated by insanitary conditions were reduced, neighbourliness and opportunities for gainful participation were increased.

*... but they frequently failed.*

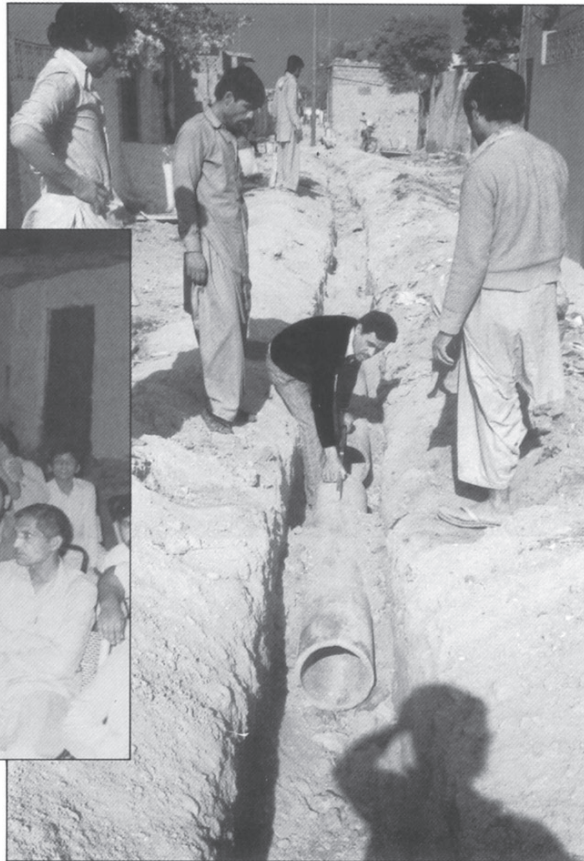


*OPP informs and helps residents to organize ...*



PHOTOS: OPP TEAM

*... and with adequate technical assistance ...*





### Small scale organizing produces large scale results

The lanes, with 10-15 houses on each side, were seen by OPP as having the right human scale for the basic units of project organization. This meant that the 20 - 30 households would generally know each other, and fewer problems resulting from mistrust would occur. The existing leadership (mostly the land sellers) functioned at the larger

... the lanes were transformed.



'mohalla', or neighbourhood, level. OPP avoided provoking their hostility by starting at a smaller scale.

The lane organizations are developed in four stages:

1. Public meetings in the lanes. Paid OPP motivators use slides, models and pamphlets to explain the programme and its benefits. They had first to convince the residents that sewer lines laid by city agencies are not a free service and that they could not afford a conventional installation. The lane groups had to be convinced that they could get an affordable system by organizing and with technical assistance from OPP.

2. Lanes organize. The neighbours elect their own leaders who then make a formal approach to OPP for assistance.

3. OPP assists. With help from university students, other volunteers and with the co-operation of the residents, the lane is surveyed, plans and cost estimates are prepared.

4. Lane groups take over. The elected lane leaders, many of whom were women, pass on the information provided by OPP, collect the residents' contributions of Rs1,000 (about one month's income per household) and organize the work. OPP continues to supervise, but makes a special point of never handling local people's money. Maintenance of the improvements has been carried out communally and informally as the need arises, by residents of the lanes.

Initially only those lanes near to gullies (nullas) which are natural rainwater run-off channels, asked for OPP assistance. The programme was endangered, however, unless other lanes too far from a gully got together in order to build shared secondary drains connecting them with the nearest one. OPP promoted the idea by doing a physical survey, using the wards of the KMC (Karachi Metropolitan Council) councillors. Students carried out surveys of each ward, talking to people and involving them in their work, producing a two-way benefit. In this way residents understood the need for secondary drains - and the idea of development through community participation was carried back to the universities, resulting in increased professional involvement.

Survey results and OPP literature were given to each ward councillor. Residents, hearing of this at motivation meetings, began to pressure their councillors about secondary drains. This resulted in a large number of neighbourhood lane organizations coming together to ask OPP for technical assistance with secondary drains.





## Inverting political relationships

### Democratizing local authority

Before the OPP project, the illegal land subdividers were Orangi's self-appointed, exploitative leaders. They have been challenged by the OPP social organizers, lane groups and managers, who have gained the necessary confidence through their project experience, and are forcing the leadership to become more democratic. Three OPP organizers have stood as candidates in local authority elections and one has been elected as a councillor.

In addition to democratizing local representation through people's demands on their ward councillors, OPP has changed relationships between Orangi councillors and the KMC. KMC grants are normally for surface projects only - roads or open storm water drains. In 1984, one Orangi sector forced their Councillor to use these funds for an underground sewer. They wanted to choose their own contractor, but KMC made the choice. The people supervised his work and introduced OPP drain designs.

### People appropriating technology

#### The necessity of doing more with less

Two major obstacles blocked the provision of sanitation by the local authority: their finances were slim and conventional methods inflated costs, making them unaffordable to katchi abadi residents. Experience shows that instalment payments for public services are impractical when users have no responsibility for management and the authority cannot afford proper maintenance. Foreign assistance, when available, could only serve a small percentage of the large population.

Finance had to be found from within the community and made available before development work began. Simple, low-cost designs, an appropriate technology, suitable for local and voluntary labour was needed in order to keep costs and overheads low. And appropriate forms of organization, planning and management also had to be devised if costs were to be locally affordable.

#### Planning from the bottom up

OPP saw that if lane residents were organized and trained to use the right technical support and tools, they could finance and build an affordable system. The approach was based on local experience and preferences, correcting

and developing what people were already attempting rather than introducing alien methods. Experience with sanitary pits and soakaways had been negative. A piped system was preferred and many had installed their own, often with individual pipes running parallel, on or very near the surface, with inadequate diameters, falls and manholes so that they frequently failed.

Underground systems are complex and hierarchic or tree-like: house drains feed into lane or street sewers and these branch into larger trunk mains. It is generally assumed that major works must be planned and installed first to ensure a workable system. But had this orthodox approach been adopted, OPP would have had to start from the top down, risking conflict with local leadership and involving itself with the bureaucracy. A natural drainage system is provided by the gullies which form in the short, heavy rainfall season. Planning and installations were therefore started from the bottom up, using the lanes opening onto this natural drainage system.

Supervision and quality control were not centralized, but carried out by residents. The only way to ensure quality work was to educate people. Confidence in OPP could only develop over time. For this reason, some substandard work was done in the lanes and by mid-1982, there was a lull in the programme. OPP's evaluation of its design concept, specifications and quality of work disclosed the following problems and solutions:

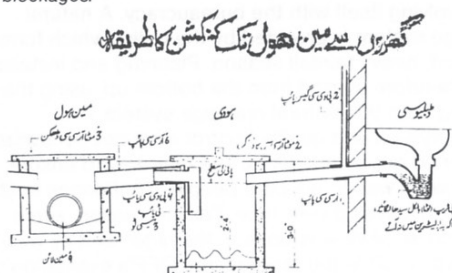
1. Discharged sewerage and excreta occasionally blocked the drains and polluted the gullies which were surrounded by high density housing. Constructing simple one-chamber septic tanks that collected solids, and locating them between every house connection and the lane sewer solved this problem.
2. KMC standard manholes were too elaborate for unskilled labour as well as too expensive. Costs were reduced from Rs400 to Rs120 each by modifying the design and lending shuttering to lane groups for casting their own manholes on site.
3. Expensive, lightweight, steel-rimmed, reinforced concrete KMC manhole covers were easily broken or removed and manholes were soon turned into garbage pits. These were later replaced by heavy, inexpensive concrete slabs.
4. Sewer lines were laid in the middle of lanes, too near the surface. OPP specified the laying of sewers to one side, to minimize damage by heavy vehicles. Lane groups insisted on placing the lines in the middle, so that



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5. Poor workmanship. Despite extension training, proper concrete mixes, curing and drain alignments were not being maintained. These defects were overcome by providing simple tools, such as measuring boxes for concrete mixes, and closer supervision.

One-chamber septic tanks collect solids avoiding manhole and sewer blockages.



Between September 1982 and January 1983, officials and professional planners who visited OPP considered this incremental bottom-up planning an invitation to disaster. The international experts could not believe that an overall drainage system could be built up incrementally and empirically, following the natural drainage system provided by the dry gullies and seasonal watercourses.

The drawing up of a master plan at that stage would have involved the bureaucracy, imposing unacceptable costs and undermining the motivation and contribution of the local population on which OPP is based.

The experts recommended that all work should stop until the plan and two other recommendations were put into effect:

1. Excreta should be sealed by changing over to a twin leach pit system with waste water flowing into open drains.
2. Plastic pipes of a smaller diameter (two inches) should replace the more expensive and larger-scale concrete pipes and manholes. Insufficient water existed to

OPP disagreed. The residents demanded a water borne system, objecting to the health hazards and maintenance problems of open overflow drains. It was pointed out that leach pits would quickly fill when the water supply increased, with the completion of the Hub River Dam. OPP countered with their own objections to a costly short-term solution ignoring social and political dynamics. Since 1983, adequate water has been provided by the Dam and OPP's prophecy has proved to be correct.

OPP no longer needs to motivate people. The demonstration effect has encouraged lanes to organize themselves and to contact OPP, who now concentrate on technical supervision. Relations between the local community and local government have been redefined, along with OPP's scope for future development work. OPP now works on three levels: at the local level, assisting lanes; helping Orangi Council to site secondary drains; and with the Karachi Metropolitan Council, designing and supervising works which they have funded.

Women's expectations have changed and OPP continues to innovate. Eight Women's Work Centres now exist. Women use sewing machines at home, producing articles for sale. OPP delivers material, collects and distributes finished articles, taking on the role of the middle-man. OPP helped women to buy industrial sewing machines. With their faster and better stitching, women have increased their earnings by 30 per cent.

The Women's Welfare Programme is conducted lane-by-lane, using a 'street vendor' approach. Women meet in groups to learn about nutrition, personal hygiene, child growth monitoring, vegetable gardens and family planning. A local woman activist makes her home the centre for these activities. To date, family planning has aroused the most interest.

OPP's programme is now included in the new Orangi Master Plan. The Aga Khan Medical University and the Department of Architecture, DCET, Karachi, use OPP for course work and contribute to the OPP programme. Two Karachi squatter colonies and some large rural villages have asked OPP help in building their own self-financed community sewerage system. The OPP experience in organization and technology goes on, involving local people in transforming their own lives.