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Deepwells Handpumps in the
Rural Water Supply Programme
Government of India
Report on Workshop

24-26 June 1975

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REPORT
ON
GOVERNMENT OF INDIA - WORLD HEALTH ORGANIZATION
WORKSHOP
ON
DEEPWELL HANDPUMPS IN THE RURAL WATER SUPPLY PROGRAMME
AT
INSTITUTE OF ENGINEERS (INDIA)
VIDHANA VEEDHI, BANGALORE, KARNATAKA
24 - 26 JUNE 1975
(PROJECT: IND BSM 001)

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1. INTRODUCTION

This workshop was held at the Indian Institute of Engineers, Bangalore, Karnataka State, from 24 to 26 June 1975, under sponsorship by the Government of India and the World Health Organization, with assistance from the Karnataka State Government. The Objectives were to bring together the Chief Engineers, and representatives from administrative and village organization of the various states where deepwell handpumps were in use in large numbers, in order to discuss the problems associated with rural water supply. In particular, the intention was to study the improved type of handpump which had recently been developed in Bangalore in a joint project of the Karnataka State Government with WHO participation and assistance from UNICEF and the Mechanical Engineering Research and Development Organization (MERADO), Madras. It was expected that decision would be taken as to whether the prototype "Bangalore" pump should be developed further.

The programme followed is attached as Annex I and the list of participants as Annex II.

2. PROCEEDINGS

Sri T.S. Swamy, Adviser, C.P.H.E.E.O., Ministry of Works and Housing was elected as Chairman for the Inaugural Session of the workshop.

The Chairman called upon Sri B.N. Seshagiri Rao, to make the welcome speech. Sri Seshagiri Rao thanked the Karnataka Govt. for providing all the necessary facilities and for conducting the workshop at Bangalore. He also thanked the W.H.O. and UNICEF authorities for their assistance in the R.W.S. Programme as well as for their efforts in supporting this workshop. The various State Governments had sent their Representatives in response to the request of the Government of India. He also thanked them all.

Thereafter Sri T.S. Swamy, presented his Introductory address in which he emphasised the efforts made by the Govt. of India to provide effective water supply to rural India. He also mentioned the technical and financial assistance given by W.H.O. and UNICEF in furthering the programme of well drilling and production of hand pumps. To achieve the massive programme of drilling tube-wells in hard rock areas and providing more than 30 000 hand pumps during the V Five Year Plan under the 'Minimum Needs Programme', he stressed the need for evolving a standard, sturdy and efficient pump for use in the hand pump programme with a view to reducing the maintenance problems to a minimum. With this objective, the Govt. of India and W.H.O. had convened this workshop to discuss various issues as well as to demonstrate proto-type of the Bangalore Pump produced with the help of W.H.O., Karnataka Govt, MERADO and the Tamilnadu Water Supply & Drainage Board.

Mr N.A. Acheson, Regional Adviser for Environmental Health, WHO, welcoming the participants, spoke of the need for evolving a sturdy and suitable hand pump to suit the conditions existing in the rural areas of the country, to ensure safe and protected water supply to the rural population of India. The objective of WHO is to pay attention to the health needs of people

throughout the world and to give them the chance to live in a clean and healthy environment. W.H.O. assistance in developing a suitable handpump may have acted as a catalyst but in his opinion the Govt. of India, State Governments and the local officers have contributed a great deal more and UNICEF has also contributed to the success of the programme with their financial support. He was of the opinion that a suitable pump with fewer maintenance problems that has been developed will not only serve Indian people but can also be used in other countries with advantage. He highlighted the W.H.O. global objective of achieving of the provision of safe and protected water supply to 25% of the rural population during the current decade. India with a large rural population has special problems. Even then, he was of the opinion that it should be possible to work towards the target proposed by the W.H.O.

Sri B.N. Seshagiri Rao announced details regarding appointment of officers. The steering Committee comprised of Mr H.A. Acheson, Mr N. Nagappa, Mr P.S. Gopal and Mr B.N. Seshagiri Rao. He requested the participants to approach the steering committee for issues regarding technical papers, discussions etc.

M/s V. Venugopalan and V. Raghu, were nominated rapporteurs for the entire workshop session.

Sri S. Neelakantappa, Chief Engineer, Karnataka, was elected Chairman for the first technical session.

Sri S. Neelakantappa, invited Sri Ramachandra Rao, Chief Engineer, Andhra Pradesh, to present his paper.

Sri Rao described the use of double-guide handpumps in Andhra Pradesh since 1963 and the maintenance problems faced. He also explained the performance of the modified Sholapur pumps which has been recently introduced on the recommendations of the UNICEF. The problems of maintenance could be divided into two groups:

1. those relating to the moving parts above the ground level;
2. those relating to the moving parts below the ground level.

The latter were more difficult and costly to attend to. He outlined the recent proposal of the Govt. of Andhra Pradesh for a maintenance programme aimed at providing effective maintenance of the handpumps provided in the R.W.S. Programme. In his opinion a sum of Rs.200 to 250 per year per pump would be necessary for maintenance alone.

Mr Qazi, Chief Engineer (Rural), Madhya Pradesh, presented his paper. He stated that for the success of the tubewell handpump programme, it would be necessary to: (i) develop a suitable pump and (ii) provide for proper maintenance. He also draw attention to the lack of quality control in respect of handpump manufactured at present. The failures occurring in the double-guide pumps are mainly due to:- (a) lack of quality control, and (b) poor maintenance.

Commenting on the handpump assembly falling into the deep well due to wearing out of threads of the G.I. coupling, he stated that the double flange system adopted in Madhya Pradesh had been found to be effective. The Bangalore pump developed had overcome many of the defects found in the other tubewell pumps available in the country. Nevertheless he stressed the need for continuous efforts to further develop and improve this Bangalore pump. On the subject of maintenance aspects, he explained that one mechanic covered an area with a radius of 5 miles in M.P. wherein the Grama Panchayats paid the cost of spares. For this purpose, the State Govt. had enacted a law permitting the Village Panchayat to collect a cess equivalent to 10% of the Land Revenue while the Janapad Parishads could collect a cess of 15%. In addition to this, the Janapad Parishad under the Panchayat Act could raise a cess up to 90% of land revenue for local services of which water supply is one. He also mentioned the need for educating the public in respect of proper maintenance of hand pumps.

The above two papers were thrown open for discussion and the participants were requested to restrict discussion on the Mechanical, Design and Cost aspects of the pumps as other matters would be discussed in another Session.

The Zilla Parishad Representative from Andhra Pradesh made the following points:-

- 1) it was necessary to have the tubewell within the reach of the villagers instead being located at a distance;
- 2) non-availability of spare parts resulted in hand pumps lying idle;
- 3) there was a need for an adequate supply of spares, tools, technicians and vehicles for the maintenance staff.

He was of the opinion that it would be possible for the Panchayats to provide necessary funds for the maintenance.

Mr Stoelzel of UNICEF stressed the need for Quality Control. He suggested that some technical institute in each State should be involved in the specification of standards and in arriving at the choice of pump. Any type of pump once selected on consideration of suitability and service ability should be utilized at least for a minimum period of 2 to 3 years to have a proper assessment of the utility of that type of handpump.

Sri Seshagiri Rao enquired as to what sort of quality control the State Govt. departments would be able to exercise in respect of handpumps. Mr Prakash Narain felt that small-scale industries involved in handpump manufacture would not be in a position to carry out research activities for further development of handpumps and that it should be the duty of the special organisations to go into the aspects of pump design for which financing could be either by the State Government concerned or the Central Govt. He felt that more than quality control, the handling of the pumps by the villagers would have to be taken in to account in the maintenance phase of the programme.

Sri Karkare, of Maharashtra, answered the query raised by Sri Seshagiri Rao and stated that the State Govt. Departments had little to do with quality control. It was the Central Stores and Purchase Organisation which was assigned the task of procuring handpumps and the decision was based on the lowest tender. The speedy pace of the programme and the huge demand for the handpumps had contributed to the fact that manufacturers attached little importance to the quality. On the other hand, the department was forced to buy pumps with a view to achieve their targets. Added to this, poor maintenance of the handpumps resulted in breakage of parts of the pumps. He was of the opinion that the Bangalore pump should be produced on a large scale and it should be on a Rate Contract by the Government of India or State Governments at a uniform and standard price. This would be necessary with a view to avoid buying pumps on the lowest tender basis.

Mass scale production of the Bangalore pump was all the more necessary as a lot of existing damaged pumps would have to be replaced.

Mr Qazi, in reply to a query raised stated that Government policy was to take up water supply schemes in villages which had at present sources at more than 1 Km. from the village. In view of this, the source was bound to be near the village. However, the exact location whether within the village or on the outskirts would be based on the hydrogeological considerations. In view of Mr Stoelzel's remarks, he also stressed the need for giving absolute powers to the Chief Engineers to select pumps on quality considerations alone and not on the lowest cost basis. If such a step was taken, automatically the quality control aspect would be taken care of by the manufacturers.

Mr Acheson, presenting his paper on the improved Bangalore pump, explained the background of the development of this pump with WHO involvement. The proto-type pump had gone through a simulated field test and had been found suitable. However, it would be premature to say that it was now perfect; the pump was yet to be extensively tested in the field and after such trials further improvement and modifications might be called for. Costly components like the brass cylinder had been replaced with cheaper and more durable parts made in plastics etc. He stated that only a limited number of copies of the draft report on hand pumps had been prepared and circulated to Chief Engineers but certain parts of the reports could be made available to those interested.

Sri Thimmappa Setty presented his paper explaining the details of the work relating to the production of the prototype of the Bangalore pump and the testing procedure.

Mr Chakravarthy, MERADO, explained that his institute which is a part of the C.M.E.R.I. became involved in this project of development of a hand pump in April 1973. Sri Govinda Menon, Chief Engineer of Tamil Nadu Water Supply and Drainage Board had rendered valuable help to MERADO in connection with the development of the proto-type handpumps. In his opinion the pump was not yet ready for handing over as a standard model to the manufacturer for production purposes as only 1000 hours of field trial in Bangalore had so far been carried out. He said that field trials of the pump in different parts of the country would be necessary and the results would have to be studied. The proto type consisted of parts which had been machined. However, when the pumps were produced on a mass scale with a minimum number of 5000, it would be economical to prepare dies and mould the components. In such a process a considerable amount of development was necessary which in his opinion was possible locally. He reiterated that the cost figures given in the paper of Thimmappa Setty and Gnanasambandam should be considered as purely arbitrary as the cost would depend on the cost of dies, quantity of pumps produced on a mass scale etc. He stated that MERADO would be in a position to carry out quality tests on the pumps produced by the manufacturers in due course. MERADO would be happy to produce the production mould as a first step in the future model of the mass scale production of pumps. He brought to the notice of participants that the old proto-type cylinder already tested was not available in Bangalore but that a new proto-type cylinder had been installed with the old proto-type pumphead for demonstration purposes in the workshop.

Shri Qazi was of the opinion that it was not desirable to wait until the perfect pump was produced. He suggested that the new Bangalore pump, which was far better than any other available deepwell pump, should be manufactured now.

Sri T.S.Swamy enquired whether it was possible for MERADO to have a special research cell for continuous research on hand pump development and whether it was advisable to use the research organization which had developed the pumps to carry out the testing of pumps. He was of the opinion that a quality control organisation for testing pumps could be set up at the national level, if need be, to test the parts of the pumps produced by manufacturers.

Sri Chakravarthy said that his organisation would have no objection to participation in the project of development of pumps which was of great socio-economic value. He said that they had sufficient experience in the machining of the parts required for hand pumps. As regards moulding, the Central Institute of Plastic Engineering and Tools, Madras, was prepared to check the design of dies as well as the moulding techniques.

Sri Thimmappa Setty explained that the moulded parts of the pumps which would be used in the regular production stage would be sturdier than the machined parts which had been used in the proto-type.

During the afternoon the delegates inspected a variety of hand pumps and parts exhibited by local distributors, and examined the components of the Bangalore pump.

On the second day, Sri Prakash Narain, Deputy Secretary to the Government of India, Ministry of Works & Housing, was elected as Chairman for the morning Session. The Chairman requested Sri Abdul Hameed to present his paper.

Sri Abdul Hameed spoke of the efforts made by the Government of India and the State Governments in the last three or four years for the provision of protected water supply systems in the rural areas, particularly in the hard rock areas where drilling and installation of pumps were undertaken. However, the results achieved had not been satisfactory counting the amount of effort put in. This was mainly because of the lack of maintenance of the tube well hand pumps. At one stage it had been found that around 90% of the hand pumps in one part of Karnataka State were out of order due to lack of maintenance. After a scheme had been completed, the maintenance responsibility was handed over to the Village Panchayat which had found it difficult both from the financial and the technical points of view. The result had been that there were complaints about the pumps being unsuitable and the State Government of Karnataka had decided that the Engineering Department should carry out the necessary repairs incurring the expenditure on maintenance and thereafter recovering the cost from the local bodies concerned. In his opinion, it would be necessary to have budget provision made for maintenance in the Taluk Board budget and for the Taluk Board to be made responsible for the maintenance. It might also be feasible to revise the regulations to make some higher authority such as the Public Health Engineering Department, responsible for maintenance. He also mentioned that in road construction, the maintenance is done at the State Government level and accordingly it should be possible to have the maintenance of rural water supply systems by the State Government on behalf of the local bodies. However, the beneficiaries might be asked to contribute towards the cost of maintenance. In his opinion this sort of arrangement to carry out the maintenance at the Government level might be restricted to a few years initially. Thereafter it could be handed over to the Taluk Board or to the Village Panchayat as well. In this connection, he pointed out that the State Government could assist in purchasing the spare parts, tools and vehicles for maintenance purposes. Taluk Boards could be asked to carry out the preventive maintenance through their mechanics who would be based at the headquarters of the Taluk Board. As regards repairs, there could be carried out at the Village Panchayat level. The estimated cost of maintenance per hand pump per annum was about Rs.500/-. He felt that this amount would be reduced in the future. He requested that the feasibility of providing 50% of the maintenance expenses from the Central Govt., W.H.O. or the State Government for the first five years might be explored.

Next, Sri Karkare presented his paper. At the outset, he made a general review of the past progress in the field of rural water supply in Maharashtra. The drilling programme and the installation of pumps are carried out by the Ground Water Department and the installations had been handed over to the Grampanchayat for maintenance. There had been a set-back in the maintenance programme due to a lack of funds and no proper organisation for maintenance. In the survey conducted by the Engineering Research Organisation of the State Government of Maharashtra, it had been observed that about 47% of the hand pumps were out of order. Another survey carried out by UNICEF had indicated that 50% of the pumps had been out of order. Even though the State Government had issued orders that one Mechanic per unit of 10 pumps could be appointed, it had not actually been implemented due to shortage of funds. He was of the opinion that the preventive maintenance of the hand pumps should be carried out by one Mechanic who could be located at the Headquarters of the Block. He might be able to move about on a cycle or on public transport. However, in respect of attending to break down maintenance, one mechanic and one helper with a pick-up van might be provided at the rate of one unit per 200 hand pumps. In his view for the successful maintenance programme, it would be necessary for the villagers to participate actively in the programme. There was also the need for health education relating to the need for protected water supply to the rural people. In this regard, wide publicity through different media such as newspapers, film shows, T.V. Programmes etc., might be suitable. He stressed the need for having power pumps on tube wells which have adequate yield. He requested the W.H.O. and the Govt. of India to help evolve a cheaper submersible pump for use in such tube wells. He also requested UNICEF to consider the possibility of providing a Van with tools at the rate of one unit per 200 tube wells.

The Chairman requested the participants to discuss the above papers. Sri P.M. Qazi of Madhya Pradesh suggested that it would be better to draw the conclusions of the Seminar that day after the Session, so that there would be enough time next day for general discussion. He was of the opinion that while State Governments might be willing to maintain the roads which gave indirect benefit to the Government, they would like the beneficiaries themselves to maintain water supply systems which gave direct benefit to the people.

Sri Govinda Menon of Tamil Nadu expressed the urgent need for training of the mechanics under a programme to be organised by the Government of India. He said they had tried encouraging private mechanics to look after the maintenance on a self-employment basis, but that this was not successful. In his opinion the maintenance of the hand pumps should be carried out by the State Governments or the Water Supply Boards for the first five years. At the same time, it was necessary to develop suitable organisations for future maintenance. Commenting on the proposed set up of the maintenance organisation, he said that adequate finances should be made available to have a Junior Engineer included, who would supervise the maintenance operations.

The Zilla Parishad representative from Andhra Pradesh appealed to W.H.O. to come forward with 50% assistance towards the cost of maintenance expenditure in rural areas. He said that it was the practice in Andhra Pradesh for the Government to transfer a part of the grant amount of the Panchayats to the Department which was in charge of the maintenance of hand pumps. He stressed the need for a suitable organisation for maintenance under the Zilla Parishads.

Sri Krishna Murthy, commenting on the estimate for the maintenance of the hand pump programme, noted that the cost of the jeep would be of the order of Rs.35,000/- instead of Rs.25,000/- as indicated in the paper. He also felt that the depreciation on the vehicle should be estimated at 20%. Even with proper maintenance, the maximum life of the vehicle in rural areas might be 3 years only. He felt that in the light of the above observations the maintenance cost would go up considerably.

Mr Modi cautioned on the use of motorised hand pump as well as location of the submersible pumps inside the tube well.

Mr T.S. Swamy requested the delegates to examine the feasibility and advisability of using windmill pump sets particularly in coastal areas. He was of the opinion that it should be possible for local bodies to effectively maintain hand pumps as it has been observed that villagers were able to maintain the oil engine pumps erected by them for irrigation purposes. He suggested that the manufacturers of hand pumps should get involved in the maintenance phase with a view to ensure that their product was in good working order.

The Representative from MERADO stated that National Aeronautical Ltd., Bangalore, had carried out experiments on the operation of windmill pump sets. They had proposed to use windmill pumps with a stroke of 10" in Karimnagar Dist. The patented designs which were available with N.A.L. could be requested by participants. Sri Neelakantappa felt that windmill pumps would be useful in areas where electricity was not available but they were bound to be expensive. He also read out the relevant paras of a Government Order regarding the maintenance of the rural water supply installations.

Sri Das Gupta stated that the maintenance organisation would not be standardised on a National basis. It would have to vary from State to State. Commenting on the use of windmill pump sets, he felt that it had been observed that shortages of water supply occurred during certain periods when wind velocity was low. On such occasions it became necessary to provide an alternative source of water supply at higher cost. Sri Ramachandra Rao reported that the wind-mill pumps fitted on dug wells in Andhra Pradesh had failed and could not be repaired for want of spare parts and agencies able to repair them. There is no known manufacturer of wind-mill pump sets in India.

The chairman summed up by saying that delegates were generally in agreement with the points brought out in the two papers presented that morning. He felt that W.H.O. or UNICEF would not be in a position to help towards meeting the cost of the maintenance of rural water supply installations. Their role would be limited to providing technical assistance as well as the supply of special equipment like drilling rigs which were not available in the country. For day to-day maintenance it should be a national responsibility and the beneficiaries would have to accept this. He felt that utilising the services of MERADO for standardising and manufacturing a production model of the Bangalore pump would be useful. However he felt that State Govts. might not be in a position to finance research and development activities. At the same time he felt that the element of cost in this connection should not be a deterrent. He felt that the valuable recommendations of the Seminar might help the State Government to decide on the financing of the maintenance programme.

The Chairman then requested Sri K. Govinda Menon, Chief Engineer, Tamilnadu, to present his paper on "Installation and Sanitation Aspects of Handpumps".

Sri Govinda Menon emphasised in his paper the need for proper basic sanitation aspects and the related health hazards in selecting and installing handpumps in the villages. He stressed the problem of pollution occurring to the source which would defeat the very purpose of the supply of potable water, and cautioned that necessary precautions should be taken in the selection of site, installation of hand pumps etc. He also spoke of the need for proper platform construction and drainage facilities. He indicated that one Junior Engineer (Mechanical) with 3 or 4 trained Fitters under the supervision of an Assistant Engineer would be required to take care of the installation of hand pumps. The need for a Jeep/Truck for carrying materials and for the movement of personnel was also stressed by him.

The Chairman invited Mr A. Besa, WHO Sanitary Engineer, UNICEF, to give his views on the subject.

Mr Besa developed the points mentioned by the earlier speaker and indicated that village participation in the maintenance of hand pumps was an important aspect. He also stressed the need for sterilising the well once it was completed before it was handed over to the villagers for use. He indicated that there should be periodical sampling and testing of water in order to check the possibility of contamination and based on the results necessary remedial measures would have to be taken. He also cautioned on the possibility of pollution occurring in new wells from abandoned wells close by. He mentioned that the method of collection of water and storage of the water in the container by the villagers were other important aspects, which if not paid due attention would defeat the purpose of supply of safe and potable water. He spoke of the need for proper health education. He considered that with a continuous supply of water and the resultant change in habits the health of the villagers would be greatly improved in the course of time.

The Chairman invited the participants to discuss the above paper.

Mr Acheson of W.H.O. asked whether in practice grouting was done for all the bores in hard rock. He expressed dis-satisfaction in the way many platforms were constructed and, even when constructed properly, some were not well maintained. He thought that the participants might wish to indicate which organisation was responsible for these aspects.

Sri Hameed and Sri Karkare mentioned that the erection of the handpump was the responsibility of the supplier or in some cases that of the PHE. Department. The construction of platforms, though, remained unsatisfactory in some cases unless due precautions were taken to have them constructed according to the specifications.

Sri Govinda Menon generally agreed with the suggestion made by the participants and Mr Besa. He mentioned that there should be a control on the quality of water supplied to the villagers, health education should be given to the villagers, abandoned wells should be sealed, and construction of platforms and drainage facilities should be carried out according to proper standards.

The Chairman requested Dr W.J. Cousins, UNICEF, New Delhi, to present his address on "Community involvement and responsibility".

Dr Cousins began his presentation stressing the need for proper maintenance of hand pumps and elaborated in detail how to approach the subject. He said that three aspects are to be considered i.e. how this will work in terms of what will work and what will not work.

1. community involvement is not simply a slogan or an ideal but a pragmatic necessity for the development process;
2. there is no such thing as a purely technological problem, but most are human problems; and
3. like all people, villagers act in terms of what they perceive to be in their own interest.

Regarding community involvement, participation and responsibility, he mentioned the following aspects:-

- i) the above approach must be genuine on both sides;
- ii) whatever one is introducing, must be related to some need the people perceive;
- iii) what is proposed to be introduced must fit into the local way of life of the people;

- iv) the perceived benefits of the new things proposed to be introduced must exceed the difficulties they perceive.

Thus we must ask: Whose needs are met by the installation of the handpumps? Who benefits? Who loses? What consequences in living patterns may result from this? The best way to answer these questions is through participation of the people, which provides feedback.

He made the following concrete suggestions:

- a) before a bore is sunk, people have to be involved in a way that convinces them that this is in their best interests.
- b) the handpump may be given to the villagers as and when the following criteria are met by them:
 - i) they express the need to have a hand pump;
 - ii) they agree that they will maintain the same;
 - iii) they set up a pump committee to be responsible for the maintenance and operation of the handpump;
 - iv) they have selected someone to maintain the handpump, after necessary training in maintenance;
 - v) they should agree to be involved in a health education programme.
- c) the drilling programme and installation of pump should be part of an integrated programme of drinking water, health education, and environmental sanitation.
- d) the women should be involved directly in the programme since they bring the water to the home.

He also elaborated on the problems of time, personnel and organization, and co-ordination needed to undertake such an approach. He mentioned that there was the possibility that handpumps could become "instruments of development" and not just ends in themselves.

The above aspects if taken care of, he stressed, would go a long way in improving the present difficulty in the maintenance of handpumps in the villages. The paper was then thrown open for discussion.

Sri Karkare mentioned that the programme had been taken up where the need was felt. He mentioned that where the people were expected to participate in the programme in the form of finances which was usually about 10% of the drilling cost, there was a lot of hesitation and the programme became delayed.

He also stressed the need for necessary health education to make the villagers appreciate the need for potable and safe water and to maintain and operate the handpump in their own interest and safety.

Sri Prakash Narain mentioned that a pre-study could be undertaken to know where the acceptance of the handpump was encouraging and where there was a lack of response. In this regard, he suggested the possibility of circulating certain proforma, questionnaires etc. for obtaining information for analysis. He also explained that the rural Broadcasting Programme should be used for involving the people in this particular programme.

Sri Swamy mentioned that the villagers accepted the ideas from persons within the village in whom they had confidence and that this aspect should be properly utilised in this programme, for the fulfilment of the objective of improving the health conditions of the people.

Sri Hameed mentioned in detail that this programme had been developed based on discussion with the communities and with other agencies involved in this aspect of water supply. He mentioned that lists of 'dos' and 'don'ts' had already been made available to the responsible persons and Panchayats and that the Panchayats were responsible for taking the necessary steps in this direction.

Sri Narasimha Reddy, Zilla Parishad Representative from A.P., explained in detail that the drinking water supply was always made available where there was a need and in fact, there was a lot of pressure from the people in clamouring for the supply of potable and safe drinking water. He also dealt in detail with the problems that were posed due to mechanical defects of the handpumps, social conflicts in the villages and other environmental problems. In this respect, he said that there was a lot to be done in educating the people in the use of handpumps.

Dr Cousins thanked the participants for the lively discussion on this very vital subject on community participation and indicated that the answer to the following question would throw more light on finding some solution.

If the people clamour and express the need for water by the "installation of handpump", why then is the handpump not maintained in good order?

The Chairman thanked Dr Cousins for his thought-provoking paper on the sociological aspects of the involvement of people in the supply of potable drinking water. He also thanked the participants for their good suggestions.

On the third day, Sri Narasimha Reddy, Representative of Zilla Parishad from A.P. was elected as Chairman for the first session. The Chairman requested Sri T.S. Swamy, to present his address on 'Proposals for manufacture and field testing of the Bangalore Pump'.

Sri Swamy traced the background of the drilling programme in the country and mentioned the assistance received from UNICEF and the stress being given for the drilling programme in the beginning. He said that the handpump which was available in the initial stages though not up to the required standards had slowly been improved upon. The handpumps that were presently available had undergone a lot of changes and improvements mainly because of the action taken by the State Govts. and private entrepreneurs. W.H.O. with the assistance of the government of India and the State Government of Karnataka had now developed a pump known as 'Bangalore' pump. This pump differed from the conventional handpump in that the components in the cylinder were non-metallic. The advantages, were ease of operation, requirement of less attention regarding maintenance and low maintenance cost. The pump had undergone limited laboratory and field tests. It was therefore recommended that (i) this pump should be taken up for wider use and (ii) tests should be conducted under field conditions in different States. UNICEF had also shown interest in the development of this handpump and in the proposal to study its usefulness and suitability in the rural water supply programme of the country. M/s. Richardson & Cruddoss, a Government of India Undertaking, had expressed interest in the manufacture of this handpump. They had good foundry facilities.

Sri Swamy suggested two alternative proposals for the consideration of the participants for testing the handpumps in the field. He suggested that initially M/s. Richardson & Cruddoss could undertake manufacture of the handpump to the extent of 100 handpumps per state for 10 states under the UNICEF Programme to be tried under field conditions. Alternatively, he suggested that the State Governments should select some manufacturers in the States who could undertake the manufacture of the Bangalore handpump for distribution. He was of the opinion that the first proposal, viz., manufacture of the handpump by a single agency would be preferable. This he suggested would give uniformity in the manufacture of the handpump parts. He suggested that the pump could be tested in a systematic manner and evaluated after a period of 6 months taking into consideration all aspects of usage, maintenance consumption of spares etc. Based on the outcome of this field evaluation, the details for the production of handpumps could be made available to all the State Governments and entrepreneurs. He also mentioned that W.H.O. would be willing to make available the drawings and specifications and that no royalty or service charge would be involved for these. He indicated that the State Governments could take up the evaluation study of this handpump as a pilot project and make available to the Central Government a systematic report based on the findings so that an overall evaluation could be made.

He mentioned that MERADO could continue the research activities especially on the cylinder components so that the continuous process of development of a new and better handpump could go on. He also indicated the need for the association of I.S.I. and other agencies for quality control when the question of production of handpumps on a massive scale is taken up.

The Chairman then requested Mr Steelzel to discuss the possibilities of financial assistance from UNICEF for the development of this handpump.

Mr Steelzel mentioned that the assistance from the UNICEF could be decided with the Government of India and they would welcome being associated in the development of handpumps, training, supply of spare parts etc. He drew attention to the two alternatives presented by Sri Swamy and mentioned that he preferred the second one viz., that the State Governments through different entrepreneurs should take up the manufacture of handpumps. This he mentioned would go a longway in deciding the quality of the product and pricing based on the capability of the manufactures. Therefore, he suggested that the drawings, specifications etc., could be made available to a few entrepreneurs suggested by the State Governments for manufacture. He however, indicated that the Government of India, W.H.O., UNICEF and the State Governments could co-ordinate and evaluate the performance of the pumps. He also referred to the need for quality control.

Regarding community participation in the maintenance aspects of the handpump, he suggested that drilling should be done independently of the installation of the handpump. This approach would give an opportunity to bring in community participation in terms of health and sanitation, maintenance of handpumps, repair aspects etc. before, during and after installation of handpumps. He indicated that the UNICEF would help and favour this programme also. He also mentioned that the UNICEF participation was in the best interest of the country, viz., supply of safe and potable water to the villagers.

The Chairman invited the participants to discuss these two presentations.

Mr Acheson referred to the two alternatives suggested by Sri Swamy, and said that the manufacture of cylinder could be taken up independently of the pump head. He was of the opinion that the manufacture of the cylinder alone would cost less and could be manufactured by one or two agencies to be made available to different entrepreneurs through the State Governments for assembly as a whole unit. He also suggested that 100 handpumps in each State might be too many and it might lead to difficulty in followup and evaluation by the State Governments. He suggested that State Government should instal about 25 handpumps and commit themselves to go into all aspects of testing and study.

Sri Hameed suggested that the Bangalore pump should be tested along with other pumps that are presently available in the market so that a comparative study on their relative merits and demerits could be made.

Sri Prakash Narain mentioned that the period mentioned, viz. 6 months, for study and evaluation of the pump might be too short, and the possibility of extending the work for a longer period might be considered. He said that apart from the mechanical and operational aspects of these pumps, the need for continued study of the village life should receive attention in the evaluation study. He suggested that this work could be taken up on a small scale and that some educational institution could be associated in evaluating the sociological aspects of this programme. He was of the opinion that though this might take a long time the efforts made in this regard would never be wasted.

Sri Karkare welcomed the suggestion of Mr Stoelzel and reported that at present drilling was taken up independently of installation of handpumps in his State. However, the question of selection of sites for drilling could be based on geophysical data analysis rather than the general judgement, if adequate numbers of geophysical instruments were made available by UNICEF. He suggested that at least one Terrameter should be supplied with each rig. He also welcomed the suggestion made by Mr Acheson that the cylinder parts could be manufactured by one agency and supplied to the different State Governments for assembly in the pumpheads manufactured by different entrepreneurs in the State. He considered that at least two handpumps per district would have to be supplied to study the suitability of the pump and therefore about 100 pumps were needed for each State. He believed that there were enough organisations for each district to do a thorough and complete study of these handpumps. For evaluation, a common proforma could be evolved for reporting purposes.

Sri Govinda Menon endorsed the suggestions made by Sri Swamy, and suggested that a single agency might take up manufacture of handpumps in the initial stages for testing purposes. He however, believed that the specifications required more study and that MERADO could do further studies before taking final standardised specifications for manufacture of the handpumps. He was also of the opinion that at least 100 pumps would be required in each State for evaluation work over a period of 6 months. Once the specifications were finalised, mass production could be taken up by the different state entrepreneurs at a later stage.

Sri Ramachandra Rao felt that the prototype Bangalore pump demonstrated during the workshop did not interest the participants much, and that the materials did not seem to be cheap. The possibility of utilising other materials could be considered by all concerned. He said that selection of materials should be such that the spare parts could be readily available when the handpumps were mass produced.

Sri Chakravarthi of MERADO mentioned that the approach to the development of this Bangalore handpump was studied in detail looking into the requirements for the future, and that the materials that have gone into the manufacture of different components of the cylinder were presently available in the market without any difficulty. He also mentioned that the materials that were now proposed to be used have no outside resale value.

Sri Modi mentioned that Bangalore Pump seemed to be a promising addition to the present existing handpumps, but he felt that some more research and development was required. He suggested that both central agencies and entrepreneurs from the states could take up production of handpumps simultaneously so that the relative manufacturing advantages could be studied and analysed. He was also of the opinion that at least 100 pumps per state would be required for the initial evaluation study.

Sri Dasgupta, agreed with the other participants about the requirement of 100 handpumps per state for study in the field conditions. He believed that different manufacturers from the State Government should also be allowed to manufacture these handpumps, but he cautioned that in view of the inadequate testing equipment and machinery at the state and manufacturer's level a central testing organisation might have to be responsible for this particular aspect.

Sri Malhotra felt that the initial requirement of handpumps for trial should be with a single agency to be proposed and agreed to by the Government of India. However, he drew attention to the difficulties in purchasing handpumps by floating tenders based on certain specifications and generally placing orders based on the lowest tender. This approach would pose some difficulties in purchasing only one type of handpump especially supplied by one manufacture.

Sri Prakash Narain, referring to the difficulties in floating tenders and purchasing handpumps and other methods like D.G.S. & D. etc., said that whatever the approach, the user was ultimately affected by these procedures and that this aspect should be taken into consideration and gone into greater detail so that an acceptable article with quality control was made available. This, he said, assumed greater importance because of the greater emphasis being placed during the V Plan in which a fairly large amount out of Rs 564 crores would be spent on the village water supply programme.

The Chairman then requested Sri Swamy to reply to the discussion.

Sri Swamy welcomed the suggestions made by the participants and stated that the following points were of interest:

- i) the two suggestions made by Mr Stoezel were welcome and would help to run the programme with greater success;
- ii) the suggestion made by Mr Acheson regarding manufacture of the cylinder portion separately was a good one and this could be done by a single agency;
- iii) the supply of at least 100 pumps per state would be necessary for a thorough field test and evaluation;
- iv) the evaluation of the handpump should be a continuous process and this could be done at the same time as other pumps in use;

v) there should be a warranty and service clause in the tender document when the manufacturers supplied the handpumps;

vi) use of non-metallic parts in the cylinder is welcome. However, this is not expected to be the last word in the development of handpumps, and handpumps will continue to be developed and improved upon with newer ideas and availability of newer and better materials;

vii) the problem of quality control needs further study and the association of a proper organisation and machinery both at the centre and state level should be looked into.

The Chairman thanked all the participants for the discussions on the above two papers and mentioned that the need of the hour is supply of safe and potable water to the masses of the village and any development in this regard would be very much appreciated by one and all.

Mr T.S. Swamy was elected as Chairman of the closing session. The chairman invited Mr Krishna Murthy to present his address.

Mr Krishna Murthy explained the activities in which Richardson & Cruddoss was engaged. The company became involved in the development of the Bangalore pump after he met Mr Emmanuel in 1974. He said that the firm is capable of producing the pumps on a mass scale as they have the technical potentialities. He said the design of the pump has the objectives of reduced cost as a maximum advantage. The use of high density polythene, nylon and neoprene served to eliminate labour intensive processes as well as to ensure dimensional accuracy. If such parts are manufactured on a mass scale, the cost is bound to be less.

The pump developed is definitely an improvement over the existing pumps. Even then there is need for more perfection based on continuous research to improve the model. He was of the opinion that the cost of the pump indicated as Rs.750/- by Mr Acheson seemed reasonable and this cost was 25 per cent less than the cost of other pumps available in the market. If the production of about 30,000 hand pumps was to be spread over two years, this would mean a monthly production of about 1250. One might wonder whether the supply of pumps by the company would have to be at cost price. In his opinion, for the existence, expansion and for research activities, an element of profit was necessary. For the production, some development time was necessary. It would be required to ensure an economical quantity for such production. The pump head of the regular model might have to be of cast-iron instead of mild steel as used in the prototype. He felt that a period of six months will be required for production from the commencement of work. To enable the firm to launch a different model of the pump and components with a view to have cheap and efficient pump, it would be necessary for the users to continuously feed back data on the performance of the pump.

The prototype had stood a thousand hour test and did prove that components were resistant to wear and that the pump was sturdy. In his opinion, the pump should work without any major repairs for two years. Thereafter it would even be economically valid to scrap the pump instead of carrying out costly maintenance. With regard to his company getting involved in maintenance, he felt that even though it was possible, it would not be advisable in view of the cost involved. As regards erection of the pump by the manufacturers he said it would be possible if the cost of erection was paid by the beneficiaries. It was his opinion that the State Governments might not be able to take up the manufacture of pumpheads. They might have to involve some private agencies but, unless the firm was able to produce an adequate number of pump heads every month, there would be a set-back in the programme.

As regards the capital involved for production of 30,000 pumps in two years, the total capital expenditure would be about Rs.2.25 crores, which would mean Rs.10 lakhs per month. He felt that Mr Acheson's suggestion that the cylinders might be produced on a mass scale by Richardson & Cruddoss while pump heads were produced locally in the states was workable if each state was able to produce 125 pump heads per month. He said his firm had no objection to produce only pump cylinder parts on a mass scale.

Sri Govinda Menon, enquired why it might be necessary for the pump to be scrapped after two years. Sri Karkare also felt that this was unnecessary. He felt that the total number of pumps required to be produced would be much more than 30,000 as many of those existing would have to be replaced in addition to the installation of new pumps during the 5th Five year Plan. Sri Neelakantappa stated that the time of six months for production of pumps indicated by Sri Krishna Murthy was reasonable. However, as the states were anxious to have the pumps in the field, he felt the six months schedule should be strictly adhered to.

Sri Krishna Murthy replying to the points raised, stated that the pump maintenance would require little attention for about two years. Thereafter, it might be economical to replace the pump instead of resorting to major repairs. As regards the production of pumps, he said the demand for such pumps might go down after some time as more sophisticated systems to water supply installations would be coming up in due course. As regards the time of six months he felt that it would normally be adequate except when unexpected hurdles come across. He appreciated the efforts of Mr Emmanuel for his good work in developing the Bangalore pump.

3. RECOMMENDATIONS:

The participants then discussed and approved the following recommendations:

3.1 The participants, after having studied the different types of handpump that are in use as well as the various components of the newly evolved Bangalore pump, and having discussed the merits of the Bangalore pump, recommend that:

- i) a few hundred Bangalore pumps should be manufactured and distributed to the various states for carrying out extensive field trials for a maximum period of six months to determine their suitability for large scale use in the rural water supply programme in India;
- ii) a suitable standardized evaluation form should be developed by CPHEEO, in consultation with other agencies as considered necessary, for data collection on operation of the pumps during the trial period;
- iii) a central organisation should be involved to look after the quality control aspects and certification of the handpumps to be produced on a mass scale and for this purpose the services of MERADO and other similar organisations may be utilised.

3.2. The participants, having discussed in detail the lacunae in the existing arrangements for the maintenance of handpumps, and recognising that the success of the rural water supply programme is dependent on the development and use of sturdy and efficient handpumps as well as the establishment of an effective system of maintenance, recommend that:

- i) preventive maintenance and breakdown maintenance and repair shall be carried out and assessed at the appropriate Taluka Board/Block level and Village/Grama Panchayat level;
- ii) suitable maintenance organisations equipped with the necessary tools, spares and vehicles shall be deployed to carry out the maintenance on a regional basis;
- iii) the cost of maintenance shall be borne ultimately by the Zilla Parishad/Grama Panchayat irrespective of interim arrangements such as subsidy from the State Government if desired.

3.3 The participants, having studied the various aspects of installation of handpumps and ancillary works, and recognising the importance that this should be carried out in a safe sanitary manner recommend that:

- i) effective sanitary measures shall be taken by all authorities concerned in the construction, maintenance and operation phases of the handpump with a view to ensure that the water supply is safe and wholesome for human consumption.

3.4 The participants, recognising the importance of community involvement in the handpump programme, recommend that special attention be given by the Zilla Parishad to the following:

- i) involvement of the beneficiaries from the early stage of the project and paying due attention to the needs of the community for the installation of handpumps;

- ii) constitution of village committees to be responsible for proper maintenance and upkeep of the handpumps;
- iii) involvement of all sections of the community directly in the programme, in particular the women as the major users;
- iv) health education, including intensive radio publicity.

4. CLOSURE

Before closing the meeting, the Chairman requested Sri Neelakantappa, Chief Engineer, Karnataka, to speak on behalf of the State Government. Sri Neelakantappa expressed his satisfaction that the Government of India had decided to hold the workshop in Bangalore and his state had readily agreed to host the meeting and had made the necessary financial allocations. He considered that the workshop had served a useful purpose in making it possible for further development of the improved handpump to take place. He thanked the participants for coming and hoped that they had enjoyed their visit.

Mr M.A. Acheson then thanked the Government and participants on behalf of W.H.O. He believed that WHO's sponsorship of this type of meeting was an important input and he hoped that it would be possible to hold similar workshops or seminars on specialised topics in years to come. He urged the Chief Engineers not to let matters rest now, but to maintain the momentum towards the field trial of the Bangalore pump, the improvement of maintenance organization and the development of community participation. The outcome of the workshop was encouraging but there was a risk that there would be delays before further action was taken.

Mr Prakash Narain, on behalf of the Government of India, also expressed his thanks and appreciation to the State Government and to the participants who had joined the discussions. He gave assurances that progress would be continued in the matter of pump development and he asked for the cooperation of all Chief Engineers.

Mr T.S. Swamy, in his capacity as Chairman, made the final closing address thanking all concerned with the workshop which he considered to have been a considerable success. He believed that the frank and free exchange of views and ideas had contributed to the planning of the rural water supply programme, and he looked forward to increased co-operation between CPHEEO and the State Governments. The workshop then was declared closed.