IRRIGATION REHABILITATION - A CHALLENGE THAT HAS BEEN AVOIDED

by
N.N. Kamaladasa
BSc(Eng), CEng, MIE(SL)

Abstract

The scope for Irrigation Development is being diminished. Irrigation Management and rehabilitation remain the only challenge left for the present day Irrigation Engineer. Facing it cannot be done purely on technical terms. Technical matters are often clouded by social and environmental issues. This complexity is interpreted differently by Lending agencies/Donors, Civil Engineers and Sociologists confusing the issues more. In this unknown, complex and confused jungle of rehabilitation and irrigation management, finding a way out has become a real challenge. This attempt is to look at it from different angles and open up some of the clouded issues.

Macro Issues

Most of the Irrigation potential of the country has been made use of, and there is very little scope remaining for developing new irrigated land. Irrigation Agencies have been left with the unique task of managing these developed resources. The Engineer who used to marvel his own civil engineering creations, is now requested to manage them. This is often seen as a trivial task compared to the design and construction of those colossal structures.

In managing the schemes, the only remaining civil engineering activity is seen as rehabilitation. Therefore it is seen as the only area left for imputting some "real engineering stuff".

Rehabilitation, when seen as a purely civil engineering exercise, loses its actual scope.

The dilemma faced by the present rehabilitation exercises however is not limited to this.

The word "rehabilitation" itself is misleading. It's literal meaning is to bring back the system to the original design which is not economical, practical or the best. Once the regime conditions have been established, it is hydraulically disastrous to change it much.

When the need for Rehabilitation occurs as a result of neglected maintenance, it is difficult to prevent the rehabilitation exercise becoming a "glorified maintenance" exercise.

When donors, one after the other queue up of providing funds for rehabilitation, the situation becomes more mixed up. Rehabilitation needs are construed by the conditions donors impose and not evolved from field realities. The "gospels" often provided by the donors describing the rehabilitation process are blindly followed by the implementing agencies, without understanding the context in which those processes have been formulated. Classic examples are the "walk through surveys" and "farmer consultations". In both these exercises the operational defects and inadequacies, are not looked for, though need for repairs, canal lining etc. are readily identified. Even where operational defects surface the solutions considered are deliberately kept within the limits of hardware options, which at least have a shade of civil engineering input.

Absence of a criteria in selecting schemes for rehabilitation has left room for so many irrational interventions of the other extreme of limiting to soft ware considerations. Recently the willingness of the farmers to organise themselves in a group is considered as one of the major criteria for rehabilitation. Though it is an essential condition to gain a satisfactory return from rehabilitation, it cannot be the criteria in selecting schemes for rehabilitation, as the need for rehabilitation is not directly related to the same. Here we have mixed up the need for rehabilitation, with the precondition for a successful rehabilitation.

Temporary confusion that has occurred among the engineers on the role of the irrigation engineer with the weaning out of construction, the wrong terminology, and the circumstances which the rehabilitation necessitated

and carried out, are some of the macro issues related to rehabilitation.

Micro Issues

Micro issues related to rehabilitation are many and vivid. Some of which stem from the same civil engineering biased approach of the present day engineer, who is less concerned over the water distribution, farmers dilemmas or socio-economic - environmental reasons that cloud most technical issues connected to irrigation water management.

As already pointed out, rehabilitation needs are not identified after a thorough analysis of the operational defects or inadequacies. Even when operational defects are surfaced, cause for such is searched analysing only the physical system. Even here much emphasis is given to arresting the defects physically and not operationally. Best example is the proposal for canal lining as a means of saving scarce water. Even in proposing these physical solutions, the consequences and implications of such on the socio-economic-human-environmental domain is often neglected. The social environmental feasibility of the proposals are pushed to corners taking technical feasibility analysis to the centre.

Even when operational solutions are given, often coupled with complex technical and structural arrangements, the social and environmental feasibility of those are overlooked. Simplicity as a motto has not gained ground yet, with the Engineers, who used to marvel at the complex formula that they learnt at the Universities.

Analysis of alternatives in the context of the total system (where physical, technical, socio - economic - human - environment are subsystems) is rarely attempted.

The results are complex measuring structures which could never be used, double banking canals destroying the useful balancing night storage tanks, unnecessary retaining walls and superfluous aprons which move the erosion point to a different location- without eliminating erosion, 6" pipe outlets which have to be concreted to make it equal to 3" later, absence of adequate regulating devices even after rehabilitation etc.

Specific Issues

In framing the rehabilitation proposals the following areas are often overlooked or looked at inadequately.

1. Localized water shortages (disputes between upstream and downstream users at main, D & F canal levels)
2. Equity in operation (with an adequate analysis of the community view on equity)
3. Operation methodology. (Continuous vs. Rotation, Rotation at what level - Main canal, D canal, F canal or farm level, at what interval and for what period).
4. Socio-economic, human and environmental constraints that have a bearing on the feasibility of selected canal operations. (Chena cultivation with rains and as a result delay in commencing the Kanna, Part-time farming, leasing of farm lots to outsiders, average family size, meeting of peak labour and farm power requirements, agronomic practices, intensity of agricultural inputs, knowledge and literacy).
5. Adequacy of canal capacities for selected operational methods.
6. Maintaining control water surface for diversions at turnouts and necessary regulating arrangements.
7. Simplicity in measurement and allocation of water.
8. Adequacy of institutional arrangements for selected canal operation.

The main reason for overlooking these factors can be attributed to the isolation of rehabilitation exercise from the exercise of managing the scheme, in addition to the other factors already mentioned elsewhere in this article. Rehabilitation has to be an evolutionary step of the Irrigation management exercise and therefore cannot be taken out of it and dealt with separately.

Rehabilitation Process

Rehabilitation process could be construed in the flow diagram given.

Donor Assisted Tools

Though we are equipped with some of the useful donor given tools like walk-through surveys and farmer consultation workshops (though there can be doubts as to whether really those or the terminology of those were given by donors) we would not achieve the desired results from rehabilitation if we are going to use these tools incorrectly.

At one end of the spectrum we find engineers who have no concern over the human, socio-political considerations while on the other end of this spectrum, we find engineers who have given-up all the engineering concerns and wait until they are advised by the farmers, on what structures should be built and where. Both these gentleman do not understand that the requirement is to reconcile the technical consideration with other considerations to give the most feasible and sustainable answer to the solutions to the problems of this multi-characteristic system.

That is why the farmer consultation would not be useful in the stages other than in identifying needs, analysing causes and in reviewing the feasibility of alternatives. It is only not useful, but sometimes can be damaging in arriving at the most technically sound decision, in certain instances.

Some Technical Issues

Some of the technical issues where our attention should be focussed are listed below. This list can be expanded to run into several pages though not attempted, as long articles will being end up not being read by anybody.

- Rotation among the different D-chl systems can address main canal tail-end problems, than rotation at a lower level.

Though this is normally true, one has to analyse the feasibility of this for the scheme under consideration. How powerful head reach farmers are, what physical constraints exist in the channel system to operate such a distribution schedule, Agency staff ability and interest in operating such a system, should be among such considerations.

- Rotation is water saving than continuous

Though it is usually correct, there are other issues connected to rotation like higher labour intensity, reduced yields as a result of higher soil temperatures in highly arid areas, less predictability leading to wasting of farmers time etc, and therefore has to be viewed in the socio-economic-human-environmental setting of the scheme.

- Water loss at the upstream is lost for ever

There can be recharges in another part of the command or there can be other farmers who reuse this by unconventional means. Therefore reducing losses at upstream should be done carefully studying a possible consequences and implications, as it could upset the already achieved status quo.

- Seepage loss in a canal is always bad

Seepage often recharges ground water. If ground water is conjunctively used already by the farmers, arresting seepage would upset this.

- Only surface water is available economically

Ground water as a supplementary source of irrigation is yet to be considered in Sri Lanka, but its use in other countries are wide spread which hints for a possible reconsideration. With such a reconsideration rehabilitation plans could change much.

- Double banking is best as it avoids silt flow and floods that would damage the channel system.

Double banking eliminates night storage/balancing tanks, which are useful in storing water when night irrigation is not practiced, when delivery time does not permit intermittent releases, from the main sluice.

- Rubble packing is an economical measure for reducing canal bank erosion.

Rubble packing can be an economical means but it could be easily disturbed by removal of rubble for other work by villagers. Therefore sustainability of the solution is at stake here.

- Retaining walls are the best to arrest erosion in canal bunds at bends.

It could be true if other alternatives like rubble pitching, flatter slopes become uneconomical and nonfeasible.

- Obtaining the minimum control water surface so that diversion requirements at turnouts, could be met through establishing regulatory devices at correct positions is the basic principle in rehabilitation designs

It would be the basic principle in addressing water needs, but when it comes to safety and socio-human needs there could be other basics also.

- Establishing the Control Water Surface is done by calculating the back water profile assuming steps of uniform flow regions in between the predetermined cross sections in the canal

It is easier said than done. Ofcourse with computers one can do this provided cross sections at sufficient intervals are available. Certain approximations however do not change the results much. But why one should calculate it when there is a 1:1 model available for establishing it.

- Though cross sections are non uniform, the streamlined flow reduces any transition losses that would otherwise occur in a canal with varying cross sections.

It is easier to say. But quantifying it, needs further research. Rehabilitation could get much impetus than what it is today, through research interventions.

Conclusive Remarks

This article, only attempts to throw certain macro and micro issues before you, which needs further study and review technically and otherwise.

As irrigation rehabilitation is going to fill a larger part of the irrigation engineering time table in future, it is prime time to throw these issues to a wider audience and to arrive at a consensus shared by all irrigation engineers.

Rehabilitation is currently forced down through the gullets of farmers with a sugar coat of "farmer consultation and participation" with an undue haste. It is right time to think rehabilitation as a gradual process, that should evolve naturally from the irrigation management exercise and carried out at a slower pace, which would allow for readjustments while being done.