IRRIGATION AND ENVIRONMENT SUSTAINABILITY

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The sustainability aspect of agricultural/irrigation development has long been neglected due to short term perspectives and the success of the green revolution. With the escalation of natural disasters attention is being found on environment degradation. However, until recently environmental aspects did not hold an important place in development agenda. This paper tries to outline the importance of combining irrigation development with environmental sustainability.

What is sustainable development?

Sustainable development is one that 'meets the needs of the present generation without compromising the ability of future generations to meet their own need's (WCED, 1987). It is not a new concept for professionals and academics working on development issues. The necessity of combining environmental sustainability with development action was discussed in the early seventies as a basic theme. This idea has evolved further with the setting up of the world conservation strategy (1980) and the World Commission on Environmental and Development (WCED, 1987). Especially the WCED has recognised the complex nature of the relationship between resources and man and has pointed out environmental degradation as the cause and effect of world poverty. Therefore, it is important to pay attention to environmental sustainability in the development of irrigation in which land and water resources are used extensively.

The need for new approach

The development of irrigation to meet the food requirements of the growing population of the world, and the use of more and more land and water resources by cultivating new lands and by more intensive use of existing lands are necessary steps. As a by-product of this process, social misery and ecological destruction in the form of landslides, silting, water logging and salinization have resulted (Centre for Science and Environment, 1982 & 1985; Falkenmark 1977; Goldsmith et al 1984). Salinity and water-logging which result from misuse of water and land are major problems in agriculture in countries like Iraq, Syria, Egypt and Pakistan.

Upto now nearly 800,000 hectares of state lands have been alienated through different settlement projects in Sri Lanka. Irrigated settlement schemes numbering 107 accounted for about 300,000 hectares in the Dry Zone.

Inadequacy of water for cultivation is the main problem in many irrigated settlements in Sri Lanka as in other countries in the region. Therefore, the peasants in irrigated settlements use various strategies to obtain adequate water for cultivation. One such strategy is the blocking of drainage channels and diverting them into farms. This prevents proper drainage while certain soil qualities have resulted in alkalinity (Somasiri 1982, Talakasiri 1979). Excessive and inadequate use of water in agricultural lands under irrigation have resettled in such environment problems.

In addition to problems of water availability, research on irrigated settlements indicates that a high incidence of informal land transactions are present in settlement schemes. Due to land tenure and other related problems together with population pressure on the available land could be affect the sustainability of irrigated agriculture. Therefore it is important to study and understand indigenous systems and their current relevance.

Sustainability aspects of water use under village irrigation

The traditional village and its spatial organization have been identified by researchers in different ways. In the Dry Zone there are a number of zones in a village including the tank, the residential area, the paddy fields, and the jungle areas. The zoning mentioned by Tennekoon (1974) has been described by Ulluwishewa (1990) as self-sustaining agro-ecological systems and subsystems. This indicates the tank, the paddy fields, the Chena, the jungles and some activities of animal husbandary, and also their relationships. For well over a thousand years the

hydraulic civilization balanced land, water and biological resources with extraordinary success.

Some examples related to the irrigation system which take sustainability into consideration can be identified even now. A narrow strip of bare land is left between the tank and the stretch of paddy fields to prevent and damage to cultivation by salinity. Special kinds of trees (like Vetakeiya, which absorb salinity) are grown in those strips of bare land and on both sides of channels. There were special farm ditches to prevent salinity at Liyadda level in stretches of paddy fields. There were also special ditches called Kiul Ela (brackish channel.) This is a feature even under the present day village irrigation (Jayawardena et.al 1984, Tilakasiri 1984)

The villager treated his irrigation system as one unit and paid attention to the command area. The watershed area of the tank was not used for Chena cultivation. According to Goldsmith (1984) there were four types of tanks in traditional villages and one of them was used as an erosion control tank. However, due to pressure of population, these features have changed and some of the lands have been used for Chena cultivation. The paddy fields have stretched across the watershed areas of the other tanks too and the tanks have been connected to each other through paddy fields. This has resulted in soil erosion and silting of the tanks.

What such evidence reveals is that the traditional peasants had addressed the problems of irrigation management and environmental sustainability through long-term experience of cultivation and through traditional customs. In the new irrigation schemes of the present day, and in the rehabilitation of existing systems too, certain concepts and

A peasant in a irrigated settlement diverting water to his farm from a drainage channel.

principles can be utilized for the development of irrigation by studying the indigenous irrigation systems.

Conclusion

Although a large number of irrigation projects have been started, proper attention has not been paid to the question of efficient water use until recently. Just as land became extra important as a resource, in the 1960's water and its use has received extra attention from the mid 1970's, – especially through a growing interest in social aspects of water use activities.

Due to different environmental and socio-economic problems which occurred in the irrigated settlements, with the irrigation water use and land tenure and also due to cost of production, it is doubtful whether irrigated agriculture could be sustained. Therefore it is necessary to draw attention to the questions such as how could irrigation water use lead to environmental problems how could irrigation development be achieved with environmental sustainability in the 90's.

This requires a deep understanding of 'time-tested indigenous irrigation systems' in the country and a multi disciplinary approach to irrigation development with the participation of not only those in the fields of agriculture and engineering but also economist, sociologists, ecologists and other categories. But this alone will not conserve the environment and ensure sustainable irrigation development. It is also equally important to even the active participation of irrigation officials and the water users.

References:

Centre for Science and Environment, 1982 and 1985. The state of India's Environment, citizen's Report, New Delhi.

Falkenmark, M 1977. Water and Mankind – A complex system of mutual interaction, AMBIO, A JL of the Human Environment Research and Management. Vol. 6 (1), pp. 3 – 9, Stockholm.

Goldsmith, E and Hildyard, N. 1984. The Social and Environmental Effects of Large Dams, Wade bridge, U.K.

Jayawardena, S. D. G. Maeda, N. 1984. Transformation of the agricultural Landscape in Sri Lanka and South India, Center for South East Asia studies, Kyoto University.

Sandell, K. 1988. Ecostrategies in theory and practice Farmer's perspectives on water, nutrients and sustainability in Low-resource agriculture in the dry zone of Sri Lanka. Linkopings Studies in Arts and Sciences.

Somasiri, S. 1982. Water management and agricultural development in major scheme's in K. P. Wimaladharama (ed) Land Settlement Experiences in Sri Lanka, Colombo pp. 103 – 112.

Tilakasiri, S. L. 1979. Water rights and irrigation practices; A study of Toranegama hamlet in the Mahaweli development area. Sri Lanka, Research manograph, Peoples Bank, Colombo.

Tilakasiri, S. L. 1984. The Indigenous irrigation system at the village and Liyadda level, paper presented at the workshop on the History of Science and technology in Sri Lanka. General Research Council, SLAAS, Dec. Colombo.

Tennakoon, M. U. A. 1974.spatial organization of Agriculture in the traditional rural settlements in the Mahaweli development area' staff studies, Central Bank of Ceylon, Colombo Vol 4 (2) pp. 1–22.

Uluwirshuewa, R. 1990. 'Modernization vs. Sustainability; A case study in sustainable village agro-eco systems in the Dry Zone of Sri Lanka, Environmental conservation, Environmental Foundation, Swister land (forth coming).

World Commission on Environment and Development, 1987. Our Common Future, Oxford University press, April.

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(c) Association would resolve conflicts among its members.

(d) NIA would provide different associations an office and technical assistance and will bear the costs of farmer seminars.

As early as 1986, about 25% of irrigation systems, had been turned over either to total farmer management or joint management of farmer association and NIA.

Private Tube Well Development In Pakistan's Punjab

In Pakistan over 90% of the total pumpage and 30% of the total amount of irrigation supplies come from private tube wells (estimate of Water and Power Development Authority). About 2/3 of the wells are diesal powered engine driven and 1/3 electrically operated. (Robert Johnson – Private Tube Well Development in Pakistan's Punjab IIMI, 1989). Thus, groundwater plays a major role in Pakistan's agricultural production system. Conservative estimates places its contribution to the total water supply for irrigated agriculture at 30%. The Pakistan government since 1970 has adopted an official policy of emphasizing private instead of public tube well development in fresh groundwater areas, under the Transition Pilot Project of the Salinity Control and Reclamation Project. Under this programme 213 wells will be transferred to farmers in 1990 in the Khanqah Dogran block of the Salinity Control and Reclamation Project – 1 area. The project plans to encourage 2100 private wells in the Khanqah Dogran block. The effect of the programme is as follows:

(a) Relieve the government of high expenditure in the sector;

(b) The birth of private drillers as an entrepreneurial class who offer private drilling facilities and services. They will be available readily when farmers need them thus eliminating the need to follow bureaucratic procedures to obtain public assistance.

(c) The Agricultural Development Bank of Pakistan began supplying credit to farmers installing tube wells.

(d) The rich farmers with holdings over 2.024 ha (5 acres) received more assistance. This curtailed the access of small scale farmers to bank credit facilities.

(e) The programme had significant impact on production. Yield increased by 15-30%, cropping intensities increased from 120-140% and cropping pattern shifted to higher value crops.

(f) Environmental sustainability was maintained.

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In Sri Lanka, the Department of Irrigation, the Department of Agrarian Services, the Mahaweli Authority, the Water Resources Board, the National Water Supply and Drainage Board are inchargeof the agricultural industrial and consumer water. It is suggested that farmer management in irrigation be extended to minor/village tanks through wew shabas (tank councils) which should maintain structures, channels, clean the tank from salvinia, issue water equitably, collect O & M. The council should only be assisted in technical factors by technical officers of the Department of Agrarian Services. Similarly, like in Pakistan, farmer owned and managed tube well programmes could be launched in dry and water stress areas. The Water Resources Board can assist in locating wells, controlling undue drilling to prevent excess extraction and compete with the private sector in offering services to farmers. As far as medium and large scale irrigation projects are concerned the strategy should be somewhat different. The participation of farmers in irrigation management varies in terms of:

(1) which management functions they are involved in,
(2) the intensity of that involvement, and
(3) the geographical extent of their participation.

Management Functions to be Devolved to Farmer Organisations/ Farmer Cooperatives

(1) PLANNING FUNCTION with tech nical personnel
(2) Placement of structures
(3) Participation in construction
(4) Maintenance of infrastructure including collection, disbursement and accountability of O & M.
(5) Distrubution of water
(6) Participation in design and construction with irrigation Engineers.

Intensity of Farmer Involvement

By getting farmers involved from the planning, designing, construction stages they will not only gain experience in negotiations but also be committed to look after the project as a farmer community. The capacity of the farmer organizations to impose sanctions on its members is the test the organization can meet. Once the legal status of the farmer organizations can be agreed upon, enforcement of sanctions, collection of dues, becomes easy. This will minimize intra – group conflicts.

Geographical Extent of Their Participation

It should be the objective to plan for the eventual farmer management of the entire system. It could begin on a small scale, say from a unit/yaya, and gradually built to cover a system. Roughly 200 – 2000 acres is a range that should be aimed at. There is a need to bring linkages with water shed management groups in the catchment areas as well. There is a need for a high level committee of members representing farmers on a minor or distributory canal. Such a committee needs to work jointly with the administration to tackle unauthorized use of water in the upper reaches and refer field level problems to the appropriate authorities. The experience of the Gal Oya, Dewahuwa, Minipe, Nagadeepa, System 'H' could be developed further to extend towards farmer managed community owned irrigation systems in Sri Lanka.

Conclusions

Participatory management in Sri Lanka in irrigation is evident from the INMAS and Gal Oya experiences. Here farmer representation is built into the project. There are many lessons to be learnt from Sri Lankan experience and those of other countries. The experience in Madagascar and Phillippines would offer some insights. Privatization of irrigation management is unthinkable because it would not work in Sri Lanka. However, farmer management in irrigation and community ownership is possible in certain location specific projects. There are several areas of conflict to be resolved before generalizations could be made. They are:

* Do farmers have the capacity to undertake irrigation management?
* What is the legal organisation that can do so?
* What should be their management functions, intensity of involvement and area of authority?
* What should be the nature of relation ship with authorities?
* What should be the functions, limits and linkages with other farmer associations and with official agencies?

Valuable and hard-won experience is being gained in Sri Lanka and elsewhere but the lessons of these experiences are not adequately researched and documented. There is an urgent need to record sufficient information from each case, before, during and after the project, so that the past and present experiences can guide current and future efforts. We should not merely copy the efforts of other countries but should come up with our own model to suit our socio politic and economic environment.

Bibliography

1. Embry. B. L. Adams N. L. 1983. Small farm self help irrigation projects, Fort Collions, Co; Colarado State University.
2. Groenfeldt. D. J. 1986. Shared government – farmer management of irrigation resources; The potential for farmer participation International commission on Irrigation and Drainage. Special Session Report.
3. Tiffen. M. 1987. Main types of irrigation management systems. In Framji. K . K. (Ed). Improvement in Irrigation management with special reference to developing countries New Delhi India: ICID .
4. Vermillion. D. 1987. Turning over irrigation systems from the government of Indonesia to farmers. Digana Village. Sri Lanka IIMI.
5. Vermillion D. L. 1989. Farmer level irrigation management in private and public systems in Indonesia. Distributional rules and exceptions, Paper delivered at the Asian Productivity Organisation Study Meeting on Farm Level Irrigation Water Management, Lahore, Pakistan Feb. 1989.
6. Howarth. S. E. Pant. M. P. 1987. Community managed irrigation in Eastern Nepal. Irrigation and Drainage Systems 1 (3).
7. Martin. E. Yoder. R. 1983. Community managed irrigation in the hills of Nepal: Some preliminary findings.
8. ILLO. J. F. I. De Los Reyes. R. P. Felix. N. S. 1984. Organizing farmers for communal irrigation. Preconstruction and construction in the Aslong irrigation project. Quezon City: Institute of Philippine Culture. Ateneo de Manila University.
9. Karunanayake M. M. 1983. Irrigation systems in Sri Lanka. A survey linkoping Sweden. Department of water in Environment and Society, Univeristy of Linkoping.
10. Kent. C. A. (Feb) 1987. Entrepeneurship and the privatization of government New York. N. Y. U. S. A. Quorum Books.