IRRIGATION SECTOR IN THE 21ST CENTURY: ISSUES IN LAND, WATER AND PEOPLE

Anura S. Widanapathirana

Mr Widanapathirana is a graduate in agricultural economics with a wide experience as agricultural economist in several public and private sector establishments both national and international. He has served as a university teacher, an advisory officer of the Rubber Research Institute and a researcher at AR & TI before his international career. He served as agricultural economist to the Ministry of Agriculture and Natural Resources, Darfur Region, Sudan during the last crisis in the Sahel and thereafter served as a UN expert in Sudan. Served in several missions sponsored by ADB and in bilateral aid missions. He continue to work as an agricultural economist to UN missions such as UNDP, ILO, FAO and UNSO specializing mainly in Africa, and several international consultancy firms. At present, He is working as agricultural economist to the Irrigation Management Policy Support Activity (IMPSA).

Economists indentify three factors of production namely, land, labour and capital. It is the combination of them which ultimately results in production. In the case of the irrigation sector, it is necessary to treat water as the most important production factor since no other factor could make irrigation water available. As a production factor, water is also most significant since it is the basic component in animal and plant production processes.The availabilityof capital is of less significance if water is the central problem. The central focus of the irrigation sector is water and its relationship to land and people. We must emphasise people since irrigation is done by and for the people. We avoid the word "labour" since "people" includes both the productive aspect and the social dimension including the old, young etc.

An examination of how the three production factors would look in the year 2000 is an interesting exercise. This will also help develop strategies to improve production in the irrigation sector. A forward looking approach is also important to plan ahead and to stimulate all the actors, viz. the farmers, planners and politicians involved in the irrigation sector.

The central focus of this paper will be to examine the likely form of the three production factors mentioned earlier, in the context of the irrigation sector, in the year 2000 and beyond. Although water and other production factors of irrigation are closely related to non-irrigation sectors as well, e.g. domestic water supplies, this paper concentrates only on the irrigation sector.

Factor dynamism

The three production factors have undergone a process of rapid change within this century. Let us see what the main changes are and their direction in the next century. Since water is the most important production factor for irrigation, the discussion will first centre thereon, followed by the other two factors.

We are moving from a water abundant situation to a deficit situation. We considered water as a never-exhausting gift given by the God. But now we are paying greater attention to water and have recognized the need to establish institutions in this connection (see separate article on "institutional issues"). Farmers used to resort to the extravagant practice of over-using water and economizing on the other inputs such as labour, farm power, etc. As a result, water used in irrigation plumetted even as high as 15 acre feet in respect of an acre of paddy. The fact that we still do not measure water demonstrates the low attention paid to it although appropriate measuring yardsticks are applied in respect of the other two production factors, land and labour.

We have started to think in terms of the produce per unit of water and not land. At the beginning of the 20th century, we were not thinking in terms of adequacy, reliability and equity parameters of water distribution. These have emerged as words frequently echoed in the latter part of this century. The other problem emerging fast is the quality of water which is deteriorating rapidly. In some major irrigation schemes, it is reported that irrigation water contains high doses of substances such as nitrogen, potassium and pesticide residues which have already reached alarmingly high levels. These problems have affected domestic supplies as well which make it necessary to impose measures to control water quality.

We saw the adoption of better water management practices and other agricultural management techniques during the 1980s which may have cut down on the extravagent use of irrigation water. The impact of these practices on water use is yet to be worked out. Available statistics show the water use rate (measured in terms of water duty) to vary from 1000mm to 25,000 mm during 1980s. There is a large variation in water duty among irrigation schemes and seasons as well.

Let us trace some developments which may possibly take place in the next century. Water will appear as a main production indicator and appropriate measurement mechanisms will have to come up. There will be water measuring devices installed and farmers trained in monitoring water delivery. Legal matters with regard to water use may also have to come up since water conflicts are likely to increase. The main focus of farmer organizations (FOs) will be in the area of water management. People will be conscious of water quality and conservation, and will have to develop

The Contents of this paper are personal opinions of the author and does not express the views of the institution to which he is attached.

appropriate measures to rectify the problems. There will be training and educational programmes focussing on water; at present, training programmes are focussed on land and labour utilization but not very much on water. Water use will appear as a main indicator of economic development of the country.

Land: Land is an important factor of production which has undergone its own changes during the 20th century. The main reason for such changes is the population growth and the resulting need to increase production. The present irrigable area of the country is about 550,000 hectares accounting for 22% of the total cultivable land. Given the need to maintain land use, the country is reaching the limit of expansion of the irrigable area. Based on population movements in the year 2000, the irrigable land area per head of the population will reach the figure of 0.023 hectare.

The following Figure shows the growth in agricultural and irrigated land extent over the years.

The next question is the level of utilization of irrigable lands. Here, there are three main categories namely, asweddumized, planted and harvested areas. Past performance indicates an upward movement in the asweddumized area which can be theoretically irrigated. However, the extent to which irrigation facilities were available is just a fraction of this. The third category is the harvested area which is still less than the planted area. A closer look at these area categories indicates that major schemes have had relatively higher areas planted and harvested compared to minor schemes. Similarly, the area planted in Maha is greater than in Yala in both major and minor schemes. The variation in the planted area is highest in the case of minor schemes (Coefficient of Variation = 13-18%) and low (CV=8-13%) for major ones (Table 1).

Table 1: Mean Value and Variation in the Area Planted and harvested by Type of Irrigation

Irrigation	Irrigated Ratio		Harvested Ration	
	Yala	Maha	Yala	Maha
Major	0.53 (13.20)	0.83 (8.43)	0.96 (4.20)	0.95 (2.08)
Minor	0.33 (18.18)	0.75 (13.33)	0.91 (7.69)	0.91 (7.69)

Source: Compiled from Census and Statistics data

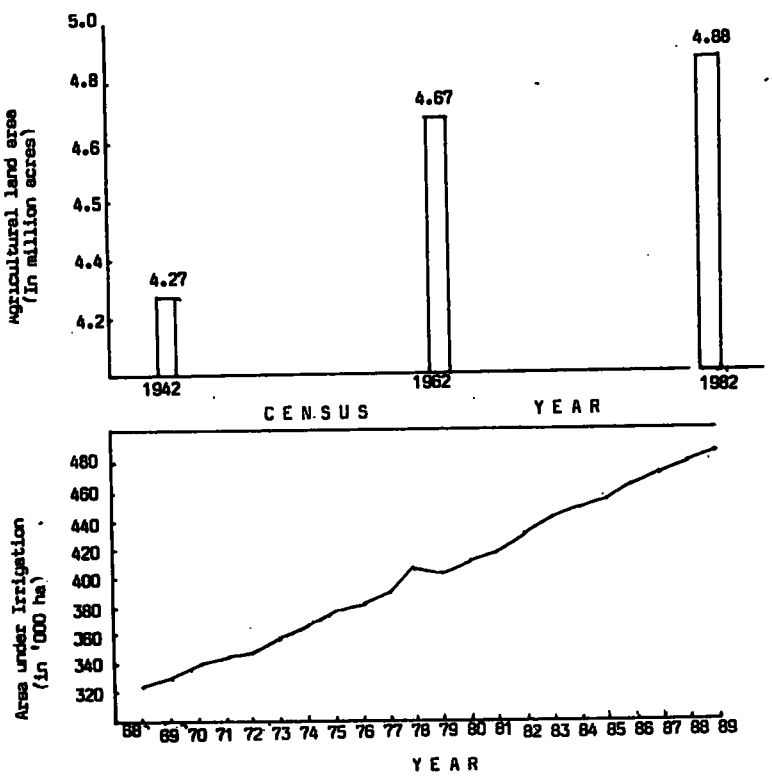
Irrigated Ratio: Proportion of the asweddumized area planted
Harvested Ratio: Proportion of the planted area harvested
Figures in parentheses show CV (in percent)
Mean and CV calculated on the basis of data for 21 years (1968-1989)

The main reason for the fluctuation in the two ratios is the differences in water availability. Since factors which could reverse these trends are unlikely to occur, they will continue even in the next century.

The third issue related to land is the method of operation of the irrigable area in relation to ownership. Statistics show that the owner-cultivation status is dwindling and other types of tenancy are appearing fast particularly in older irrigation schemes. Some of the old irrigation schemes bear testimony to the complex forms of tenure with almost no hope for tenure reform. A related aspect to this tenure form is the encroached areas which in older schemes have reached very high levels. In all irrigation schemes, lands set apart for various purposes have all been encroached upon affecting land and water use efficiency on one hand and even the safety factor on the other. The latter two problems are likely to be serious in the next century.

People: With regard to population, there are three dimensions which are important in the context of the future irrigation sector, They are the growth rate, labour force and its composition. The growth rate for the country which was as high as 2.4% in the1960s has dropped down to 1.5% in the late 1980s. In the dry zone, however, it is at a high level where most of country's irrigation works are in operation. The growth rate of population in the dry zone is 2.7

FIGURE 1: CHANGE IN AGRICULTURAL LAND AND AREA UNDER IRRIGATION OVER TIME



compared to 1.5 for the country as a whole which is likely to remain at the same rate. The high growth rate will have implications on irrigated agriculture.

The labour force as revealed by the last census is one-third of the total population. The present growth rate of labour force is higher than the population growth rate with the majority confined to rural areas. Since almost all of the irrigation is done in rural areas, it may be deduced that the labour force growth rate within the irrigation sector will stay at a high level in the next few decades. Moreover, the female component of the labour force is greater than that of the males.

This growing labour force consists of educated people compared with their predecessors. With the increase in the educational standard and the associated increase in the standard of living, the future generations involved in the irrigation sector will require more material wealth than their parents. Whether irrigated farming, given the present level of technology adoption, can generate this higher level of income commensurate with their expenses is a doubtful issue. Data for the country indicate an increase in income in real terms from Rs. 185 in 1981 to Rs. 284 in 1985. We do not have similar data in respect of the irrigation sector. The widely-held observation is that the profitability of irrigated paddy farming is diminishing and hence it may be surmised that irrigated paddy farming may not generate a high level of returns. Given the above scenario, two options are possible: One is modernization of irrigated agriculture with equity so that the future generations will earn a higher income. In this connection, application of modern irrigation techniques and enterprise diversification including crops and livestock, double and treble cropping, etc. are possible (see separate articles on irrigation and agricultural technology in this issue of **Economic Review**) options. The other option is to remain within the present production environment, a situation which we must certainly avoid.

Finally, issues operating in the interface of water, land and people should also surface. In this connection, the main issue is environmental pollution which is spreading fast in the irrigation sector. The high level of soil erosion and siltation, deterioration in the quality of land and water resources, socio-economic problems such as fragmentation of holdings, emergence of various forms of tenure, destruction in watershed, etc. are some environmental problems that have emerged in the 20th century. By all means, these problems are expected to grow rapidly with the increase in population and adoption of environmentally haphazard cultivation practices.

Based on the foregoing analysis, it may be summed up that the changes occurring in water, land and population resources, will most likely impose a compulsory twist in the form of the irrigation sector in the year 2000 and beyond.

Thoughts for the next century

Problems associated with water, land and people will continue in the next century. The high land pressure, issues connected with securing water supplies, unemployment, and environmental degradation are likely to create additional problems in the irrigation sector in the next century. It should be noted that these changes will ultimately become the problems of the country too. Therefore, some changes in this sector are inevitable in order to cushion off these unfavourable conditions.

Discussed below are some opinions of the author which warrant consideration in the 21st century.

Land consolidation: The need for consolidation of agricultural lands in the irrigation sector is a subject which has been debated for several decades without any impact. This is more so given the socio-economic, cultural and political context within which the irrigation sector operates in this country. The extremely complex land tenancy problem in minor schemes in particular is a clear issue at hand. It would suffice to say that consolidation in its actual terms cannot be brought about. A practical approach to this problem is urgently required. It is suggested that irrigation schemes can be converted into productive enterprises working along the lines of companies (see separate article on "institutional issues"). The shares of the company may be distributed among those who have land and other productive resources which can be pooled in the share capital. It may be operated as one single unit (as opposed to several divided and undevided holdings) and the profits distributed among its share holder according to the contribution made by each member. The actual work may be undertaken by the shareholders or by hired labour for which the company may pay the wages. The company may operate along the lines of the export village concept.

For the above purpose, it is important to undertake a pilot project in several irrigation schemes in order to gather practical experiences on this aspect. Such experience does not exist yet in the context of irrigated agriculture.

Irrigation management: There are two main issues involved with irrigation management. First, provision of water for cultivation on a equitable basis is the fundamental requirement. In doing so, it is indispensable to manage the system properly including its operation and maintenance. As noted earlier, a fundamental requirement in solving water distribution problems is to form farmer organizations (FOs) which would take up allocation, distribution, conservation and quality aspects with regard to irrigation water. The former two aspects have already been taken up by several FOs throughout the country. But the latter issues have not been the focus as yet, which would appear to be important in the next century. The formation of FOs was initiated in the middle of this century which will continue even in the years beyond 2000 since the number of schemes turned over to FOs is still just a handful.

Increasing productivity: Productivity is a complex issue which is discussed frequently. It may be measured in terms of water, land and labour. Increase in productivity continues to be the central focus of irrigated agriculture. In this article, it is viewed from two angles namely, primary and secondary productivity.

With regard to primary productivity, it

Contd. on page 63

Contd from page 12

should be increased through appropriate and cost-effective water management programmes and crop diversification which is being implemented in several schemes. This should continue beyond the year 2000. Secondary productivity envisages enhancing the value of agricultural products through processing. Agro-industrial enterprises create new employment opportunities, increase incomes and absorb excess labour from the primary production process. This will therefore increase the profitability of irrigated agriculture as a whole. Very little work has been undertaken to introduce agro-industries into the irrigation sector in this century. Considering the high growth rate in the labour force with a high standard of education and the need for increasing farm incomes several-fold, it is imperative to establish agro-industries in the irrigation sector.

Another issue which should be encouraged in future is to get the private sector involved in the primary and secondary production processes. At present, the private sector, is actively engaged in such industries as electrical, eletronic, garment, tourism, etc. which has already contributed in solving the unemployment problem in a big way. The majority of the employees in these industries are educated youth. We should learn from such experiences and develop appropriate strategies to get the private sector involved in irrigation sector in the next century. Its main role would be to facilitate primary production and to get the secondary production facility established. Similar to the incentives made available in the take-off period of other industries, it is suggested that appropriate incentives be extended to the private sector to establish agro-industries.

Environmental managment: The environmental issues involved in irrigated agriculture have not received careful attention in the past. We must see the irrigation sector as composing a large number of people and it is of paramount importance to maintain a high standard of the environment. In the past, environmental matters were confined to the prevention of salinity and pollution caused by agro-chemicals, Malaria eradication and soil erosion control. The human aspects as well as the overall environmental protection were not considered. In the next century, due to the increase in environment-related problems, it is a **sine-qua-non** to launch a comprehensive programme to protect the environment. This should cover both physical as well as social aspects. In this connection, educating and training the people on environmental matters should be emphasised.

Conclusion

The role played by the irrigation sector will continue to be important in the socio-economic development of the country in the 21st century. In the meantime, profitability and productive capacity of land is declining and other socio-economic problems of the irrigation sector are growing rapidly. This underlines the necessity to maintain irrigated agriculture profitably so that it is in a position to contribute to the overall economy in a sustainable manner in the next century. In facilitating this role, the sector will have to undergo a process of restructuring, change in focus and composition. In this connection, it is inevitable that some activities initiated in the 20th century be maintained while a set of new activities be introduced. With regard to the former, increasing productivity with equity, formation of FOs, turning over schemes to FOs, creating consciousness on water use, experimentation with various models to manage irrigation systems, etc. should continue in the next century. Among the new activities which should be introduced are agro-industries, increased environmental consciousness, water conservation and maximizing economic returns to water. In accomplishing these roles, formation of FOs and increased participation by the private sector in irrigation are emphasised. In this scenario, the government will play the role of facilitator and provider of agri-support services with the added responsibilities of monitoring efforts and co-ordinating activities. Then only the irrigation sector can boldly face up to the 21st century.