



## ECONOMY AND ENVIRONMENT PROGRAM FOR SOUTHEAST ASIA

### POLICY BRIEF

#### TOO MUCH SALT IN THE RICE BOWL: IRRIGATION IN SRI LANKA

Salination is a major problem for agriculture in many parts of the world. However, a recent economic study from Sri Lanka has shown that the involving farmers in preventative measures can provide a cost-effective solution.

The study, which was carried out by Selliah Thiruchelvam and S. Pathmarajah from the University of Peradeniya, looked at one of the largest irrigation schemes in Southeast Asia. The researchers concluded that salination represents a real threat to the scheme and that drainage improvement represents the best permanent solution to the issue.

Approximately 40% of the world's irrigated areas are affected by salination. Some of the most serious of these problems occur in semi-arid regions associated with the great river systems of Southeast Asia. The effects of salinity on agriculture can be dramatic. As salt levels build up, both wet and dry season crops are affected. Ultimately, farmers have to abandon part of their acreage, leaving landscapes which show a patchwork of productive irrigated fields and abandoned saline land. In Sri Lanka, although irrigation projects have substantially improved agricultural production, most large-scale projects face salinity problems. Although only a small percentage of the country's land has high and severe salinity problems, there are a significant number of areas affected by medium salinity. These are in danger of becoming highly saline due to inadequate management.

Despite the scale of the problem, information on salinity in the Sri-Lanka is scarce. Thiruchelvam and Pathmarajah therefore undertook their study to generate information that would help inform policies to save and prevent further degradation of saline

EEPSEA is supported by a consortium of donors and administered by IDRC.

Mailing address: Tanglin PO Box 101, Singapore 912404.

Visiting address: 7th Storey RELC Building, 30 Orange Grove Road.

Tel: 65 235 1344 Fax: 65 235 1849 Internet: [dglover@idrc.org.sg](mailto:dglover@idrc.org.sg)

Deputy Director: [hermi@laguna.net](mailto:hermi@laguna.net) Website: <http://www.idrc.org.sg/eeepsea>

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areas. Their study focused on the Mahaweli River System H Irrigation scheme. The researchers attempted to measure the impact of soil salinization on rice production and on the environment. They also investigated the best way to control salinity.

The Mahaweli System H is located in the North Central part of Sri Lanka. It contributes 25%, 30% and 20% of the national production of paddy rice, chilli and big onion, respectively. Nearly 28,000 families are dependent on agriculture in the area. The study was conducted in the paddy lands of Nochchiyagama and Madatugama. The former area is located far end of the irrigation scheme, while the latter is located near the main reservoir, Kalawewa tank.

Thiruchelvam and Pathmarajah undertook primary data collection on rice production in the research areas during the 1998 season. Their preliminary studies indicated that crops and land in Madatugama and Nochchiyagama exhibited significant salinity damage (10% and 25% respectively). Indeed they found that large numbers of farmers in the affected areas cannot cultivate their land fully, while many suffer low productivity.

More in-depth salinity measurements were done immediately after the harvest season in April 1998. Using a soil auger, soil samples from a depth of 30 cm were collected randomly from the cultivated land of selected farmers. Based on the values obtained, farms were classified into low, medium, high and severe salinity-affected areas.

To establish the relationship between salinity and rice yield, the researchers looked at all the factors affecting rice yield - including fertilizer use, capital costs and labor - to isolate the impact of salinity. The methods farmers used to prevent salinity were catalogued and compared. The researchers also analyzed factors that might affect the salinity control efforts that farmers undertake - including education level, age, experience and income. Farmers and other key informants were also interviewed about the effects of salinity problems on other vegetation, on drinking water, and on human health.

Thiruchelvam and Pathmarajah found that 40% of farmers' fields were affected by moderate salinity. Soil salinity problems were significantly higher in areas far from the reservoir. (23% of the farmers in Nochchiyagama operated under high salinity levels, compared to 10% in Madatugama.)

Analysis showed that in affected areas, soil salinity was the principal factor determining rice productivity. In moderately saline areas, Thiruchelvam and Pathmarajah found that a rice yield loss of 10-15%; in high and severe salinity areas, yield was reduced by a third. Net income from rice fell by about 22% and 43% respectively in moderate and highly saline areas for both blocks. These results indicate that high saline areas are becoming economically unviable for cultivation. The researchers also found that crop production possibilities are severely restricted in salinity-affected soils. In addition they found that salinity was having an effect on drinking water quality, human health and vegetation.

When they analyzed farmers' responses to the salinity problem, Thiruchelvam and Pathmarajah found that in moderately saline soil areas, the use of corrective fertilizer application and other inputs could compensate for the salinity. However, they found that it was the general drainage condition of fields rather than soil and water management that had a decisive effect in controlling soil salinity and in ensuring reasonable rice yield. Using

a cost-benefit analysis they found that drainage improvement is the most desirable long-term solution to the problem. Unfortunately, although the cost of such control measures are relatively low, they are not currently adopted by farmers because of the poor returns from rice farming and a lack of knowledge.

In the highly saline areas where salinity overpowers the positive response of all yield-enhancing factors, it seems that not much can be done to neutralize the effect of soil salinity. In these areas, the researchers concluded that adaptive research is required to reclaim the affected soil. From these findings the researchers concluded that, while more efforts should be made to tackle high salinity problems, the main challenge is to prevent land experiencing moderate levels of salinity from becoming worse. Implementing the necessary drainage improvements will take time and an injection of capital. Therefore as a short-term measure, the researchers recommend that farmers should be encouraged to practice drainage improvements and that excessive irrigation should be controlled to prevent the problem of a rising water table. In the long term more monitoring is required, but most important is the participation of farmers, who must co-operate to implement the necessary improvements in the development of drainage channels. Such participation, say Thiruchelvam and Pathmarajah, should be encouraged through subsidies, farmer education and training.

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*The full text of this study is available as an EEPSEA Research Report: An Economic Analysis of Salinity Problems in the Mahaweli River System H Irrigation Scheme in Sri Lanka - Selliah Thiruchelvam and S. Pathmarajah.*

*For further information contact:  
Dr. Selliah Thiruchelvam  
Dept. of Agricultural Economics  
University of Peradeniya,  
Peradeniya, Sri Lanka  
Email: [thiru@agecon.pdn.ac.lk](mailto:thiru@agecon.pdn.ac.lk)*