Increased water scarcity in Dak Lak Province in the Tay Nguyen region of Vietnam is of growing national concern. As a result, development of a sustainable water management regime has been declared a high priority (National Water Resources Strategy 2006-10). Viet Nam’s national water policies are increasingly turning towards managing the demand for water. This approach will achieve sustainable water management as well as increased water use efficiency.

To manage scarcity, and stimulate regional growth, water supply infrastructure in Viet Nam has been developed over a number of decades. New water supply infrastructure, however, is unlikely to be economically viable. For better long-term economic, social and environmental outcomes, Viet Nam’s Law on Water Resources (1998) legislates for integrated water resource planning as well as economical and rational exploitation of water resources by organizations and individuals.

The Managing Groundwater Access in Tay Nguyen, Viet Nam research project contributes to the development of integrated demand side water policy in the Dak Lak Plateau of Viet Nam. Collaborating on the project were hydrologists, agronomists and economists from the Ministry of Natural Resources and Environment, The Australian National University, Ho Chi Minh City University of Economics and Tay Nguyen University. This brief reports on part of that project.

The marginal value of water in dry season coffee irrigation and opportunities to increase irrigation water use efficiency

Research objectives

1. To estimate the value of dry season irrigation water in micro-basin smallholder coffee production.
2. To identify opportunities for increased irrigation water use efficiency on coffee smallholdings in the Dak Lak Plateau.

Research method

A survey of 106 Robusta smallholdings, unevenly but randomly selected from the six districts in the Dak Lak Plateau (Buon Don, Cu m’gar, Krong Ana, Krong Buk, Krong Pak, and Buon Ma Thuot).
Irrigation water use efficiency
By changing their dry season irrigation management practices, Dak Lak Plateau coffee smallholders can use irrigation water far more efficiently. Their output will increase and irrigation costs will decrease without the need for new irrigation technology.

Required irrigation input per tree
In the Dak Lak Plateau, when smallholders apply more than 550 litres of water per coffee tree per irrigation, excess water drains away from the root zone in red basalt soils. The current recommended coffee irrigation amount of 650 litres per tree per application should be reduced to a maximum of 550 litres.

Irrigation schedule for Robusta coffee in Dak Lak
To maximise their coffee output through irrigation scheduling, coffee smallholders in Dak Lak need to start irrigating before mid-January, apply more water to the tree in the first irrigation to stimulate the majority of buds to flower, then space subsequent irrigations 16 to 21 days apart until the end of the dry season.

Marginal value of irrigation water
The marginal value of irrigation water measures the value of additional coffee output that is produced when additional water is used. For Dak Lak coffee smallholders this was found to be zero. This means coffee smallholders do not increase their coffee output when they apply more than 550 litres per tree per irrigation – over irrigation is reducing their achievable profits.

Irrigation scheduling
Existing irrigation scheduling practices were found to be inefficient.

Profit potential
If an efficient coffee smallholder:
1. applied 550 litres per tree per irrigation
2. used a 20-day irrigation interval
3. irrigated three times during the dry season

they would, on average, use around 1,700 cubic metres of water per hectare during the dry season.

This would yield around five tonnes of coffee per hectare under optimal growing conditions and fertilizer inputs.

Water savings
If coffee smallholders in the Dak Lak Plateau adopted the practice of three equally spaced irrigations totalling 550 litres per tree per irrigation, with a planting density of 1,050 trees per hectare, the amount of water used across 130,000 hectares of Robusta in dry season coffee irrigation would be reduced by around 340,000 mls per annum. The water saving would be equivalent to about 30 per cent of the annual average recharge to the Plateau’s unconfined aquifer.


The complete set of research reports, detailing all aspects of the research project can be downloaded at: https://www.crawford.anu.edu.au/staff/jb_vietnam.php

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