

# Modelling Salinity Management at Farm and Catchment Scales in NSW and Thailand

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**Abstract:** The Spatial optimisation Model for Analysing Catchment Management (SMAC) has been developed to examine the relationship between groundwater accessions from agricultural land, land salinisation and its medium-term economic effects. This mathematical programming model represents the farm and catchment-scale aspects of land management. The model quantifies the relevant inter-relationships between socio-economic conditions, including the economic and policy environment affecting farms, and the biophysical condition of the catchment, including agronomy, hydrogeology and soil salinisation. The SMAC model was chosen as the catchment-modelling tool in an ACIAR project on salinisation to be carried out by a research team headed by the University of Technology, Sydney and, in Thailand, the project will involve Khon Kaen University, The Royal Forest Department and the Land Development Department of the Ministry of Agriculture and Cooperatives. SMAC will be applied for hydrological, economic and social modelling, at catchment and other scales to evaluate the impact of revegetation in Thailand (Lam Pao and Khorat and Australia (Liverpool Plains and Upper Macquarie Valley). This paper describes the SMAC model and discusses the methodological and other challenges of applying it in other regions with different land-use systems, economic conditions and hydrology, and a data-sparse environment.

**Keywords:** Integrated modelling; Agroforestry; Salinity; Integrated Catchment Management

## 1. BACKGROUND

ACIAR is funding a research and development project entitled ‘Salinity Management in South-Eastern Australia, North-Eastern Thailand and Lao PDR<sup>1</sup>. This project is focussed on the management of dryland salinity, its manifestations and socio-economic effects in three broad regions: South-eastern Australia (New South Wales), North-eastern Thailand (Lam Pao and Khorat) and Lao PDR (Vientiane and Suvannakhet).

The main socio-economic research aims are to develop and apply hydrogeological, economic and social models, at catchment and other scales to evaluate the impact of revegetation in Thailand (Lam Pao and Khorat) and Australia (Liverpool Plains and Upper Macquarie Valley) and advise on revegetation strategies for each project site.

The key outcome of the project is expected to be the development of soundly based procedures for

assessing the economic and social benefits of the remediation of land affected by salinisation in the three study regions. In Thailand, immediate application of the research results is expected by involvement of the Land Development Department, which is already undertaking replanting of trees near Khorat. In addition the results will be used in relation to the selection of the locations for revegetation, and type of revegetation of upland (recharge) areas in Lam Pao and other areas of North-east Thailand. In Lao PDR, the Department of Irrigation is involved in the project. The immediate application of the research is aimed at informing decision-makers of the possible implications of ongoing logging of forest resources and the expansion of irrigation areas.

The economic analysis within the project is primarily aimed at providing information for

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