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Case Study 31

Impacts of irrigation development on small-scale aquatic resources: a case study of southern Laos

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INTRODUCTION

Small-scale aquatic resources play an important but poorly quantified role in the livelihoods of rural people in many developing countries, and are also important reservoirs of biological diversity. We are conducting a field study in Southern Laos to assess the impacts of small-to-medium scale irrigation schemes on the ecology and exploitation of these resources, and their role in rural livelihoods. Here we report on some key, preliminary results.

METHODS

The aquatic resource use and irrigation impact study was designed as a replicated, paired comparison of household fishing effort and yield and fish species richness between irrigated and non-irrigated sites. The study covered weir and dam irrigation schemes with command areas ranging from 17-515 ha (average 155 ha). A total of ten paired sites were surveyed for each type of irrigation scheme. The survey was designed to detect differences between irrigated and non-irrigated sites at key periods rather than estimate total annual fish catches, hence information on the latter should be regarded as indicative.

USE OF NATURAL AQUATIC RESOURCES BY RURAL HOUSEHOLDS

Participation in natural aquatic resource use was near universal, with 83% of households fishing during the survey period. The estimated average weekly household catch was 1.15 kg, which suggests an annual household catch of about 60 kg with a market value of about 90 US\$. This represents about 15-20% of average total household income (in cash and in kind). Work on within and between-household differentiation in fishing effort and catch is ongoing.

IMPACTS OF IRRIGATION DEVELOPMENT

Weir irrigation schemes were associated with a 40% (90%CI [5%, 67%]) reduction in household fish catches from a non-impacted mean of 0.58 kg/week. This difference reflects a change in fishing effort as well as in the ecology of the resource.

Dam irrigation schemes were associated with no significant overall effect on household catches in villages in the vicinity of the newly created reservoir. However, catches from floodplain areas declined significantly by 58% (90%CI [2%, 90%]) from a non-impacted average of 1.5 kg/week. This was largely but not fully compensated by increased catches from the reservoir. Hence reservoirs should not be regarded as adding to total aquatic habitat and productivity, but as partial compensation for downstream impacts. Net impacts may be spatially differentiated, and overall negative impacts on household catches may occur downstream of the dam where the reservoir is less accessible.

None of the irrigation schemes had significant effects on local fish species richness. Measured effects on species richness were as follows: weir schemes -3% (90%CI [-30%, +16%]), dam schemes +8% (90%CI [-22%, +30%]).

CONCLUSIONS AND RECOMMENDATIONS

The development of individual, small-to-medium scale irrigation schemes is associated with moderate, but significant negative impacts on local aquatic resources. Hence aquatic resources impacts should be considered in cost-benefit analyses and environmental assessments of small and medium scale irrigation schemes.

The significant-but-moderate nature impacts implies that natural aquatic resources remain productive and contribute to household food security and income within irrigated agricultural systems. Hence these resources should be managed and where possible enhanced, and considered in the assessment of the value irrigation water where allocation decisions are made.

Proliferation of small-to-medium scale irrigation schemes may lead to cumulative impacts in excess of those established here. This should be assessed and managed on a catchment scale.