Ex post analysis of irrigation development for future SIAs[1]

Introduction

Social Impact Assessment (SIA) analyses the intended and unintended consequences of policies, plans, programmes and projects on people and communities. In these terms, SIA is a *predictive* endeavour, occurring *before* a policy, plan, programme or project is implemented. SIA also generates recommendations to mitigate anticipated (negative) effects in plans for monitoring and managing social change (Taylor et al. 2004; Vanclay 2015).

For empirically sound if-then propositions of social change and useful plans for social impact management, SIA's need a base of comparative, ex post research. Ex post SIAs look back at the actual social effects of a policy, plan, programme or project as experienced by affected communities. They help to build an understanding of broader elements of social change, i.e., what worked well, for whom, what patterns of change were not anticipated and how were these addressed, and what can be learnt from these experiences?

We have conducted ex post analyses of initiatives for regional regeneration in the Canterbury's region's Amuri basin and the Otago region's Waitaki catchment (Figure 1). The work is part of Aotearoa New Zealand's Building Better Homes Towns and Cities National Science Challenge: Ko ngā wā kāinga hei whakamāhorahora (Perkins et al., 2019). The first tranche of work examined the social impacts of tourism infrastructure developments. The current focus is on the social impacts of irrigation developments in both regions, and in this paper we report preliminary findings.

Social impacts of irrigation development

From either a strategic or project perspective, irrigation development typically has objectives of economic regeneration and positive social impacts in the minds of planners and development communities. But the use of water and subsequent changes in land use can create social impacts with potential to reduce or enhance outcomes for community wellbeing in affected areas, communities and regions. The search for enhanced social wellbeing is not simple. Abstraction of water for irrigation normally triggers an environmental impact assessment because of the impact on river flows and the impacts of new infrastructure such as dams, storage lakes and canals. These assessments should include SIA. But irrigation development also requires strategic SIA for planning land and water use in a catchment (Taylor and Mackay, 2016).

Social changes with irrigation are best understood in relation to changes in land use and land ownership (Taylor, et al., 2003). Initial thinking by proponents of community irrigation projects, such as the Amuri and Lower Waitaki irrigation schemes, was to avoid the depressing effect of successive droughts on dry-land framing systems and rural communities. "You could see a mouse running" reported once Amuri farmer (Taylor, et al., 2018). Positive social benefits from irrigation were expected for rural people and communities, but the extent of land use changes and subsequent social changes was not fully anticipated ex ante.

In summary, irrigation in the Amuri (Taylor et al., 2018) and Lower Waitaki (McCrostie Little, et al., 1998) brought changes in land ownership, land uses, farming systems and farm size. There was early

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evidence of phases of changes in farm ownership: from farm family succession and sales of land to new owners from outside the district, who introduced new farming systems such as dairy farming (Taylor, et al. 2003).

Recent irrigation projects such as the North Otago Irrigation Company scheme, which takes water from the Waitaki River, confirm that changes in land use now happen in just a few years post irrigation. In this scheme an increase in dairy farming was soon evident, along with an increase in dairy and beef production and a reduction in sheep numbers. Early adoption of new land uses was facilitated by farmers who had already converted parts of their farms through point sources of water (Agribusiness Group, 2010).

Accompanying new land uses were new methods to apply water: a shift from mainly border dyke (flood) irrigation systems to centre pivot and other types of spray irrigation. These more efficient technologies resulted in re-distribution of water in catchments, particularly impacting down-stream farmers who previously extracted surface water boosted by increased run off from flood irrigation upstream. They also impacted amenity values and recreational users (Mackay and Taylor, 2020).

Impacts on employment and population

Ex post analysis confirms irrigation causes a change in the type and number of jobs on and off farm, which in turn affects the size of the population. These changes are often significant in small rural communities previously experiencing a decline in population under dry-land farming systems. At the same time the composition of a population changes, with a younger age structure (Taylor, et al. 2003).

Changes in the size and composition of communities were identified in the Amuri (Taylor, et al., 2018), the Lower Waitaki (McCrostie Little, et al., 1998) and other parts of Canterbury (Mackay and Taylor, 2020). The key driver of these primary social effects is the change of land use to dairy farming and some horticulture. The analysis showed marked increases in the number of dairy farmers and farm workers in the farmer and farm worker occupation group over the main periods of land use change.

The more intensive land uses attract younger, more mobile workers including farm workers, share milkers, contract managers and their families. The cohort effect in these younger populations is reduced by the ongoing movement of younger farmers and farm families into dairy areas due to the demand for contract milkers and farm workers (Taylor et al., 2018).

Furthermore, an underlying change process is the social structure of farming changing with a marked increase in the number and proportion of paid employees and a reduction in self-employed farmers. These changes are associated with the increasing size of irrigated land holdings and scale of production – indicated by the average herd size. For instance, in the Amuri irrigation area the average herd size was 832 cows, double the national average of 414 (Taylor et al., 2016). Intensive farming, industrial landscapes and corporate farming systems are indicative of a super productivist landscape (Mackay and Perkins, 2019).

Intensification of farming in these landscapes was also found to bring higher qualifications and technical skill levels amongst farmers and farm workers and associated communities. Relevant qualifications and ongoing learning are necessary for large, high-tech farms and corporate-

structured operations, and many farm operators have utilised migrant workers to fill the skills gap faced with the expansion of intensive farming (Mackay and Taylor, 2020).

The research also found an underlying trend of structural ageing in many rural areas and communities, such as the Waitaki, due to their attractiveness for retirement, including the presence of amenity migrants. This puts an onus on environmental policy and management to ensure intensive farming does not reduce amenity values and adds to rather than reduces outdoor recreational opportunities (Mackay and Perkins, 2019).

Overall, an increased population in rural areas and small settlements was found to bring significant benefit to community wellbeing, through the effect of increased school rolls, health services, organised sports, and a range of community organisations and facilities that all require sufficient numbers of people for funding purposes and to build social capital (Mackay and Taylor, 2020).

Impacts on diversity and social cohesion

Irrigated areas are increasingly diverse and dynamic socially with incoming farmers, migrant workers and their families (Rawlinson, 2011; Mackay and Taylor, 2020). The Amuri assessment confirmed these findings (Taylor et al., 2018) as did our research in the Waitaki area. A significant increase in the number of migrant workers in agricultural production and processing has flow-on effects on services such as local schools, social capital and community resilience. Challenges emerged in the early years of land use change when a combination of long-standing residents and newcomers, shaped and reshaped affected areas though investment of social and financial capital, business acumen, organisational prowess and new volunteers (Mackay, et al., 2018). It was revealing that migrants are largely a positive experience not just for their labour but the way they have integrated positively into communities. This may be because the farmer employers benefited from early negative experiences with cultural differences, and subsequent programmes to support positive employer-employee relations and newcomer migrants settling into an area.

Impacts on environmental quality, recreation and amenity values

Irrigation transformed landscapes with shelter, other trees and hedges removed to facilitate centre pivots, bringing what a local newspaper described as “alien” landscapes and public concern about loss of visual amenity, more uniform landscapes, physical changes in water ways and old drainage systems, and increased on and off-farm water storage areas – some of which are now used for recreation purposes (Mackay and Perkins, 2019). Non-point discharges of nutrients into water from intensive farming have reduced water quantity and quality, ecological values and amenity values in lowland streams. The research recognised negative effects on the socio-cultural values of freshwater bodies, cultural uses by Māori and outdoor recreation by a range of people including farmers (Mackay and Taylor, 2020).

Impacts on health

The impacts of water management on human health are a concern in catchments affected by intensive farming. Domestic drinking water wells in rural Canterbury are relatively shallow and there is an increase in the level of Nitrates in wells close to areas of intensive farming. A report by the Canterbury District Health Board notes direct effect on human health (Green, 2014). In addition, low quality of surface water affects the health of humans and their pets engaged in water-based recreation through cyanobacteria. Plus reduced quality and quantity of surface water and associated amenity reduces healthy, active, outdoor recreation (Mackay and Taylor, 2020).

The management of change

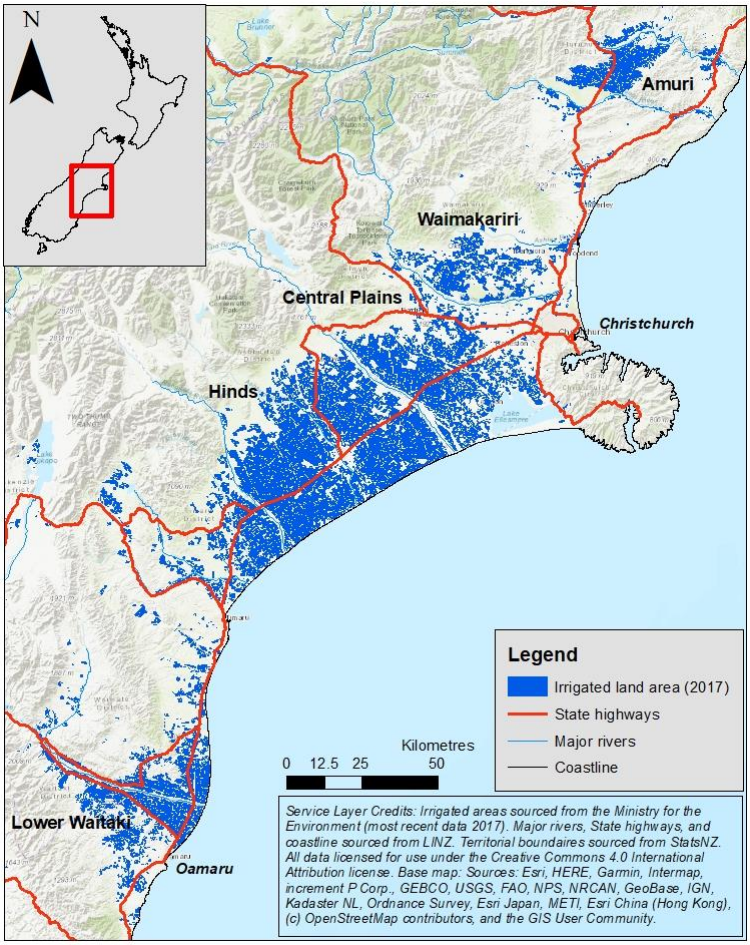
Given the extent of social changes found by ex post SIAs of irrigation, it is notable the changes were largely *unanticipated* in project planning. As a result there is little about proactive management of change. Ad hoc initiatives focus on integration of newcomers, including migrant workers, into communities. Solutions such as finding housing for workers are largely left to individual businesses and contractors (Taylor, et al., 2018).

Another aspect is environmental management, as issues arise from water abstraction and nutrient discharges, affecting cultural uses, outdoor recreation and drinking water. Farmers have adopted collective, farmer-driven approaches to adaptive environmental management, recognising the importance of social licence if future developments are to proceed in an increasingly contested arena. But rural communities seeking to balance economic, social and environmental outcomes, requires capacity to monitor and document social impacts and consequences for social wellbeing.

Conclusion

Irrigation development creates a complex set of positive and negative social impacts. Their assessment and management has implications for net social wellbeing over time. The social licence for large-scale irrigation development requires commitment to strategic and project-level SIA. Effective practice is clearly assisted by the availability of comparative, ex-post analysis.

Figure 1: Irrigation areas in the Canterbury Region



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