

Programs to Resolve Agricultural and Water Quality Issues – the Kiwi Perspective

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New Zealand (NZ) is a relatively small country with a population of only 4.5 million, but it is well known internationally for both eco-tourism and agriculture. A temperate climate combined with historically clean rivers, lakes, and the ocean provide for recreation activities including water sports, swimming, and game fishing, as well as an intrinsic scenic and ecological value which attracts tourism. The country relies on a “100% pure”, clean, green brand image for tourism, which makes a substantial contribution to the economic wealth of the country. At the same time, water is essential for hydropower, which produces over 60% of NZ’s electricity needs, and the agricultural sector, which is the major engine of the NZ economy. Large hydropower development has abated since the 1970’s, but agriculture is expanding as new markets for agricultural products are being forged through trade treaties.

Over the last thirty years, NZ has shifted from being a sheep producing country to being the world’s foremost provider of dairy products (Figure 1). To this effect, large scale dairy operations have arisen and the management of water and effluent nutrients (nitrogen and phosphorus) has become a top priority. Successful dairy operations in NZ require extensive irrigation of pasture lands and this has caused pressure on both surface and ground water resources, as well as concern for nutrient pollution of waterways which result in nuisance slime and algae (periphyton) growth and high trophic indices of downstream water bodies. The growth of algae in NZ rivers results in modified river flows, blocked irrigation and water supply intakes, and can smother riverbed habitats (Davies-Colley et al., 2011). Reduced water clarity and elevated nutrient levels also affect fresh water recreation use.

To maintain the delicate balance between agricultural productivity and natural ecosystem health, a number of initiatives and programs have been implemented to monitor, regulate, or alleviate potential degradation of fresh water from extensive agriculture. In this presentation, an overview of key programs and research that are helping NZ resolve agricultural and water quality issues are presented and discussed.

Local, regional, and national authorities in NZ currently work under the umbrella of the Resource Management Act (RMA) established in 1991, which is a coordinated, streamlined, and comprehensive approach to environmental management and is being used to deal with water quality issues (Jackson and Dixon, 2007). Another key legislative tool is the implementation of Water Conservation Orders, which can be used provide recognition of the outstanding amenity or intrinsic values of water bodies and protect waterways from degradation.

Legislation alone, however, cannot guarantee the health of the environment without extensive monitoring and advances in research and technology to protect water quality. To this effect, coordinated efforts to monitor water quality have been established, such as the National River Water Quality Network (NRWQN), which is New Zealand’s most comprehensive freshwater quality monitoring network (Davies-Colley et al., 2011). Results from the monitoring show that between 1989 and 2013, total nitrogen levels in rivers increased 12 percent (MES-NZ, 2015; Larned et al., 2014), primarily due to dairying. Water clarity, on the other hand, improved

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at two-thirds of monitored sites between 1989 and 2013 (Ballantine and Davies-Colley, 2014), signifying a potential reduction in erosion.

New Zealand has also been driving research in BMPs and management tools for farms such as irrigation scheduling software (Irricad), farm management systems, and integrated surface and groundwater modelling efforts. Advances in community engagement, through Integrated Catchment Management programs in key watersheds around New Zealand (e.g. Motueka Catchment), have also been central to dealing with water quality issues. Efforts have also been made to protect key lakes and wetlands such as Te Waihora/Lake Ellesmere, south of Christchurch (Figure 1), which is downstream from major irrigation areas in the productive Canterbury plains (Measures et al., 2015). The combined effort of various programs, research, and technology are helping NZ deal with pressing agricultural and water quality issues to balance the drive to grow our economy with the need for clean water. The struggle, however, continues in an effort to maintain the wealth, health, and beauty of “middle earth”.



Figure 1. Changing from sheep farming (left) to irrigated dairy farming (center), and water quality sampling (right) in Te Waihora/Lake Ellesmere that receives waters from extensive agricultural lands.

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