Chapter 14

Collective action case study: New Zealand[1]

This chapter analyses three New Zealand case studies: Sustainable Farming Fund (SFF), East Coast Forestry Project (ECFP) and North Otago Irrigation Company (NOIC). SFF funds grass-root activities by farmers, growers and foresters. The Aorere Catchment Project is led by members of the local community, including dairy farmers. SFF provides funds and helps address the complexities of sustainable water management. ECFP aims to prevent and control erosion in the Gisborne region by providing funding to landholders and promoting collective action. NOIC is formed by farmers to establish, manage and operate an irrigation scheme for the North Otago area and to provide water for its members. Following a brief description of the case studies, the roles of participants, the factors affecting outcomes in collective action, and the cost-effectiveness of the actions are discussed.

Agriculture is an important industry in New Zealand. It contributes about 5.5% to GDP and 7.2% to employment, while farm exports account for 53.4% of the value of merchandise exports (OECD, 2011). Agricultural land use is 43% of land area and 57% of water use is for agriculture (OECD, 2011). Forty-nine per cent of greenhouse gas emissions are also from agriculture (OECD, 2004). Many innovative policies have been established for dealing with agri-environmental effects. The Ministry for Primary Industries of New Zealand (MPI) and local governments have promoted grass-root activities by farmers, growers and foresters to provide public goods and reduce negative externalities associated with agriculture. Among various collective actions in New Zealand, this study analyses three cases: Sustainable Farming Fund (SFF), East Coast Forestry Project (ECFP) and North Otago Irrigation Company (NOIC).

14.1. Sustainable Farming Fund

Brief outline of the case

The MPI launched the Sustainable Farming Fund (SFF) in 2000 to fund grass-root activities and help innovation, research and other environmental projects by farmers, growers and foresters. Until 2010, SFF had invested about NZD 100 million in 700 projects (MAF, 2010). In 2012, aquaculture projects became eligible for funding.

This case study picks up a specific example in SFF projects: Aorere Catchment Project. This project is led by the dairy farming community. They work for improving water quality in the Aorere Catchment to the benefit of the near shore environment and coastal water quality. SFF funds the farmers' group and helps address the complexities around sustainable water management.

Sustainable Farming Fund

SFF is a funding programme to support grass-root activities. All SFF projects are collaborative projects often initiated by farmers, growers or foresters with the support of a wider *community of interest* involving industry organisations, agribusiness, researchers or consultants. The purpose of the fund is to support rural communities to undertake applied research and extension projects that tackle a shared problem or address an opportunity (MAF, 2010).

SFF projects include projects such as sustainable land management, novel production systems and human capability development. SFF often funds initial work leading to larger ongoing programmes and provides support to facilitate various local or cross-industry activities. These activities are related to various public goods and externalities associated with agriculture such as biodiversity, water quality, sustainable forestry and pest management. However, projects that target fundamental or long-term research and that benefit an individual or a single business are not eligible for SFF funding (MPI, 2012).

The maximum investment SFF can provide to any one project is NZD 200 000 annually for three years (MAF, 2010). However, SFF cannot fully fund projects just by itself. It requires a minimum of 20% non-governmental contribution (MPI, 2012). SFF funds costs associated with specific, contracted project work not for business as usual activities. Most projects leverage a significant amount of cash and in-kind support from the applicant group.

Aorere Catchment Project

The Aorere Catchment is located in the Western Golden Bay of the South Island. About 30 dairy farms operate throughout the catchment. Most of the catchment is hilly and covered in native bush. About 16% of the catchment's land use is pastoral farming, mainly dairying.

The Aorere Catchment project was established because, in 2005, coastal water quality of Golden Bay became a problem. Mussel farming that had operated near the Aorere River mouth had almost become unviable due to restrictions on the number of harvesting days resulting from poor freshwater water quality entering the Bay. Dairy farming, in this high rainfall environment, was thought to be affecting the water quality which was having a detrimental impact on the mussel farms. Local dairy farmers began to proactively address the issue, with the help of the NZ Landcare Trust (MAF, 2010; OECD, 2012).

In 2006, local dairy farmers applied for SFF funding to run a three-year project in the catchment. By using SFF, first, the Aorere Catchment Group commissioned a scientific investigation to understand possible causes of water deterioration. They found that although the Aorere River does not have a nutrient contamination problem, coastal waters near the mouth of the river are very sensitive to faecal bacteria, which affects harvesting shellfish (NZ Landcare Trust, 2009). Next, based on the results of the scientific research, dairy farmers agreed to take action to improve water quality by trying to reduce the levels of bacteria reaching their waterways during fine weather and low rainfall events. Each farmer developed their own environmental plan, which shows what kind of measures they should take in what order, with the help of the NZ Landcare Trust, and support of the local council and changed their farming practices including: 1) eliminating stock access to waterways, 2) stopping effluent irrigation to saturated soils, 3) reducing effluent application rates, and 4) looking for runoff hotspots (NZ Landcare Trust, 2009).

The project used local science, farm-scale environmental plans and farmer leadership as the tools to improve water quality, and indeed, water quality in the Aorere Catchment improved greatly (MAF, 2010). In 2002, local shellfish harvest days were as low as 28%, but in 2006, they increased to about 50%, and after the three-year project, mussel farmers can now harvest shell fish 79% of the days per year[2] (NZ Landcare Trust, 2009). Although the first project finished in 2008, from 2009 the project extended the Aorere approach to the neighbouring Rai catchment (Table 14.1).

Table 14.1. AORERE Project

	2006-2008	2009-2011
SFF project name	A community approach to improving catchment wellbeing	Farmers as leaders in water quality action
SFF investment	NZD 218 000	NZD 259 000
Other cash contributors	NZ Landcare Trust	NZ Landcare Trust
	Tasman District Council[1].	Tasman District Council
		DairyNZ
Total project value	NZD 503 473	NZD 585 000

1. The Aorere Catchment is located in the Tasman region. The Tasman District Council is one of 16 regional councils of New Zealand.
Source: MAF (2010).

Collective action

In order to improve water quality in the Aorere Catchment, dairy farmers worked collectively together with NGOs and government agencies. Their roles are summarised in Table 14.2. This collective action has financial support from the central government. However, although MPI funds the group, activities taken by the group are locally devised, with support from NGOs and external experts. This project illustrates how farmers can take

initiatives if they are provided with information and ownership to act (MAF, 2010). This concept is reflected in a catch phrase of the project, "experts on tap, not on top".

Table 14.2. Roles of stakeholders (Aorere)

Farmer's roles	Non-Farmer's roles	Governmental roles
• Forming a farmer group to improve water quality. • Commissioning a scientific investigation for identifying possible causes of water deterioration. • Changing farming practices for water quality improvement by reducing the levels of bacteria reaching their waterways.	• *The NZ Landcare Trust* (NGO): assisting farmers in applying for SFF, facilitating the project and making financial contribution to the activity. • *External scientists:* undertaking scientific research and providing information for improving farming practices. • *Golden Bay Streamcare Group* (established by a NGO): voluntarily planting thousands of seedlings along stream banks.	• *MPI (SFF)*: providing three-years funding for the activity from 2006 to 2008, and expanding the programme from 2009 to 2011. • *Tasman District Council*: providing fencing materials to help farmers exclude stock from streams. Farmers build fences by using these materials by themselves.

In the Aorere Catchment Project case, the community of interest is improving water quality. Therefore, by collective action, negative externalities from dairy farming have been reduced. It also enhanced stream health and biodiversity (e.g. habitat for flora, fish, birds) in the catchment. In addition, the Aorere Catchment project has a characteristic of managing common pool resource, because the Aorere Catchment is not only shared by dairy farmers, but also by marine farmers and other local citizens. Although everyone can access the resource and can enjoy it in common including for dairying, mussel farming and recreation and wild shellfish gathering (non-excludable), it can be subtractable (rivalry). If one exploits the resource, the others suffer from the action. Co-ordinated management among stakeholders through collective action is necessary.

Factors affecting collective action

The factors affecting the outcome of collective action can be classified into four groups. Based on this classification, Table 14.3 summarises successful factors of the Aorere Catchment Project.

Table 14.3. Factors affecting collective action (Aorere)

1) Resource system characteristics	2) Group characteristics
• Sharing the recognition of keeping common pool resources • Knowledge of environmental resources	• Social capital and small group • Farmer-led initiative • Communication
3) Institutional arrangement	**4) External environment**
• Tailored individual planning	• Financial support • Intermediary/coordinator • Involving wider community

Resource system characteristics

- *Sharing the recognition of keeping common resources*: The Aorere Catchment is a common pool resource which is shared by dairy and marine farmers. Mussel farming had almost become unviable due to restrictions on the number of harvesting days

resulting from poor freshwater water quality. This fact let all stakeholders notice that if one side over-exploits the resource, the other side suffers from the action. Collective action is essential to manage the shared natural resource. The recognition of maintaining common resource among stakeholders is a key factor for successful collective action.

- *Knowledge of environmental resources*: Having precise knowledge on local environmental resources is a first step to take action. The Aorere Catchment group asked external researchers to undertake scientific research. Good science can empower farmers (MAF, 2009). The group also shares this information with the local district council and local marine farmers, thus enabling smoother communication.

Group characteristics

- *Social capital and small group*: The significant point of this project is that nearly all 33 dairy farmers in the community supported the project. In addition, most farmers have been farming for a long time in the area. The small group size and historical relationships may help them to organise collective action. Moreover, the success has positive impacts on community capacity, pride and cohesion (MAF, 2009), which further develops social capital.
- *Farmer-led initiative*: The Aorere Catchment Project is a farmer-led initiative with full community support. Farmers, and their spouses, actively participate in the project and adopt suggestions and solutions in co-operation with other farmers and external experts. Some farmers took the role of spokesmen/women and pro-actively led initiatives. Strong leadership and bottom-up approaches make collective action successful.
- *Communication*: Communication is key to collective action. The Aorere Catchment group holds community meetings regularly to exchange and update information, engage in social events, issue newsletters, and utilise the media (MAF, 2009). Open communication with dairy and marine farmers, and other stakeholders helps all stakeholders to understand each other and to make collective action effective.

Institutional arrangement

- *Tailored individual planning*: Farmers developed a confidential individual farm planning system to address specific water quality issues with help from a local NGO and rural consultant because each farm is different and needs specific treatments. Confidentiality is also important as it relates to working in a style of respectful engagement with landowners. The plan shows what kind of measures farmers should take and in what order. Flexible and locally-adjusted approaches are more effective to manage non-point pollution, as opposed to a one-size-fits-all approach.

External environment

- *Financial support*: This collective action is a bottom-up collective action: farmers take actions in response to criticism of water quality problems. However, SFF greatly helps farmers to organise as a group and implement solutions. Financial support from governments can promote grass root activities by farmer groups.
- *Intermediary/co-ordinator*: In this collective action, strong support from NZ Landcare Trust is a key to success. It actively participates in the discussion, co-ordinates meetings and helps farmers to develop plans. Even after the SFF project period, it continues to help farmer with their activities.

- *Involving the wider community*: Interacting with others can provide great opportunities for two-way learning. Liaising with and utilising outside agencies, such as local governments, NGOs and experts, can build collaborative networks and bring better solutions (NZ Landcare Trust, 2009).

Cost-effectiveness of collective action

Improving water quality of the Aorere Catchment cannot be done by a single farmer. Collective action among all dairy farmers is necessary. They can learn good management practices from other farmers and experts by sharing information and working together. Moreover, through this collective action, farmers can also reduce costs for changing farming practices, compared with individual actions for improving water quality. Therefore, although quantitative data is missing, collective action seems a cost-effective approach for managing local water quality issues.

According to a farmer in the Aorere Catchment Project, although farmers always farm with intentions to take care of the land, sometimes they don't know environmental effects associated with their traditional farming. Respectfully explained the need for change is accepted, action may take time and money.

14.2. East Coast Forestry Project

Brief outline of the case

The Gisborne region[3], located in the north eastern corner of the central North Island in New Zealand, has a severe erosion problem. 26% of Gisborne region's land is susceptible to severe erosion. This is much higher than the New Zealand national average, which is 8% (MAF, 2007).

Severe erosion causes long-term damage to agriculture and rural infrastructure. It also lowers water quality by increasing the amounts of sediment in rivers. In order to address the wide-scale erosion problem, the MPI launched the East Coast Forestry Project (ECFP) in 1992. The ECFP provides funding to landholders to prevent and control soil erosion (MAF, 2007).

East Coast Forestry Project

Hill country of the East Coast area was once covered by native forests and its underlying geology is dominated by allochthonous unstable rocks, such as mudstone and argillite which make the area susceptible to erosion. A significant area of native forests was cleared for pastoral farming in the nineteenth century following European settlement, which exacerbated the soil erosion problem, i.e. negative externalities associated with agriculture. The East Coast has the highest population of Māori people (the indigenous people of New Zealand), and they have significant tribal landholdings and a strong cultural association with the land. The soil erosion has had a negative effect on Māori and other local people in the area (Rhodes, 2002).

The ECFP aims to promote sustainable land management in the area by providing a grant for planting trees or encouraging natural reversion to native forests. This is a voluntary project for encouraging landowners to take initiatives for treating erosion – some of the plantations are expected to be commercially viable (MAF, 2007). It targets the worst 60 000 hectares of eroding land in the Gisborne region. Since the first planting in 1993, by 2010, the ECFP has provided grants to 356 grantees, which covers 35 552 hectares (MAF, 2011). This number shows that the voluntary funding programme could attract a lot of landowners to take initiatives to prevent soil erosion. However, in 2007, in order to take more proactive approaches to prevent this severe soil erosion and involve landowners who had not

implemented treatments under the ECFP scheme, the Gisborne District Council (GDC), a local council in the region, introduced a regulation which requires landowners to treat severe erosion. The regulation came into force on 1 July 2011. Landowners can use funding from the ECFP to satisfy this requirement, i.e. the ECFP (voluntary funding programme) is complemented by the local land use rule (regulation).

The ECFP grant can be used for the following erosion treatments: forestry treatments (closely planted radiata pine, Douglas fir, poplar and other species, if appropriate), pole planting (wide-spaced poplar and willow poles and wands) and reversion to native forests. Grant rates for afforestation (forestry treatments) range from NZD 1 476 to NZD 2 280 per hectare depending on the distance to port. Grant rates for pole planting are 70% of actual and reasonable costs and those for reversion to native forests are NZD 1 512 per hectare (MAF, 2011). This grant does not cover all costs for the treatments. Landowners have to bear a part of the cost which ensures their continued interest in the project.

Landowners are helped by the GDC and the ECFP to choose effective and appropriate treatments for preventing soil erosion. For this purpose, understanding the type of erosion is a first step. Each erosion type requires a different approach. For example, severely eroding soils require closer tree planting such as radiata pine, not space planted trees such as poplars and willows. Through inspection of site conditions, it is necessary to identify various factors including soil moisture levels, wind and frost, and match the tree type to the land type. In addition, for effective treatments, it is important to treat contiguous areas, not just the actively eroding parts. A combination, rather than a single treatment option, is most effective for reducing soil erosion (MAF, 2008).

To apply for an ECFP grant, applicants must own or have an interest in land where the worst erosion is occurring or prone to occur (this type of land is called "target land"). This includes the applicant having a lease on the land or a forestry right that applies to the land. People who are going to purchase or gain an interest in the land can also apply for the ECFP. In addition to individuals, a trust or incorporation can also apply for a grant instead of people who own or have an interest in target land (MAF, 2007). Soil erosion sometimes occurs beyond individual lands and collaboration between landowners is necessary for providing effective treatments. If an application is accepted, landowners can start a project up to three years after the approval (MAF, 2007). Landowners receive part of their grants at the time of establishment, and the rest three to eight years later depending on treatments. Once landowners are in the programme, fifty-year covenants are applied. The covenants bind current and future landowners to maintain the erosion control effectiveness on the treated area (MAF, 2007).

Collective action

Landowners, the GDC and the MPI work together to prevent soil erosion in the Gisborne region. Their collective action tries to reduce negative externalities. Although the ECFP does target groups of landowners, individual landowners also need to work with local and central governments for their common interest. In this sense, this is collective action in a broad sense. All erosion problem areas have been mapped at property scale by the GDC. The MPI and the GDC approach landowners together and develop plans to treat erosion, including technical advice. Landowners are free to obtain independent advice. Once the landowner is satisfied with the plan, s/he applies to MPI for funding. Therefore, in this collective action, governments take proactive approaches (implementing both funding programme and regulation) and prevent soil erosion together with landowners. Their roles are summarised in the Table 14.4.

Table 14.4. Roles of stakeholders (ECFP)

Landowners' roles	Local government's roles (Gisborne District Council)	Central government's roles (Ministry for Primary Industries)
• Recognising soil erosion problem and contacting GDC/MPI. • Applying to MPI for funding • Implementing treatments: forestry treatments, pole planting or reversion to native forests.	• Helping landowners develop soil erosion treatment plans and prepare applications. • Establishing rules for targeting eroding/erosion prone areas in the District Plan. • Requiring landowners to implement treatment of soil erosion.	• Designing the ECFP and providing grants to landowners. • Auditing the annual claims for payment to make sure that agreed work is completed to an acceptable standard and in accordance with the approved treatment plan.

The collective action by these groups is underpinned by the MPI. Without support from the MPI, or put another way, central government, it would not be possible to provide treatments on the necessary scale. This is mainly because the necessary resources are beyond the capacity of the GDC. However, the GDC has supported erosion control by establishing rules to target eroding and erosion prone areas in the Gisborne Regional Plan (MAF, 2011).

Through collective action, landowners can enjoy several benefits. The most important is funding to mitigate soil erosion which helps to mitigate landowner's cash flow issues. The ECFP's financial support also assists landowner compliance with the Gisborne Regional Plan requirement of having tree cover on targeted land. In addition, the ECFP provides benefits for central and local government through carbon sequestration, improved water quality, and biodiversity (MAF, 2011).

Factors affecting collective action

Factors affecting the success of collective action can be classified into four groups. Based on this classification, Table 14.5 summarises the successful factors of the ECFP.

Table 14.5. Factors affecting collective action (ECFP)

Resource system characteristics	Group characteristics
• Severe resource problem • Scientific knowledge	• Large group
Institutional arrangement	**External environment**
• Commercial activity (commercial forestry)	• Financial support from governments • Regulatory measures by a local government • Effective collaboration between central government and local government

Resource system characteristics

- *Severe resource problem*: Soil erosion in the Gisborne region is 26% of the area. It is very high compared with the New Zealand national average, which is 8%. This severe resource problem encourages all stakeholders to take strong collective action to prevent the problem.

- *Scientific knowledge*: Choosing effective and appropriate treatments for preventing soil erosion is very important. Each erosion type requires a different approach. The need for strong expertise, including scientific knowledge, data and mapping, requires collective action since it is beyond the capacity of each landowner.

Group characteristics

- *Large group*: To cover the large soil erosion area (60 000 hectares), the ECFP provides funds to more than 350 grantees with support from the local government. A large number of landowners work together on the same issue (soil erosion problems) in the same region (Gisborne region). To manage large group activities, strong governmental involvement is necessary.

Institutional arrangement

- *Commercial activity (commercial forestry)*: The ECFP takes a "private initiative" approach to motivate landowners to pursue economic activities so as to improve the environment. They can sell thinned-out timbers and some plantations are expected to be commercially viable. Indeed, this approach is of interest to landowners.

External environment

- *Financial support from governments*: Managing 60 000 hectares of eroding land is beyond the ability of individual landowners and a single district council. Financial support from the ECFP is essential for managing a large-scale problem.
- *Regulatory measures by a local government*: The ECFP (voluntary funding programme) is complemented by a local land use rule (regulation). The local government decided to take regulatory approach to cover broad eroding areas. Although the voluntary funding programme can attract many landowners and provide treatment, as the voluntary approach was not enough to encourage all landowners in the target areas to treat the problem. The stick (regulation) and carrot (funding) approach, was effective to deal with this more severe environmental problem.
- *Effective collaboration between central government and local government*: The GDC is responsible for the Regional Plan which requires effective tree cover and relies on cost-effective treatment options. The ECFP supports landowners in meeting this requirement by providing grants. A good working relationship and collaboration between the MPI's ECFP management and the GDC has been important to the success of this collective action (MAF, 2011).

Cost-effectiveness of collective action

The ECFP has resulted in 35 552 hectares being treated through afforestation, pole planting or reversion. Between 2007 and 2010, 718 hectares were treated per year on average. In 2010, approvals were made for a further 5 745 hectares of forest planting, 451 hectares of pole planting and 498 hectares of reversion in the next three years (MAF, 2011).

However, the ECFP has struggled to use available funding and deliver treatments. The ECFP receives NZD 4.5 million per year for project grants and administration. Administration is estimated to cost about NZD 400 000 per year, leaving NZD 4.1 million for grants. Nevertheless, from 2007 to 2009 total spending has been between NZD 1.7 and NZD 2.2 million per year. Much higher annual amounts have been allocated but not spent due to the high dropout rate from grant approval to implementation (MAF, 2011). Reasons for this high dropout rate may include a lack of landowner finance, complications with Māori land

with multiple landowners, relative economics of farming in the short term and a lack of genuine interest in undertaking land use change (MAF, 2011). Thus, it is necessary for improving its cost-related aspects. Since the introduction of the regulation by the GDC in 2011, application of the ECFP is increasing and this funding-delivery problem is expected to be improved.

14.3. North Otago Irrigation Company (NOIC)

Brief outline of the case

Otago[4] is the second biggest region in New Zealand. It spans from east coast to west coast of the South Island. North Otago is a sub region on the east coast. The extensive dry tussock grassland hills and lowland down lands in North Otago area provide the important agricultural base. However, farmers had been struggling to access reliable water supply due to its dry environment and existing allocation pressure on the main rivers in the area. In order to have access to reliable water, farmers took initiatives and formed the North Otago Irrigation Company Ltd (NOIC), which started a scheme to deliver a large volume of water to farmers from a nearby reliable (over 90%) resource, the Waitaki River in 2006.

North Otago irrigation Company [5]

NOIC is a company owned by the users of the scheme, i.e. farmers, with a strong governance structure. The NOIC scheme pumps water from the Waitaki River up to a head pond. Then, the water is delivered to the farm gate via natural water courses and a piped network by using gravity and secondary pump stations to maintain water pressure.

Farmers can get a water right and have access to water if they have shares and have also completed a registered Water Supply Agreement with NOIC, which nests water use efficiency, nutrient and farm management. Farmers can get shares either by buying them from NOIC when additional shares are issued or by trading shares through the market which is conducted independent of NOIC. Typically, shares are transferred as part of the transaction when properties change hands. Once farmers become shareholders, they have to pay charges for maintenance, operation and administration of the irrigation scheme. This funds the board and staff that run the scheme.

Farmers also need to improve environmental performance through the NOIC's Environmental Farm Plan System, in order to maintain access to water supplied by the NOIC scheme. For achieving environmentally sustainable irrigation development, NOIC promotes responsible and efficient use of water through education and technological innovation. Farmers are required to implement the best practices for achieving environmentally sustainable farming, and every year one third of farms are audited to ensure that they are implementing the best practices detailed in their farm plans. If a farm fails audit, farmers are required to review their performance and take another auditing. In addition to the Environmental Farm Plan audit process, NOIC also undertakes weekly unscheduled compliance checks throughout the irrigation season.

NOIC provides water to over 100 shareholders and covers approximately 14 000 hectares of farmland in North Otago. It also aims to expand its service to adjacent areas and cover another 10 000 hectares of farmland. For expanding the services, the Waitaki District Council[6], one of the district councils in the Otago region, made a partnership with NOIC in 2006 to pre-invest NZD 10 million.

Collective action

In order to have access to reliable water, farmers took initiatives to form NOIC and implement environmentally sustainable farming. NOIC provides its members with reliable water and promotes sustainable farming by providing technical services. Local regulators, Otago Regional Council (ORC) and Waitaki District Council provide support for this collective action. For example, the ORC works closely with NOIC to improve on-farm practice for preventing water run-off from farms and achieving sustainable development. Table 14.6 summarises the roles of stakeholders.

Table 14.6. Roles of stakeholders (Otago)

Farmer's roles	NOIC 's roles	Government roles
• Taking initiatives to form NOIC for accessing reliable water. • Having access to water from the NOIC scheme if they become shareholders of NOIC. • Implementing Environmental Farm Plan for achieving sustainable farming.	• Providing shareholders with reliable water. • Auditing farmers and confirming the implementation of Environmental Farm Plan. • Regularly reviewing environmental performance and reporting progress to ORC and other stakeholders. • Promoting responsible and efficient use of water for achieving environmentally sustainable irrigation development.	• *Otago Regional Council*: developing water run-off policies with NOIC and has been involved in negotiating drainage agreements between neighbours. • *Waitaki District Council*: a founding funder of NOIC scheme, having invested NZD 10 million in infrastructures. • *Whitestone Contracting Limited*: owned 100% by the Waitaki District Council, providing operations and maintenance services to NOIC.

Club goods and public goods provided by collective action

The NOIC scheme provides reliable water and this service can be classified as club goods. First, this service is excludable. NOIC is a company owned by the users of the scheme. Farmers can get a right to have access to water if they have a share of NOIC and have also completed a registered Water Supply Agreement with NOIC. Shareholders have to pay 1) annual charges for maintenance, operation and administration of the irrigation scheme, 2) fixed charges for debt servicing associated with capital costs of the irrigation scheme and 3) the cost of power for water supplied by the NOIC scheme. Second, this service is non-rival. Once farmers join the scheme, they have access to reliable water according to the number of shares they have. Additions to the scheme are regulated and can be admitted only if they do not affect existing shareholders' water flows or pressures.

NOIC also provides significant benefits to the local community, and the wider Otago community, not only economically but also environmentally. NOIC scheme enhances in-stream flows and hence biodiversity values, and maintains cultural values, in particular respecting Māori values in relation to water and the natural environment. These additional values associated with irrigation system are public goods, i.e. non-excludable and non-rival goods.

Factors affecting collective action

The factors affecting the outcome of collective action can be classified into four groups. Based on this classification, Table 14.7 summarises successful factors of NOIC.

Table 14.7. Factors affecting collective action (North Otago Irrigation)

1) Resource system characteristics	2) Group characteristics
Broad area Strong need for the resource	Club goods: one provider delivers services to many club members
3) Institutional arrangement	**4) External environment**
Additional environmental requirements Monitoring	Financial support from governments Close work with local governments

Resource system characteristics

- *Broad area*: The NOIC scheme covers more than 10 000 hectares and aims to expand its services. For investments in large infrastructures and undertaking a large operating system, NOIC collaborates with farmers and local governments. When the targeted area is large, collective action is usually necessary.
- *Strong demand for the resource*: In this dry environment, farmers had been investigating access to a reliable water supply for a long time, but concerns about the ability to fund such a scheme had prevented farmers from going further. Following a significant drought in 1999, strong demand for reliable water encouraged farmers and other stakeholders to co-operate and to take action.

Group characteristics

- *Club goods*: One provider, NOIC, delivers services to many club members, i.e. farmers. This club goods case (water supply) is different from public goods cases (landscape, biodiversity, etc) because services can be excludable and part of its operational costs and fixed costs are covered by fees from farmers. On the other hand, public goods are non-excludable, which makes it difficult to let beneficiaries pay for the costs of provision. Market mechanisms to provide goods work better in a club goods case than in a public goods case.

Institutional arrangement

- *Additional environmental requirements*: Farmers must comply with an Environmental Farm Plan to participate in the NOIC scheme. This requirement makes it possible for farmers to work on environmental issues including water quality on a larger scale, which cannot be done by a single farmer. This requirement promotes collective action and brings better environmental outcomes.
- *Monitoring*: In order to prevent farmers from free-riding, NOIC audits one-third of farmers every year and undertakes weekly unscheduled compliance checks. This strong monitoring system helps large-scale collective action work. Without monitoring, there is a risk of free-riding.

External environment

- *Financial support from governments*: Financial support is provided by the Waitaki District Council to expand the irrigation system. Although farmers also bear the costs of operation and maintenance, external financial contribution is significant for expanding the service of the NOIC scheme.

- *Close work with local governments*: NOIC works closely with local governments, the ORC to improve on-farm environmental practices, prevent water run-off from farms and achieve more sustainable development. Support, information and close co-ordination of local regulators and ORC is important to assist the NOIC scheme to meet community expectations.

Cost-effectiveness of collective action

This large-scale irrigation system brings large benefits to farmers and communities. Farmers can have access to reliable water supply, which was impossible without the NOIC scheme, and the scheme greatly improves their agricultural performance as well as improving environmental management. Some of them can expand their farms and reduce costs because of the economy of scale. Thus, the collective action by the NOIC scheme seems a cost-effective approach for providing water while also meeting environmental expectations.

In fact, according to the AgBusiness (2010), gross revenue from the scheme area has increased from NZD 21.14 million (without the irrigation scheme) to NZD 65.08 million (with the scheme), i.e. NZD 43.95 million or about 300% increase. Farmer's cash expenditure has increased by NZD 29.26 million or 310%. Indeed, farmers have spent about NZD 62.24 million in land conversion and created 76 extra labour units. The NOIC scheme has brought about large economic impacts in the local community.

Notes

1. This case study was prepared by Tetsuya Uetake, agricultural policy analyst at the OECD. The assistance of Chris Arbuckle, Louise Askin, Neil Fraser, Helen Percy, Sebastian Rattansen and Avinash Shrivastava from the Ministry for Primary Industries Manatu Ahu Matua, New Zealand government, Barbara Stuart from the NZ Landcare Trust and Sue Brown from the Aorere Catchment Group in preparing this case study is gratefully acknowledged.
2. There will always be some days when harvesting is not possible due to poor weather conditions and/or water quality,.
3. The Gisborne region is of the 16 regions in New Zealand.
4. The Otago region is one of the 16 regions in New Zealand.
5. This section is based on information available on the NOIC website, www.noic.co.nz/ (accessed 15 June 2012), and information provided by the New Zealand government.
6. Otago region has five districts. The Waitaki District is located in North Otago.

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From:

Providing Agri-environmental Public Goods through Collective Action

Access the complete publication at:
https://doi.org/10.1787/9789264197213-en

Please cite this chapter as:

OECD (2013), "New Zealand case study", in *Providing Agri-environmental Public Goods through Collective Action*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/9789264197213-16-en

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