Managing Agri-environmental Commons through Collective action: Lessons from OECD Countries

TETSUYA UETAKE[123]

OECD Trade and Agriculture Directorate, France
E-mail: tetsuya.uetake@oecd.org

ABSTRACT

Agriculture is a provider of food as well as commons such as biodiversity and landscape. Agri-environmental commons are very old, but their use and non-use values are newly appreciated by a wider community. Managing and producing them are key to society. However, previous research on agri-environmental commons and agri-environmental policies has focused on individual farmers, but much less on collective action.

The paper examines 25 collective action cases from 13 OECD countries, which manage and produce various types of agri-environmental commons. Collective action can facilitate geographically appropriate management of resources, allow for shared knowledge among members and increase their capacities, and provide solutions for dealing with agri-environmental commons. However, sometimes, transaction costs may hinder collective action from being formed. Moreover, farmers often need external support such as scientific knowledge, technical information and financial assistance. Thus, external help from public agencies or other interested bodies may be necessary to promote collective action.

The study indicates that many local and central governments in OECD countries encourage farmers and other stakeholders to take initiatives to govern commons by themselves through various policy measures including technical assistance and financial programmes. Collaboration with intermediaries is also necessary to facilitate state-community relationships. Governments can assist commons management rather than interfering with it.

KEYWORDS:

collective action, agri-environmental policy, public goods, OECD countries, case studies

---

1 . The views expressed in this article are those of the authors and not those of the OECD or its member countries.

2 . The author wishes to thank Dale Andrew, Patrizia Borsotto, Alison Burrell, Monica Caggiano, Dimitris Diakosavvas, José A. Gómez-Limón, Gilles Grolleau, Fredrik Holstein, Guido Van Huylenbroeck, Riri Kiminami, Evy Mettepenningen, Heike Nitsch, Bernhard Osterburg, Hiroki Sasaki, Mikitaro Shobayashi, Laurence E.D. Smith, Masatada Takemoto, Paul Terwan, Stefano Trione, Francesco Vanni, Anne-Mari Ventelä and Charles Willcocks for their valuable assistance in undertaking this study.

3 . The author agrees to allow the Digital Library of the Commons to add this paper to its archives for IASC conferences.

1. INTRODUCTION

1. Agriculture provides valued outputs —food, feed, fibre, fuel and fun (e.g. agri-tourism) — and, to a certain extent, commons like landscape and biodiversity. However, agriculture can also have a negative impact on commons such as biodiversity, water quality and soil quality. Agri-environmental commons are very old, but their use and non-use values are newly appreciated by a wider community.

2. Many researchers and organisations, including the OECD, have studied agri-environmental commons, and related policy measures. Previous studies have focused on provision by individual farmers acting independently, with little discussion of the importance of collective action among farmers in managing commons (Ayer, 1997; Hodge and McNally, 2000). However, some agri-environmental commons may be provided more effectively by farmers acting co-operatively or in a synchronised manner. Biodiversity and landscape are often more effectively approached on a scale greater than that of a single farm. Moreover, in order to tackle non-point source pollution, synchronised actions on a scale beyond that of the individual farm are necessary. This means that, in order to overcome market failure associated with agri-environmental commons, policies that work through groups or consortia of individual farmers acting together may also be needed.

3. The purpose of this study is to analyse collective action for managing agri-environmental commons by reviewing the experience of several OECD member countries, in order to clarify the following points.

- For what type of agri-environmental commons is collective action necessary?
- What types of collective action are undertaken in OECD countries?
- What are the benefits of collective action?
- What are the challenges for collective action?
- Which factors are conducive to successful collective action, and why?
- How can governments stimulate collective action and what policies are available for promoting collective action?

2. METHODOLOGIES

4. This study draws on the collective action literature and on studies of agri-environmental commons. It also makes extensive use of 25 case studies from 13 OECD countries, which are originally undertaken in OECD (2013), in order to identify examples of good practice and to derive insights for policy practitioners.

5. The case studies were selected according to three criteria: 1) variety with respect to country and world region, 2) variety with respect to the type of case study, but with a special focus on clarifying the role and potential of government, both central and local, and 3) adequate coverage across the classic typology of public goods (pure public goods, common pool resources, and club goods) and negative

externalities. Based on these criteria, 25 cases from 13 countries (Australia, Belgium, Canada, Finland, France, Germany, Italy, Japan, the Netherlands, New Zealand, Spain, Sweden and the United Kingdom) have been examined. The broad range of these case studies offers a good overview of the kinds of agri-environmental commons managed by collective action, the different sorts of collective action currently undertaken in OECD countries and the particular policies that have proved successful in stimulating collective action.

6. The paper is organised as follows. Section 3 provides a definition and typologies of collective action, Section 4 briefly summarises the case studies, Section 5 provides findings from the case studies, and Section 6 draws some policy implications.

3. DEFINITION AND TYPOLOGIES OF COLLECTIVE ACTION

7. In this report, collective action is defined as "a set of actions taken by a group of farmers, often in conjunction with other people and organisations, acting together in order to tackle local agri-environmental issues"[4]. Participation in collective action to manage agri-environmental commons is not restricted to farmers, but may also extend to other people and organisations who share the interests that motivate the action. Many agri-environmental commons include a collective, spatial element. Critical mass, synergies among farmers and the extent and manner in which individuals are co-ordinated affect the provision of the goods (OECD, 2012a). They share common interests, i.e. managing local agri-environmental issues such as biodiversity, landscape and water quality. Even in the case of collective action promoted by national governments, each collective action deals with locally specific issues under the big umbrella of a government programme.

8. Four simple types of collective actions are identified in the study (Figure 1). For all four types, external support is often provided by farmers' organisations, NGOs, researchers, etc.

- Type 1 is a collective action in which farmers and other participants form organisations and act collectively as members. In this case, to manage organisations, rules and governance are very important. Sometimes, they establish sub-groups or sub-committees composed of those most concerned to discuss specific issues.

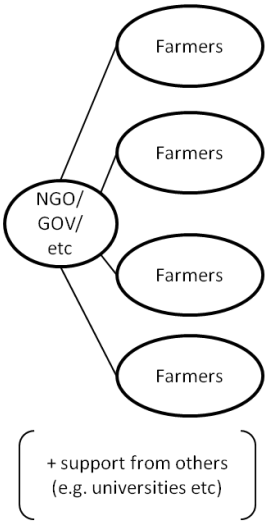
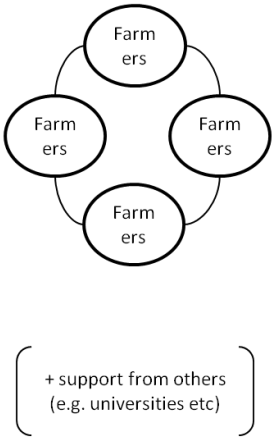
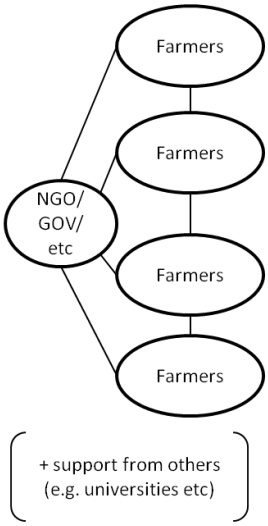
- Type 2 is a collective action in which external agencies (NGOs, governments, etc.) organise farmers (usually in the same geographical area) to act collectively for a common purpose. In this case, external agencies take strong initiatives and co-operate with farmers. Co-operation *between* farmers is not necessarily a feature of all these collective action cases, but a common goal is shared by the external agencies and farmers (e.g. improving water quality, reducing soil erosion).

4 . There are other definitions of collective action. For example, Scott and Marshall (2009) define it as "action taken by a group (either directly or on its behalf through an organisation) in pursuit of members' perceived shared interests". Meinzen-Dick and Di Gregorio (2004) also define it as an "action taken by a group to achieve common interests."

- Type 3 is a collective action in which farmers collaborate with other farmers (and non-farmers), but do not form an independent organisation. This group does not require strict rules and strong governance, unlike Type 1, since co-operation is usually based on strong social capital and daily communication.

- Type 4 is a collective action in which external agencies (NGOs, governments, etc.) take strong initiatives, but co-operation *between* farmers is a feature of collective action cases. This type is a combination of Type 2 and Type 3.

Figure 1. A simple typology of collective action

Type 1: Organisation-style collective action	**Type 2: External agency-led collective action**	**Type 3: Non-organisation- style collective action**	**Type 4: Co-operation between external agency and farmers**
Farmers and other participants form organisations and act collectively as members. To manage organisations, rules and governance are very important.	External agencies organise farmers (usually in the same geographical area) and act collectively. Co-operation between farmers is not necessarily a feature.	Farmers collaborate with other farmers (and non-farmers), but do not form independent organisations.	Combination of Type 2 and Type 3. Although external agencies take strong initiatives, Co-operation between farmers is an essential part of the action.
			

4. SUMMARIES OF THE CASE STUDIES

9. Table 1 summarises the case studies. The simple typologies identified in the Figure 1 are applied for each case. Among 25 cases, Type 1 cases are 13, Type 2 cases are four, Type 3 cases are three, and Type 4 cases are five. More than half cases form independent organisations and undertake collective actions.

Table 1. Collective action case studies in OECD countries

Countries	Serial number	Case	Brief descriptions	Types of collective action
Australia	AUS1	Landcare Programme (Mulgrave Landcare and Catchment Group Inc)	A farmer-based environment group has for some years been actively addressing the natural resource management issues in the catchments near the Great Barrier Reef World Heritage Area.	1
	AUS2	Landcare Programme (Holbrook Landcare Network)	The Holbrook Landcare Network is acting to address the main natural resource management issues (habitat loss, dryland salinity and soil erosion)	1
Belgium	BEL1	Strategic installation of buffer strips in the Dommel Valley	The Watering the Dommel Valley (a local organisation responsible for water management) is acting to improve water quality in the valley's rivers and streams. They aim to convince farmers to manage interconnected buffer strips next to water courses running through their land.	4
Belgium	BEL2	Water quality management by a water provider (Pidpa) and farmers in the Antwerp region	The water company Pidpa is co-operating with farmers who manage Pidpa-owned land in groundwater catchment areas and in protection zones around the catchment. The scheme also stimulates the management of nature areas on local farmer-owned land.	2
Canada	CAN1	Group Environmental Farm Planning in Saskatchewan	Some Saskatchewan producers are acting together to adopt Beneficial Management Practices (BMPs) by accessing risk assessment programmes that approach environmental protection collectively.	4
	CAN2	Beaver Hills Initiative (near Edmonton)	The Beaver Hills Initiative was launched to deal with strong development pressure that threatens landscape and other environmental values. It involves various participants, who pool knowledge and develop science-based strategies for preserving the area.	1
Finland	FIN1	Pyhäjärvi Restoration Project	Local voluntarily actions aiming to improve or maintain water quality in Lake Pyhäjärvi undertaken by local firms, communities and other beneficiaries of the lake's water quality.	1
France	FRA1	Contract between Vittel (mineral water bottler) and farmers, Vosges region	A group of farmers located in Vittel's catchment area have accepted a contract to change their practices in order to reduce non-point source pollution from intensive farming	2
Germany	DEU1	Landcare associations (example: Altmühl Valley, Bavaria)	Landcare associations are regional non-profit associations, where farmers, local administrations, politicians and nature conservation experts work together with the aim to implement nature conservation and landcare measures.	1
	DEU2	Co-operation in drinking water protection, Lower Saxony	Co-operation between farmers, water suppliers and technical advisers in Lower Saxony is helping to solve problems of maintaining or restoring a high drinking water quality.	1
	DEU3	Wetland restoration in the Eider valley	The project aims to restore wetlands in the Eider Valley by extensifying agricultural land use and deconstructing drainage systems, based on co-operative institutional organisations	4
Italy	ITA1	Custody of the territory in Tuscany	Initiative promoted by a territorial agency via an agreement with local farmers for co-production of environmental services such as the cleaning of rivers, riverbeds, rivers banks and canals in Tuscany	4
	ITA2	Community garden in Campania	Since 2001 a local NGO has been co-ordinating a project called Eco-archaeological Park, converting a degraded site into a collaborative green space where urban gardens, environmental benefits and social relationships can flourish	1
	ITA3	Mountain pasture management in the Aosta Valley	In *Alta Val d'Ayas,* farmers provide highly valued public goods by inscribing the rules and organisational patterns for successful alpine grazing into the collective management of mountain meadows and pastures	3

(continued next page)

Table 1. Collective action case studies in OECD countries *(continued)*

Countries	Serial number	Case	Brief descriptions	Types of collective action
Japan	JPN1	Policy for Preserving Biodiversity Associated with Agriculture, Shiga Prefecture	This policy for preserving biodiversity makes payments to farmers who agree to increase the water level of drainage canals so that fish can swim up to paddy fields.	4
	JPN2	Policy to Recycle Drained Water from Agriculture, Shiga Prefecture	This policy aims to recycle drainage water from agriculture, by means of contracts with irrigation districts, each representing large numbers of farmers, to reuse drained water.	1
	JPN3	Measures to conserve and improve land, water, and the environment	The most extensive agri-environmental policy in Japan for preserving agricultural resources and the environment, which works through hamlet-based local action groups that manage drainage facilities	3
Netherlands	NLD1	Water, Land & Dijken Association, Laag Holland	The Water, Land & Dijken association, composed of farmers and civilians, is developing tailor-made conservation practices for biodiversity (grassland birds) and landscape	1
New Zealand	NZL1	Sustainable Farming Fund (SFF) (Aorere Catchment Project)	SFF funds grass-root activities by farmers, growers and foresters. Aorere Catchment Project is led by members of the local community, including dairy farmers. SFF provides fund and helps address the complexities around sustainable water management	3
	NZL2	East Coast Forestry Programme, Gisborne district	This programme aims to prevent and control erosion in the district by providing funding to landholders and promoting collective action	2
	NZL3	North Otago Irrigation Company	Farmers formed the North Otago Irrigation Company, which establishes, manages and operates an irrigation scheme for the North Otago area and provides water for its members	1
Spain	ESP1	Community water management, (example: Guadalquivir River basin)	Communities of irrigators (CR) are established by owners of irrigated land who are collectively granted a water concession. They manage resources locally following their own water allocation rules	1
	ESP2	Animal Health Associations (ADGs) (example: Pedroche county)	ADGs (currently 1500 in Spain) are created by local livestock breeders who implement a common animal health programme. The ADSG of Pedroches is a representative example	1
Sweden	SWE1	Söne Mad Grazing Association, Western Sweden	The Söne Mad pasture area, historically collectively grazed by farmers, is managed by a NGO established by landowners and farmers. It applies environmental subsidies to restore and maintain fences	1
United Kingdom	GBR1	"Upstream Thinking" project in the Southwest of England	This project aims to improve raw water quality through a collaborative approach that informs and assists landowners in the protection of river catchments as part of an integrated approach to good land management	2

5. FINDINGS AND ANALYSES

5.1. Collective action and agri-environmental commons

10. There is a large body of studies on collective action. In Olson's seminal work (Olson, 1965), the difficulty of co-operation due to the free rider problem is addressed. Although it is often believed that groups are expected to act on behalf of their common interests as individuals, Olson argues that all individuals in a group gain if they achieve their group objective, thus individuals tend to be free riders. Hardin (1968) points to the difficulty of collective action by using the example of a pasture open to all. Each herder tries to add more animals to increase his private benefit, which results in over-exploitation of the common pasture. This situation is known as "the tragedy of the commons". Hardin's argument shows that individuals'

pursuit of their own benefits may hinder the maximisation of benefits of collective action. However, recent studies on common pool resources (CPRs) (e.g. Wade, 1988; Ostrom, 1990; Baland and Platteau, 1996; Agrawal, 2001) have found that, in certain cases, voluntary collective action can be useful to manage CPRs and overcome the problem of the tragedy of the commons.

11. This study identified that farmers develop collective action to manage a range of agri-environmental commons including agri-environmental public goods, not just managing CPRs. It is especially useful when the production of public goods needs a certain minimum amount of supply in order to provide significant value. These types of public goods are called “threshold public goods” or “non-linear public goods” (Marks and Croson, 1998). On the other hand, “linear public goods” have a linear relationship between their supply and their total value (Cremer and Vugt, 2002).

12. Figure 2 provides a stylised representation of linear public goods and threshold/non-linear public goods. *Line A* denotes a linear public good. As the amount produced increases, its value increases proportionally. This type of public good does not need a minimum amount of supply to be provided. Carbon sequestration is an example of a linear public good; for example, the cultivated under a no-tillage farming system on each farm increases the amount of carbon sequestered in soils, and the total contribution is the simple aggregate of these areas. *Line B* corresponds to a threshold/non-linear public good. For the provision of this public good, a minimum amount of supply is required, and the public good is produced on a significant scale only beyond this threshold (Rondeau et al., 1999). Agricultural landscape is such an example. Although a small amount of landscape provision can be valuable in a micro-location, the value of the landscape provision significantly increases if the supply exceeds a certain amount and has a certain geographic scale. Collective action can play an important role in ensuring that public good provision exceeds this threshold point.

13. The main agri-environmental commons managed by collective action in the case studies are landscape, biodiversity, water quality, common pool resources (e.g. natural habitat and catchments) and club goods (e.g. irrigation systems). Most of them have characteristics of threshold/non-linear public goods (Table2). For example, catchment management cannot be done by a single farmer, but if a number of farmers and non-farmers collaborate, it is possible to manage the catchment and provide associated agri-environmental public goods such as biodiversity and water quality improvement (e.g. AUS1, CAN1, FRA1, GBR1, NZL1, SWE1). Managing drainage facilities also cannot be done by a single farmer, but collective action makes it possible and provides associated agri-environmental public goods such as water quality improvement and biodiversity (e.g. ESP1, JPN1, JPN2, JPN3, NLZ3).

Figure 2. Stylised model of linear/non-linear public goods

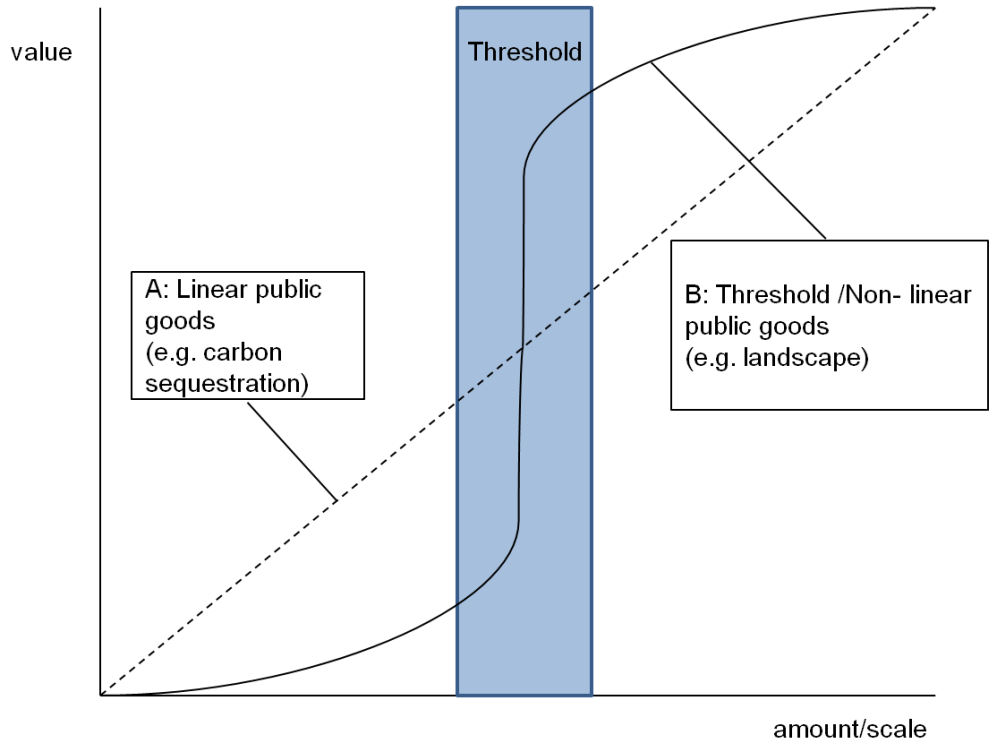


Table 2. Agri-environmental commons targeted by the case studies

Case	Public Goods			Reduction in Negative Externalities[1]
	Pure Public Goods	Common Pool Resources	Club Goods	
AUS1	XX (Riparian and wetland restoration, biodiversity)	X (Management of ground water)	NR	NR
AUS2	XX (Biodiversity)	NR	NR	XX (Management of soil erosion and dry land salinity)
BEL1	X (Biodiversity, landscape)	NR	NR	XX (Improvement in water quality)
BEL2	X (Biodiversity, landscape)	NR	NR	XX (Improvement in water quality)
CAN1	XX (Wetland restoration, biodiversity)	NR	NR	XX (Improvement in water quality)
CAN2	X (Landscape, biodiversity)	XX (Management of natural resources)	NR	NR
DEU1	XX (Landscape, biodiversity)	NR	NR	NR
DEU2	NR	NR	NR	XX (Improvement in water quality)
DEU3	XX (Greenhouse gas mitigation, biodiversity, flood control)	NR	NR	X (Improvement in water quality)

(continued next page)

Table 2. Agri-environmental public goods and negative externalities targeted by the case studies *(continued)*

Case	Public Goods			Reduction in Negative Externalities[1]
	Pure Public Goods	Common Pool Resources	Club Goods	
ESP1	NR	XX (Management of common irrigation)	NR	X (Improvement in water quality and quantity)
ESP2	X (Animal welfare, prevention of zoonosis)	NR	XX (Animal disease protection for members)	NR
FIN1	NR	XX (Management of Lake)	NR	XX (Improvement in water quality)
FRA1	X (Landscape, biodiversity)	NR	NR	XX (Improvement in water quality)
GBR1	X (Biodiversity, resilience to flood, carbon sequestration)	NR	NR	XX (Improvement in water quality)
ITA1	XX (Hydro-geological management, landscape, resilience to flooding)	NR	NR	NR
ITA2	X (Landscape, biodiversity)	NR	XX (Farming opportunities for members)	NR
ITA3	XX (Hydro-geological management, landscape, biodiversity)	NR	NR	NR
JPN1	XX (Biodiversity)	NR	NR	NR
JPN2	NR	NR	NR	XX (Improvement in water quality)
JPN3	NR	XX (Maintaining drainage facilities)	NR	NR
NLD1	XX (Biodiversity, landscape)	NR	NR	NR
NZL1	X (Biodiversity)	X (Management of Aorere Catchment)	NR	XX (Improvement in water quality)
NZL2	X (Carbon sequestration, biodiversity)	NR	NR	XX (Management of soil erosion)
NZL3	X (Biodiversity)	NR	XX (Water supply for members)	NR
SWE1	XX (Biodiversity, landscape)	XX (Management of wetland grazing)	NR	NR

NR: Not relevant, or marginal; X: Important; XX: Very important.

1. It should be noted that public goods and externalities often overlap (OECD, 1999). It means that some cases belong to more than one category in the classification shown in Table 2. For example, water quality and availability have characteristics of non-excludability and non-rivalry, i.e. public goods (Cooper et al., 2009). Agriculture impacts negatively on both the availability and quality of water resource. It is one of the largest consumers of water and its activity depletes the stock and/or quality of this public good. Inappropriate use of fertilisers and pesticides or unsustainable farming methods may degrade water quality and availability (negative externalities). However, certain management practices can result in significant improvements to water quality and availability. For instance, the creation of reed beds along river valleys or converting arable land to grassland can improve water quality (Cooper et al., 2009). Just as the negative externalities agriculture inflicts on water resources are non-excludable and non-rival, so too are the improvements to water quality and availability beyond regulation levels achieved by collective action, and they can be regarded as public goods/positive externalities. For simplicity, in Table 2, water quality is categorised as negative externalities, since most water quality improvement associated with agriculture is related with the reduction of pesticide or manures stemming from agriculture.

5.2. Collective action and geographical scale of externalities

14. The desirability of collective action is also related to the geographical boundaries defining the area within which externalities associated with agriculture have an impact. Collective action can be especially useful for dealing with externalities whose boundaries exceed those of the farm property and extend to much larger areas. The impact of externalities due to agriculture on other farmers and resource quality differs depending on the distance from the farm property. Figure 3 depicts the total discounted benefits/damage per hectare associated with farming activities in a highly stylised form, which was originally developed by OECD (1998) and recently applied by Uetake (2012) and OECD (2013). Three types of agri-environmental externalities are represented. *Curve A* shows an example of chemical pesticides. Their dispersion into the environment is assumed to decline gradually with distance. *Curve B* depicts an activity that causes wind-borne soil erosion. It may result in relatively little damage to soils on the farm where the activity is carried out, but considerable damage to neighbouring farms. Lastly, *Curve C* represents an example of greenhouse gas emissions such as methane. Their diffusion into the environment occurs within a global system and is widespread. Thus the marginal damage is shown as uniform over the globe.

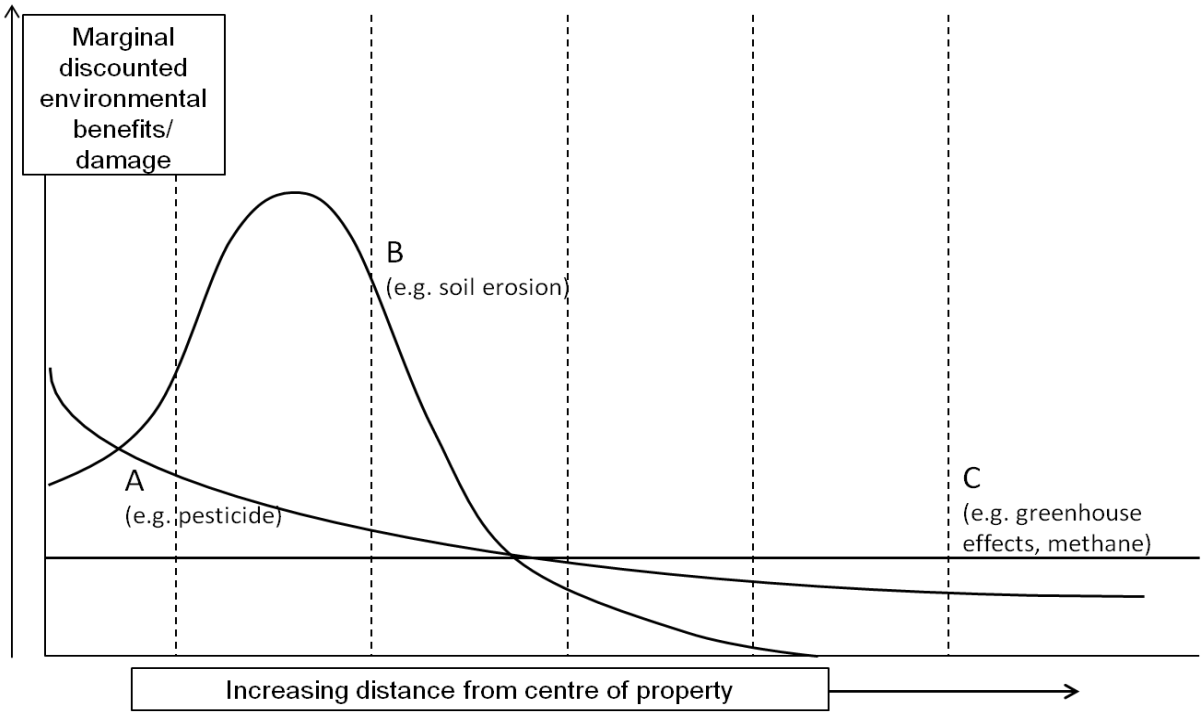
15. Collective action could be especially useful for the externalities represented in *Curve A* and *Curve B*. In the case of Curve *A,* the net cost to a farmer of reducing pesticide use could be quite high compared with the off-site impacts borne by surrounding land owners. However, the need to use those pesticides may also be affected by the practices of neighbouring farmers; for example, the farmer may need to use more pesticides as a result of inappropriate pesticide use by neighbouring farmers. In such a situation, farmers may have an incentive to work together to use their pesticides appropriately.

16. In the case of Curve *B,* a large proportion of the environmental costs generated from a farmer's activities are externalised to his neighbours' farms. If he were the only farm creating such an externality, it might be worthwhile for affected land owners to pay him to take remedial measures. In a typical case, the farmer would himself be affected by similar externalities generated by neighbours, and those neighbours by other neighbours in turn. In this case, they may devise a solution that attempts to get every farmer in the area to commit to a common plan of action.

17. In the case of *Curve C,* both the farmer and his neighbours have little economic incentive to reduce their environmental impact to any large degree since the share of local benefits to be gained, even collectively, is likely to be tiny compared with those of the rest of the world. Moreover, such benefits are unlikely to be realised by the current generation. The idea of all interested parties working out solutions within a group is difficult due to the large numbers involved, thousands of millions of people. Such transboundary issues require co-ordination among larger, representative institutions, i.e. governments.

18. Many case studies cover the geographical boundaries from the farm property to township or county boundaries. These case studies confirm that collective action can be especially useful for dealing with the externalities represented by *Curve A* and *Curve B*.

Figure 3. Stylised representation of farming activities that create externalities



		BEL1			
		CAN1			
		FIN1			
		FRA1	AUS1		
	BEL2	DEU1	AUS2		
	JPN2	DEU2	CAN2		
	JPN3	ITA3	ITA1		
	NZL1	NZL3	NLD1		
ITA2	DEU3	ESP1	NZL2		
JPN1	SWE	GBR1	ESP2		
Centre of farm property	**Farm boundary**	**Township boundary**	**County boundary**	**State boundary**	**National boundary**

Source: Adapted from Uetake (2012) and OECD (1998, 2013)

5.3. Group size and collective action

19. The appropriate group size for collective action has been analysed in many studies. Much of the literature argues that small groups are more appropriate since they can prevent free riders more easily and help members to know one another (e.g. Olson, 1965; Wade, 1988; Ayer, 1997), but that large groups can work if their rules, decision-making procedures and operating methods are well established so as to increase group capabilities through group dynamics.

20. When the number of group members is small, individuals know each other's particularities and this can facilitate effective co-operation among members (Dowling and Chin-Fang, 2007). Dunbar (1992) suggested that, because there is a cognitive

limit within which people can maintain stable social relationships, more rules and norms are needed to maintain group stability when the number of people exceeds a certain level. Although this level is not clearly identified, some studies on collective action have given specific numbers. According to Pretty (2003), from the early 1990s to the early 2000s, about 400 000 to 500 000 new local groups were established worldwide to manage agricultural and rural resources; most of them were small groups, usually having 20 to 30 active members. Mills et al. (2010) argue that a maximum number of members should be initially about ten in order to facilitate communication and development of the organisation.

21. However, large groups can still manage agri-environmental commons if they have clear, fair and meaningful rules and their effective governance is well established. If larger groups work well, they can cover larger geographical areas and bring greater environmental benefits. Large groups can exploit economies of scale to reduce costs. Ayer (1997) shows three possible cases of provision of public goods associated with agriculture: 1) one person, whose benefits from the provision of a public good outweigh his costs, provides the public goods for all; 2) rules can be set requiring that those who benefit the most from the provision of a public good pay more of the costs; and 3) a government institution can divide a larger group into more homogeneous subgroups to facilitate co-operation. The last point is made by many studies (e.g. Ostrom, 1990; Marshall, 2008; Hearnshaw et al., 2012). Ostrom (1990) points out the importance of decomposing large groups into smaller nested groups. Bland and Plateau (1996) claim that even a large group can work when members share common norms or when it is confronted by a common challenge.

22. Table 3 summarises the information on group size found in the case studies. These are classified into three classes according to number of participants: small (fewer than 50), middle (50-100) and large (more than 100). To examine the correlation, if any, between group size and institutional arrangements, each case study is also classified according to the four types of group structure identified in above (Figure1). Table 3 shows that farmers and other participants tend to form independent organisations if the group size becomes large. If organisations are established, more functional institutions (e.g. clear, fair and meaningful rules) can be established. Therefore, although there are many members, they can work together by following the rules. They can form sub-groups or sub-committees and contribute for specific issues. Thus, an effective organisational structure is essential to managing large groups.

Table 3. Group size in the OECD case studies

Group structure type	Small (<50 members) (8 cases)	Group structure type	Middle (50-100 members) (5cases)	Group structure type	Large (>100 members) (12 cases)
1	SWE1	1	AUS1	1	AUS2
2	FRA1	1	DEU2	1	CAN2
3	ITA3	1	ITA2	1	DEU1
3	NZL1	2	BEL2	1	ESP1
4	BEL1	3	JPN3	1	ESP2
4	DEU3			1	FIN1
4	ITA1			1	JPN2
4	JPN1			1	NLD1
				1	NZL3
				2	GBR1
				2	NZL2
				4	CAN1
Majority types are Type 2, Type 3 or Type 4 (combination of Type 2 and Type3)		Various types exist, but **Type 1 predominates.**		**Most of them are Type 1**, suggesting larger groups need strong governance.	

5.4. Benefits of collective action

23. Collective action has several merits, compared with uncoordinated individual actions. First, it allows individual farmers to manage resources and farm practices at a geographically and ecologically appropriate scale, across legal and administrative boundaries (Figure3). Many case studies cover the geographical boundaries beyond the farm property. It can provide various agri-environmental public goods effectively (Davies et al., 2004, Mills et al., 2010).

24. Collective action provides for economies of scale and scope, which can reduce the cost of providing agri-environmental public goods compared with individual uncoordinated provision (OECD, 1998; Hodge and McNally, 2000; Davies et al. 2004; Polman et al. 2010; Shobayashi et al., 2011). As shown in Table 2, multiple public goods are produced by collective action simultaneously. The co-ordinated provision of multiple goods can reduce the costs of provision compared with separate provision.

25. Collective action promotes knowledge sharing among members and increases their technical capacities, thereby making it possible to undertake projects collectively with a larger pool of resources than could be supported or afforded by individuals acting separately (OECD, 1998; Hodge and Reader, 2007). Sometimes, local knowledge from local landowners is shared with others, including policy makers as well as industrial partners and NGOs. This can foster a better understanding of community-based stewardship across multiple sectors and multi-disciplinary partners (e.g. CAN2).

26. Lastly, collective action can tackle local issues that are not necessarily best dealt with by central authorities or individuals because of its flexible forms and diverse members with different knowledge and skills. It can identify critical sites that are central to different environmental objectives and signal opportunities for groups of farmers, landowners, conservation groups and local authorities to collaborate in a joint group (Pollard et al. 1998; Hodge and Reader, 2007; Vojtech, 2010). Landcare in Australia (AUS1 and AUS2) is an example of grass-roots movement grounded in local volunteer effort and stewardship of the land and other natural resources.

5.5. Challenges for collective action

27. There are, however, barriers that prevent collective action. First, free-riding can be a major problem. Some group members tend not to contribute to group activities because they can benefit from other members' activities without contributing (Olson, 1965; Hardin, 1968). However, it is also necessary to note that farmers are more willing to participate in collective action than is assumed by theories based on pure self-interest (OECD, 2012b). Farmers are often strongly in favour of collaborating with their neighbours. How to facilitate communication and collaboration among them is a key challenge to be overcome. Some case studies indicate that strong social capital helps farmers to act together and promotes their production of public goods. For example, in Spain, there is a long history of collective self-management of irrigation water resources. Strong social capital shared by farmers helped the Community of Irrigators (CRs) in Spain to successfully promote co-operation among them, prevent free-riding, and manage common irrigation infrastructures and water endowment collectively (ESP1).

28. Transaction costs stemming from collective action (e.g. costs of identifying relevant participants, or of negotiating agreements) can prevent collective action from being undertaken, especially if these costs occur at an early stage (Ostrom, 1990; Davies et al., 2004). In order to make collective action work, members' benefits from collective action need to cover the costs they incur from the action. It is important to study how to reduce costs associated with collective action. Transaction costs can be reduced by sharing experience across agencies, regions or countries, exploiting already existing administrative networks, integrating government and private information, reducing the number of agencies, and using information technologies (OECD, 2007). In the Aorere Catchment Project (NZL1), the strong social capital shared by the small Aorere group (about 30 farmers) seems to have helped them negotiate agreements and reduce bargaining and other transaction costs.

29. Certain sceptical attitudes towards collective action (e.g. individualism, inertia, awareness, acceptability of the evidence) can be barriers to collective action (Aldrich and Stern, 1983). A recent study of drivers of change in farming management in Australia found that group-based extension is not suitable for everyone since some farmers prefer to act as individuals (Eckerd et al., 2012). At the policy design stage, governments need to decide carefully whom they should target — individual farmers or groups of farmers— depending on each agri-environmental situation. In order to promote collective action, it is also important to raise awareness of the importance of such action and provide solid scientific evidence that demonstrates the potential value of collective action to farmers.

30. Lastly, uncertainty of the policy environment can also negatively affect farmers' willingness to take part in collective action (Harris-Adams et al., 2012). It creates apprehension amongst farmers as to the future direction of government support and choice of policy instruments.

5.6. Key Factors for Successful collective action

31. This study identifies several key factors for successful collective action, which help participants to overcome barriers and increase benefits. They can be divided into four groups according to 1) the characteristics of the resources concerned, 2) the nature of the groups that depend on these resources, 3) the particulars of the institutional relationships through which the resources are managed, and 4) the nature of the links between the group, on the one hand, and external forces or the authorities, on the other (Agrawal, 2001). Figure 4 summarises the benefits, barriers and 16 key factors of collective action identified in this study.

32. Precise knowledge of community resources is necessary for collective action since it is essential for identifying environmental problems and developing measures. Different participants and external scientists can contribute and share various elements of essential knowledge and expertise, and help farmers to undertake collective action. For example, NGOs and scientists provide scientific advice in NZL1. Collective action should be based on geographical boundaries of targeted environmental resources, such as natural habitat and watersheds, and not on jurisdictional boundaries. The case studies show that typically collective action deals with broad agri-environmental issues beyond individual farms (e.g. severe soil erosion (NZL2), non-point water pollution (GBR1), and managing catchments (CAN1), or a lake (FIN1)), but not issues related to individual farming (e.g. risk-assessment of individual farms) (Figure 3). Visible positive outcomes and clear benefits from the activity and resources are necessary to motivate participants and keep activities alive. Many of the case studies demonstrate the importance of visible outcomes and benefits from the action. Indeed, because of benefits from collective action, some private companies pay groups of farmers to improve water quality and undertake actions collectively (e.g. BEL1, FRA1, GBR1).

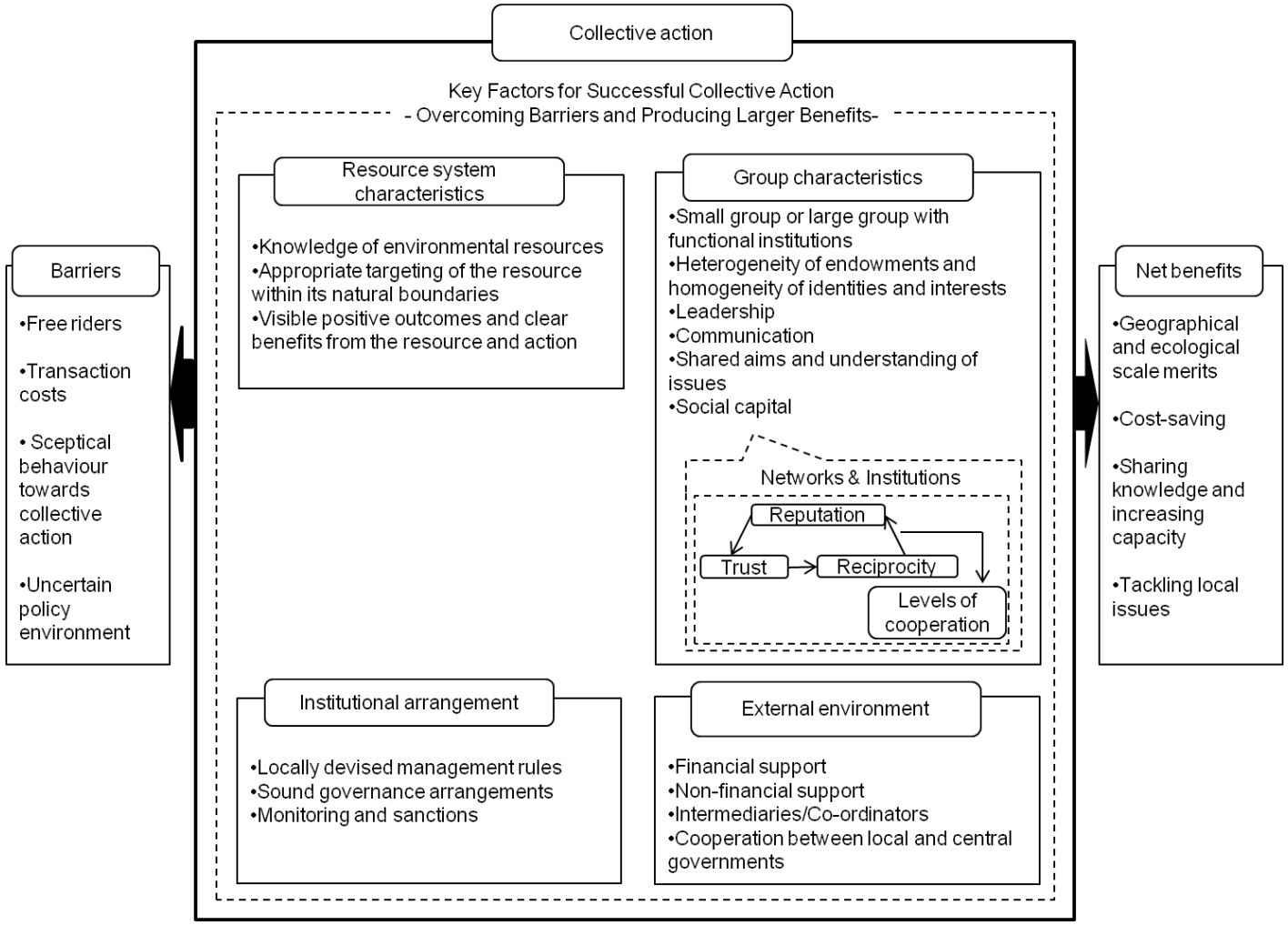
33. Understanding the behaviour of farmers is important as group activities are based on trust and co-operation. A relatively small group can establish trust and render collective action easier (e.g. Söne Mad Grazing Association is about 30 members (SWE1)). However, large functional groups (Table 3) can work effectively and save costs because of economies of scale and scope (e.g. ESP1 and ESP2 have more than 1 000 members). Diverse endowments among members can leverage their resources, but homogeneity of identities and interests among groups is important for facilitating group activities. Typically, farmers are within the same geographical boundary (e.g. watershed), practice similar farming and share common interests, but external support from NGOs and others can provide diversity and also help the group activities (e.g. researchers provide technical assistance in AUS1). Leadership by farmers is essential for better performances (e.g. AUS2, NZL1). On the other hand, other interested bodies can take the leading role as well (e.g. programme officers (CAN1), irrigation organisation (NZL3)). Effective communication, especially face-to-face communication, is important. Communication is not just for collective action participants, but also for outsiders so as to raise awareness on community activities. Many outreach events are undertaken such as school programmes (e.g. NLD1, JPN1). Participants need to share the aims of the collective action and understand the issues since collective action involves a large number of individuals and organisations. The importance of having a clear vision is identified in

the case studies (e.g. AUS1, AUS2, SWE1). Lastly, social capital (e.g. trust, networks and supportive institutional arrangements) can help individuals work co-operatively. This social capital significantly helps groups to manage agri-environmental commons by reducing search, bargaining, and monitoring and enforcement costs (e.g. SWE1)

34. Allowing groups to develop local management rules is essential for successful collective action because the "one-size-fits-all" approach may fail to engage farmers in collective action. Tailor-made action plans are developed by each group to manage various agri-environmental commons (e.g. BEL1, CAN1). Sound governance arrangements underpinning collective action are important, especially when the group size is large. Some of these organisations have legal status, which may help them to establish efficient formal rules and good governance, and to receive funds (e.g. AUS1, AUS2, ESP1, ESP2). Monitoring and sanctions are usually necessary to prevent free-riding and rule-breaking. Some of the case studies incorporate sanctions into the collective action mechanism (e.g. DEU1, NZL3).

35. Financial support from both governments and non-government entities is important for collective action. It is particularly significant at the initial stage of an activity because this stage usually incurs higher transaction costs compared to individual action. Indeed, among the 25 OECD case studies, 21 cases involved some financial support from governments. Non-financial support such as advice from local authorities can help identify potential parties and promote collective action. Research and development, technology and innovation can empower farmers. Support from intermediaries and co-ordinators (e.g. NGOs, government programme staff, research centres) can help collective action by contributing information about issues and policy measures, liaising between participants and providing inputs including staff and funding. For instance, a local NGO organises a community garden (ITA2) and a local water association organises a wetland restoration programme. Finally, effective co-operation between local and central governments is important to promote collective action, as local governments usually have a better knowledge of local issues. Central governments can promote collective action through national programmes. In some cases, local and central governments collaborate and provide co-ordinated support for collective action (e.g. NZL2).

Figure 4. Summary of benefits, barriers and key factors for collective action



5.7. When collective action is necessary and desirable

36. This study identifies several cases where collective action is useful for managing agri-environmental commons. In some cases, collective action is necessary, and in other cases it is just desirable. Table4 summarises this point. Collective action is necessary when providing threshold public goods or farmers need external expertise to tackle local agri-environmental issues. Co-operation among farmers and non-farmers is an essential part in these cases.

37. Collective action is desirable when trying to internalise externalities and tackling local issues or when economies of scale and scope exist. Although individual actions may be possible to deal with these issues and bring benefits or reduce costs, co-ordinated actions among farmers and non-farmers can bring better results.

Table 4. Necessity and desirability of collective action

Collective action is necessary when	**Collective action is desirable when**
Providing threshold public goods: Provision of public goods is possible only when certain number of people within scheme boundaries (e.g. landscape in a river valley, water quality in a catchment area) participate in collective action (Figure2).	**Trying to internalise externalities**: Collective action can be especially useful for dealing with externalities whose boundaries exceed those of the farm property and extend to much larger areas. If collective action can be formed successfully, it can ask free-riders to contribute to the provision of externalities (Figure 3).
External expertise is needed: Collective action makes it possible for members to share knowledge and information and enhance farmers' expertise in ways that cannot be achieved by an individual farmer.	**Tackling local issues:** If local issues are not necessarily best dealt with by central authorities or individuals, collective action can provide alternate approaches to manage issues.
	Economies of scale and scope exist: Significant cost savings can be realised through collective action if there are economies of scale and scope. Collective action may reduce transaction costs, such as those related to contracting, monitoring and making payments. In addition, collective action can reduce the cost of implementing farm practices.

5.8. Policy measures for collective action

38. When collective action is necessary or desirable, governments may be better to promote it so as to manage agri-environmental commons effectively. Farmers sometimes initiate collective action voluntarily without government support. If the benefits to farmers from collective action outweigh the costs they incur, they may take the initiative to manage agri-environmental commons in collaboration with neighbours and others. However, barriers such as free-rider problems, high initial transaction costs, negative attitudes towards collective action and policy uncertainty may hinder the spontaneous development of collective action. Farmers can try to overcome these difficulties by themselves, but in some cases they will need external support in the form of scientific knowledge, technical information and financial assistance to overcome these difficulties. If farmers cannot take collective action by themselves, government support can promote collective action in cases where the total benefits arising from it outweigh its costs.

39. Governments implement various policy measures for promoting collective action. They sometimes participate in collective action as a group member, providing technical assistance (e.g. data) or financial assistance. Generally speaking, central governments provide support outside of groups, but local governments sometimes participate, co-operate with farmers and develop collective action. In both cases, government policies for collective action vary from facilitation (e.g. technical assistance) or providing a financial stimulus such as an agri-environmental payment to more coercive measures like imposing regulations.[5] Table 5 summarises policy measures for collective action. It shows that in 23 of the 25 case studies, government provides at least some support for collective action. In 21 of the case studies, financial support is provided.

Table 5. Policy measures and collective action

Method of participation by government:	Non-intervention	Facilitation	Financial stimulus	Coercion
Examples of policy measures	-	Technical assistance	Agri-environmental payments	Regulations
Cases	ITA2; FRA1	BEL2; GBR1	Others[1]	—[2]

1. In most cases government provides both technical assistance and agri-environmental payments. Among these cases, the degree of government involvement varies from facilitation or providing financial incentives to more prescriptive measures.
2. Although the 25 case studies do not include any cases of coercion by regulation, such cases do exist. For example, drought co-ordination committees in Japan require irrigation districts to reduce the use of water. In this case, farmer members of the irrigation districts have no choice but to act collectively (Shobayashi et al., 2011).

40. Technical assistance from government is important for collective action. Farmers do not always have enough scientific knowledge on how to manage resources. If they lack specific expertise, external experts, including those from government services and research departments, can provide farmers with technical assistance. Technical assistance can reduce transaction costs (search, bargaining, and monitoring and enforcement costs). Search costs can be reduced when local authorities provide appropriate information to help to identify potential group members from the locality (Hodge and McNally, 2000; Mills et al., 2010). Bargaining costs can be reduced by making a common template for contracts. Baland and Platteau (1996) argue that governments should provide a framework of basic rights, rules and objectives for collective action to serve as a guideline for managing common pool resources voluntarily. Monitoring and enforcement costs can be also reduced by providing monitoring data and assistance with monitoring itself. In general, these types of technical assistance influence farmers' willingness to participate and the effectiveness of the action taken.

41. Government financial support is given through either general agri-environmental policies or policy measures specifically for promoting collective action. In some cases, general agri-environmental policies may target outcomes without stipulating whether they are to be achieved by individual or collective activities. They

5. For example, regulations can force a group of farmers to adopt environmentally-friendly farming practices or to reduce polluting runoff. Also, regulations can establish background conditions or norms that facilitate collective action being formed and the collective actions adapt them to local circumstances.

can be used to foster collective action as long as it is not a specific requirement that the recipients must be individual farmers acting independently. However, general agri-environmental policies are more often taken up by individuals since, as long as they can access the payments as individuals, farmers are usually not motivated to form collective action groups in order to achieve the targeted objectives. Therefore, if it is better to tackle agri-environmental problems collectively (e.g. dealing with externalities that extend beyond the individual farm or dealing with threshold public goods associated with agriculture), policies that specifically target collective action are preferable. There are several such examples among the OECD case studies (e.g. Landcare programmes (AUS1, AUS2 and DEU1), Sustainable Farming Fund (NZL1), Measures to Conserve and Improve Land, Water, and the Environment (JPN3)). In addition to these national programmes, local governments also implement policy measures specifically for promoting collective action (e.g. Policy for Preserving Biodiversity Associated with Agriculture in Shiga Prefecture (JPN1)).

6. DISCUSSION

42. This study is one of the first extensive studies which examine various collective action cases in OECD countries. It provides an extensive literature review and analyses 25 case studies from 13 OECD countries. The study shows that collective action is useful in managing agri-environmental commons and the study finds that government policies have a considerable effect on farmers' behaviour towards collective action.

43. However, there are several issues need to be further examined. First, appropriate government policies for managing agri-environmental commons need to be studied more. The study identifies that there are different types of managing agri-environmental commons provided in OECD countries (e.g. biodiversity, landscape, water quality, common pool resources) and collective action has the potential to manage these issues effectively. However, to figure out the best approach for dealing with agri-environmental issues, it is necessary to compare all related approaches (targeting individual actions or collective actions) and policy measures (e.g. regulations, agri-environmental payments, taxes, tradeable credits, technical assistance). Appropriate government policies and approaches may differ depending on the characteristics of the resource problem and the type of agri-environmental commons (e.g. biodiversity, water quality). This study only examines the role of collective action, and there is insufficient evidence to permit the formulation of guidelines or prescriptions about when collective action is the *best* approach compared with other approaches and policy measures.

44. Second, this study just examines cases in OECD countries. Features of collective action including key factors for successful collective action may differ depending on cultural and economic background. The comparison between OECD countries and developing countries in terms of managing agri-environmental commons is not sufficient. It would be worthwhile to compare cases in OECD countries and developing countries to figure out what makes collective action useful to manage agri-environmental commons. When comparing cases, although previous studies (e.g. Ostrom, 1990) have mainly focused on key factors for successful

collective action, policy measures for collective action should be also compared so as to establish better policy measures for collective action.

REFERENCES

Agrawal, A. (2001), "Common Property Institutions and Sustainable Governance of Resources", *World Development*, Vol. 29, No. 10, pp. 1694-1672.

Aldrich, H. and R.N. Stern (1983), "Resource Mobilization and the Creation of US Producer's Cooperatives, 1835-1935," *Economic and Industrial Democracy*, Vol. 4, pp. 371-406.

Ayer, H. (1997), "Grass Roots Collective Action: Agricultural Opportunities", *Journal of Agricultural and Resource Economics*, Vol. 22, No. 1, pp.1-11.

Baland, J. M. and J. P. Platteau (1996), *Halting Degradation of Natural Resources: Is there a Role for Rural Communities?*, FAO (Food and Agriculture Organization of the United Nations), Rome.

Cremer, D. D. and M. V. Vugt (2002), "Intergroup and Intragroup Aspects of Leadership in Social Dilemmas: A Relational Model of Cooperation", *Journal of Experimental Social Psychology*, Vol. 38, pp. 126 –136.

Cooper, T., K. Hart and D. Baldock (2009), *The Provision of Public Goods through Agriculture in the European Union*, report prepared for DG Agriculture and Rural Development, Contract No 30-CE-023309/00-28, Institute for European Environmental Policy, London.

Davies, B., K. Blackstock, K. Brown and P. Shannon (2004), *Challenges in Creating Local Agri-environmental Cooperation Action amongst Farmers and Other Stakeholders*, The Macaulay Institute, Aberdeen.

Dowling, J. M. and Y. Chin-Fang (2007), *Modern Developments in Behavioral Economics: Social Science Perspectives on Choice and Decision*, World Scientific Pub Co Inc.

Dunbar R. I. M. (1992), "Neocortex Size as a Constraint on Group Size in Primates", *Journal of Human Evolution*, Vol. 22, No.6, pp. 469-493.

Ecker S., R. Kancans and L. Thompson (2011), "Drivers of Practice Change in Land Management in Australian Agriculture: Preliminary National Survey Results", *Science and Economic Insights*, Issue 2.1-2011, Australian Bureau of Agricultural and Resource Economics and Sciences, Australian Government.

Hardin, G. (1968), "The Tragedy of the Commons", *Science*, Vol. 162, pp. 1243-1248.

Harris-Adams, K,, P. Townsend and K. Lawson (2012), *Native Vegetation Management on Agricultural Land*, ABARES (Australian Bureau of Agricultural and Resource Economics and Sciences) Research report 12.10, Canberra, November.

Hearnshaw E. S., S. N. Holmes, J. J. Yeates, D. D. Karl, A. C. Schollum and M. N. Simms (2012), "Collective Action Success in New Zealand", Strategic Policy Team, Ministry of Environment, Wellington, New Zealand.

Hodge, I. and S. McNally (2000), “Wetland Restoration, Collective Action and the Role of Water Management Institutions”, *Ecological Economics*, Vol. 35, pp. 107-118.

Hodge, I. and M. Reader (2007), *Maximising the Provision of Public Goods from Future Agri-environment Schemes*, Final Report for Scottish Natural Heritage, Rural Business Unit, Department of Land Economy, University of Cambridge.

Marks, M. and R. Croson (1998), “Alternative Rebate Rules in the Provision of a Threshold Public Good: An Experimental Investigation”, *Journal of Public Economics*, Vol. 67, No. 2, pp. 195-220.

Marshall, G. R. (2008), “Nesting, Subsidiarity, and Community-based Environmental Governance beyond the Local Level”, *International Journal of the Commons,* Vol.2, pp. 75-97.

Meinzen-Dick, R. and M. Di Gregorio (eds.) (2004), *Collective Action and Property Rights for Sustainable Development,* 2020 Vision for Food, Agriculture and the Environment, Focus 11, IFPRI, Washington, D.C.

Mills, J., D. Gibbon, J. Ingram, M. Reed, C. Short and J. Dwyer (2010), “Collective Action for Effective Environmental Management and Social Learning in Wales”, paper presented at the Workshop 1.1 Innovation and Change Facilitation for Rural Development, 9th European IFSA, Building Sustainable Futures, Vienna Austria, 4-7th July 2010.

OECD (1998), *Co-operative Approaches to Sustainable Agriculture*, OECD Publishing, Paris.

OECD (1999), *Cultivating Rural Amenities: An Economic Development Perspective*, OECD Publishing, Paris.

OECD (2007), *The Implementation Costs of Agricultural Policies*, OECD Publishing.

OECD (2012a), *Water Quality and Agriculture: Meeting the Policy Challenge*, OCED studies on Water, OECD Publishing, Paris.

OECD (2012b), *Farmer Behaviour, Agricultural Management and Climate Change*, OECD Publishing, Paris.

OECD (2013), *Providing Agri-environmental Public Goods through Collective Action*, OECD Publishing, Paris.

Olson, M. (1965), *The Logic of Collective Action: Public Goods and the Theory of Groups,* Harvard University Press, Cambridge.

Ostrom, E. (1990), *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, New York.

Pollard, P., E. Leighton and T. Seymour (1998), “Partnership Approaches to Diffuse Pollution Management”, in Petchey, M., B. J. Darcy and C. A. Frost (eds.), *Diffuse Pollution and Agriculture*, Proceedings of the Second Diffuse Pollution and Agriculture Conference in Edinburgh, The Scottish Agricultural College, Aberdeen.

Polman, N., L. Slangen and G. van Huylenbroeck (2010), “Collective Approaches to Agri-environmental Management”, in Oskam, A., G. Meester and H. Silvis (eds.), *EU policy for Agriculture, Food and Rural Areas*, Wageningen Academic Publishers.

Pretty, J. (2003), “Social Capital and the Collective Management of Resources”, *Science*, Vol. 302, pp. 1912-1914.

Rondeau, D., W. D. Schulze and G. L. Poe (1999), “Voluntary Revelation of the Demand for Public Goods Using a Provision Points Mechanism”, *Journal of Public Economics*, Vol. 72, No. 3, pp. 455-470.

Scott, J. and G. Marshall (2009), *A dictionary of sociology*, Oxford University Press, Oxford.

Shobayashi, M., Y. Kinoshita and M. Takeda (2011), “Promoting Collective Actions in Implementing Agri-environmental Policies: A Conceptual Discussion”, Presentation at the OECD Workshop on the Evaluation of Agri-environmental Policies, 20-22 June, Braunschweig.

Vojtech, V. (2010), *Policy Measures Addressing Agri-environmental Issues*, OECD Food, Agriculture and Fisheries Working Papers, No.24, OECD Publishing, Paris.

Uetake, T. (2012), “Providing Agri-environmental Public Goods through Collective Action Lessons from New Zealand Case Studies”, paper presented at the New Zealand Agricultural and Resource Economics Society Conference, 30 August 2012, Nelson, New Zealand

Wade, R. (1988), *Village Republics: Economic Conditions for Collective Action in South India,* ICS Press, Oakland.