Chapter 22
Other Types of Incentives in Water Policy: An Introduction

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Abstract Over the last decades, Cooperative Agreements (CAs) (voluntary, payments for ecosystem services (PES) schemes etc.) have been introduced as supplements to existing command and control regulations, i.e. as part of policy mix, for promoting higher water and environmental efficiency levels than mandated by law. This chapter illustrates the effectiveness and efficiency of CAs among farmers, water companies, authorities and citizens to achieve water policy goals in Europe and beyond. These include voluntary agreements and PES schemes to improve water quality in Dorset (UK), in Evian (France) and in New York (USA) and river restoration in Ebro (Spain). A negotiation agreement to cope with increasing water scarcity by promoting the use of reclaimed water in Tordera and Llobregat (Spain) is also analysed. The economic, environmental and social outcomes from the implementation of these CAs along with their institutional set-up, transactions costs and policy implementability are highlighted. Overall conclusions from the findings of the representative case study areas are finally presented.

Keywords Voluntary agreements • Payments for ecosystem services • Negotiation • Water quality and scarcity • River restoration

22.1 The Role of Other Types of Incentives in Water Policy

Global water and environmental challenges (e.g. water quality, water scarcity, river restoration, greenhouse gas emissions) along with economic development (e.g. population growth, increases in demand) or the need to innovative in terms of new technology (e.g. use of recycled water, clean technology) have persuaded policy makers to search for innovative economic policy instruments. In most Member

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States (MS) of the European Union (EU), the implementation of water and environmental policy is foreseen through traditional *command and control* policies, however, a closer cooperation among authorities, firms, farmers and citizens are of paramount importance to tackle water and environmental challenges. This implies the use of instruments that include cooperative (CAs) (e.g. voluntary, payments for ecosystems services (PES) schemes) agreements, i.e. negotiated voluntary arrangements between parties to adopt agreed practices often linked to subsidies or offset schemes (Lago and Moller-Gulland 2012; Delacamara et al. 2013).[1] More particularly, there are three main types of voluntary agreements as defined by OECD (1999); *public voluntary agreements*, where the environmental agency defines the rules and conditions of participation; *unilateral commitments* where the agreement is designed by firms and their industry associations and *negotiated agreements* which take the form of formal contract between the environmental agency and industry and are often developed with the expectation that regulators will not introduce more stringent regulation if firms meet pollution targets within a specified time (Borkey et al. 1998; Darnall and Carmin 2005). For the purposes of this book and because of its current relevance as an instrument for water policy in Europe, Voluntary Agreements (VA) have been included as a category in the broad categories of Economic Policy Instruments (EPIs). But it is worth noting that there is an on-going debate in the literature about whether voluntary agreements (VA) can be regarded as a "pure" economic policy instrument or not. Environmental VAs are commonly defined "as an agreement between a government authority and one or more private parties with the aim of achieving environmental objectives or improving environmental performance beyond compliance to regulated obligations. Not all VAs are truly voluntary; some include rewards and/or penalties associated with participating in the agreement or achieving the commitments" (Gupta et al. 2007). Some economists interpret the "Voluntary" nature of the agreements as a version of

[1] In addition to CAs, Chap. 1 introduces another type of instruments, i.e. risk-based mechanisms which rely on the influence of differential insurance premiums and liabilities (compensation) levels (Delacamara et al. 2013). The former refers to insurance schemes against natural and man-made disasters which have recently promoted by the European Commission's Adaptation Strategy to climate change. More particularly, its aim is to improve the market penetration of natural disaster insurance and unleash the full potential of insurance pricing and other financial products for risk-awareness prevention and mitigation and for long-term resilience in investment and business decisions (EC 2013). Example of these schemes is provided by Gomez et al. (2013) where insurance addressing drought risk, i.e. a financial mechanism that covers the loss of or damage to crops caused by insufficient rainfall, was explored in Tagus-Segura (Spain) (Delacamara et al. 2013). Liabilities refer to schemes to prevent and remedy damage to animals, plants, natural habitats and water resources and they are promoted by the Environmental Liability Directive (2004/35/EC). Examples of compensation schemes for environmental damage have been examined for selective case study areas in Europe such as in Sweden (tank collapse and chemical release), Czech Republic (coal mining pollution), UK (effects of abstraction for public water supply on the ecological integrity of river), Germany (compensation in the form of habitat banking, i.e. creation of nature conservation areas from the construction of new infrastructure) (Cole and Kriström 2007). Risk-based mechanisms were not assessed as part of the EPI-WATER project and therefore, no case study areas were included in this chapter.

regulation and therefore, argue that they do not belong to the economic policy instruments category.

Another form of cooperative agreements is PES schemes which are based on voluntary transactions between at least two social actors with the aim of securing the provision of ecosystem services (ES) (e.g. clean water supply, flood risk mitigation, etc.) (Delacamara et al. 2013). Over the last decades, an increasing number of voluntary approaches have been widely implemented in environmental policy such as reduction in CO_2 emissions from energy sector, pollution from the steel sector etc. (OECD 2003; Bryden et al. 2012). Cooperative agreements (e.g., voluntary or PES) have also been carried to improve water quality from pollution by agriculture, highlighting therefore the beneficial interaction between water-related and agricultural policy (Brouwer et al. 2003; Heinz 2008). The benefits of CAs may be significant for both firms and society. Firms could enjoy lower legal costs and increase reputation by improving their environmental performance, whereas societies gain to the extent that firms translate goals into concrete business practices and persuade other firms to follow their example (Gupta et al. 2007). CAs have been introduced as supplements to existing *command and control* regulations, i.e. as part of *policy mix*, e.g. for promoting higher water efficiency levels than mandated by law. The use of cooperative agreements is more and more often seen as an alternative to legislative measures at the EU level but one must not overlook the strengths and merits of the actual existing regulatory system, especially when well devised and effectively enforced (BEUC 2006).

In Europe, the Water Framework Directive (EC/2000/60) and Common Agriculture Policy (CAP) require new approaches in water management (Heinz 2008). WFD's main aims are at achieving good ecological status of water bodies by 2015, tackling water pollution by agriculture and responding to water scarcity and drought risk. Article 4 of the WFD sets the regulations to ensure enhancement and restoration of all surface waters; to guarantee the progressive reduction of pollution of groundwater; and to promote long-term sustainability of water resources (Heinz 2004). To achieve the environmental objectives of the Article 4, each MS needs to adopt the Programme of Measures (Article 11) which will be enhanced by supplementary measures such as negotiated agreements, legislative, economic or financial instruments. These measures should be affordable and should not cause disproportionate costs (Article 4 (5)). Hence, cooperative agreements could assist the implementation of the WFD by allowing for instance farmers and water companies to form an agreement to prevent further pollution. These agreements also provide information on the most cost-effective measures in farming practices (e.g. intercrops to reduce nitrate loads) (Heinz 2004, 2008). Recent publication by the European Commission "A Blueprint to Safeguard Europe's Water Resources" encourages water re-use for irrigation or industrial purposes as an alternative supply option to respond to water scarcity (EC 2012). Cooperative agreements (e.g. water re-use from waste water treatment plants for irrigation or industrial purposes) could be a useful approach to promote a more efficient utilisation of scarce water resources.

Moreover, the Common Agricultural Policy (CAP) is aimed at ensuring the economic sustainability of the agricultural sector and reducing environmental pressures

on water bodies. Past reforms of the CAP included cross-compliance direct payments to ensure environmental and agricultural protection e.g. protection of soil and water and avoid the deterioration of habitats and support for rural development policies, whereas the latest reform introduced a green payment to encourage the adoption of agronomic practices by farmers. Therefore, cooperative agreements among relevant parties such as authorities, firms or farmers, could allow knowledge and expertise sharing to avert further pollution and deterioration of water resources. Water companies could engage with farmers to be aware of their efforts to reduce pollution by limiting the excessive use of pesticides and fertilizers and in exchange, farmers could expect compensation payments from water companies and free advisory services (Heinz 2008). In addition to the WFD and CAP, cooperative agreements could assist the implementation of the Nitrates Directive (91/676/EEC). It is a special water-related environmental regulation which requires the identification of water resources that suffer from nitrate pollution by agriculture (Nitrate Vulnerable Zones – NVZs) and the design of action programmes for monitoring the amount of nitrate inputs in these NVZs (Defra 2012). As a result, farmers within those NVZs must comply with certain farming practices for preventing deterioration of water quality and for greater protection of drinking water resources. Cooperative agreements can provide information about best agricultural practices allowing therefore protection against pollution. Finally, the role of cooperative agreements in the form of PES schemes has been promoted and highlighted in other EU legislation and initiatives such as the EU Biodiversity Strategy to 2020 and in the Roadmap for a Resource Efficient Europe. However, clear and transparent definitions and methodologies are still needed at EU level (and national level) to promote the implementation of PES schemes as water-related EPI (Delacamara et al. 2013).

Cooperative (e.g. voluntary, PES) agreements to improve environmental performance have also become popular in countries beyond Europe. In USA, voluntary agreements are defined as programs, codes, agreements, and commitments that encourage organizations to voluntarily reduce their environmental impacts beyond the requirements established by the environmental regulatory system (Carmin et al. 2003; Darnall and Sides 2008). The Environmental Protection Agency (EPA) maintains primary responsibility for setting environmental standards, prescribing the ways in which the regulated community must achieve these standards and imposing penalties (fines) in cases when environmental conditions are violated by companies (Dallar and Carmin 2005). Voluntary agreements had been in place for more than 20 years in USA, around 200 studies exist (Darnall and Sides 2008). As far as PES schemes are concerned, Buric and Gault (2011) and Benett et al. (2013) listed several dozen cases in South America (Brazil, Bolivia, Colombia, Costa Rica, Ecuador, Guatemala, Mexico), Asia (China, India, the Philippines), North America (New York and Santa Fe (USA) and Africa (South Africa, Tanzania, Rwanda) (Delacamara et al. 2013). In Europe the number of CAs (e.g. voluntary or PES) is approximately 500 (the majority of these cases refer to voluntary agreements), with Germany being the country with highest number of such agreements (Heinz et al. 2002; Brouwer et al. 2003; Heinz 2008; Mattheiß et al. 2010).

The chapters in this section of the book discuss the effectiveness and efficiency of cooperative (e.g. voluntary, PES) agreements among farmers, water companies, authorities and municipality to achieve water policy goals in selective case study areas. These include agreements to improve water quality in Dorset (UK), in Evian (France) and in New York (USA), to improve river restoration in Ebro (Spain) and to cope with increasing water scarcity by promoting the use of reclaimed water in Tordera and Llobregat (Spain). The economic, environmental and social outcomes from the implementation of the voluntary agreements along with their institutional set-up, transactions costs and policy implementability are highlighted. Overall conclusions from the findings of the representative case studies are finally presented.

The first chapter in this section comes from the County of Dorset in England and includes a cooperative (voluntary) agreement between a water company (Wessex water) and farmers to reduce water pollution from farming activities. The water company has approached the farmers to cooperate to improve water quality by promoting better practices (catchment approach) instead of opting for other approaches such as water treatment which could be costly. The findings from this study suggest that although the benefits in terms of reduced loads of nutrients in water bodies will become apparent by 2015, the catchment approach proved to be economic efficient (cheaper than alternative solutions) and both farmers and water company were better off (win-win situation). The cooperative agreement between water supplier and farmers was very popular as alternative to regulation and farmers have become keen supporters of the approach, willing its success in order to prove that further regulation is not necessary.

The next chapters discuss cooperative agreements in Evian (France) and in New York (USA), which take the form of payments for ecosystem services (PES) to improve water quality. CA in Evian is developed by the association for the protection of the catchment area of Evian mineral water (APIEME), an association which involves the villages from the spring area that benefit from a government tax on bottled water, the villages from the catchment area, the Evian Company and national public bodies, with local farmers. The French case study illustrates how the Evian Company can maintain a land use and traditional agricultural practices on the catchment area presumed to preserve the quality of the Evian Natural Mineral Water. Although the economic, environmental and distributional effectiveness of this instrument was difficult to quantify with accuracy, it is concluded that this agreement met its ultimate objective, i.e. the environmental protection and sustainable development of the area. Despite the high transaction costs and advanced water regulation and institutions, the involvement of stakeholders and the conduction of a background study to take into account any local particularities and heterogeneous farming were key factors for the successful selection, design and implementation of the agreement. Another example of payments for ecosystem services comes from New York (USA) where the city is paying farmers for services for improving source water quality, i.e. the Watershed Agricultural Programme (WAP). This case study provides an excellent example how the city and farmers are voluntarily working together to protect the quality of a watershed. The study showed that there were substantial benefits in terms of reducing phosphorus loadings to surface waters

suggesting that pollution from agriculture is no longer a threat to the city. The economic effectiveness of this agreement was difficult to quantify with accuracy as it was not possible to monetize the value of the water quality benefits that the city received. However, this agreement has certainly been proven to be cheaper than opting for other costly options such as mandatory filtration as required by the Environmental Protection Agency (EPA). Moreover, farmers were better-off but not evenly as larger farmers benefit more than smaller ones. Key successful factor of this agreement was also the importance of well-structured dialogue and negotiations between the city and farmers who were able to work together to identify common ground and solutions to both groups' problems. What remains is for the city to continually monitor and invest in watershed management efforts to control pollutants and excess nutrient loadings as other threats remain (e.g. pollution from exurban development).

The next chapter in this section provides a unique example of voluntary public-private partnerships (the hydropower company (Endesa), the water authorities (Ebro River Basin Authority, ERBA) and the scientific community) for the partial re-naturalization of a significantly modified river in the Lower Ebro (Spain). Changes in the river morphology reduced flood frequency and magnitude, sediment load and altered the river's ecology leading to detrimental effects over many water services such as reduced health and navigation. As a result, macrophytes (visible algae and other flora species) have increased which are detrimental to power generation facilities and their removal through mechanical means is costly. This provides incentives for hydropower companies to cooperate via flushing flows (FF) to improve the ecological potential of the river and control and remove the excess of macrophytes from the river channel. The findings of this study suggest that the benefits in terms of macrophytes removal were substantially high leading to welfare improvement both from a private and social perspective. The voluntary agreement is implemented at an intra-basin level which avoided significant transaction costs and clearly shows that macrophytes removal at a minimum cost has been proved to be the catalyst for agreement and reconciliation of public good concerns and private interests. However, this case is by no means "over" as the progressive drop of macrophytes removal rate may give a chance to a more ambitious agreement (Lago and Moller-Gulland 2012).

The last chapter discusses a voluntary water intra-sectorial transfer (from municipality to irrigators) to promote the use of reclaimed water and decrease the pressure on the local aquifers in Tordera and Llobregat (Spain). This area is characterized by overexploitation of groundwater resources and frequent drought events which could threaten the long-term availability of water resources. To address the growing regional water shortage and pressure on the local aquifers, the Catalonian Water Agency (ACA) considered that a plausible solution would be the use of reclaimed water mainly for irrigation. The findings of this study shows that the reliability of reclaimed water improved the water availability by reducing pumping from groundwater and increased farmers' income by raising the crop yield per hectare. The agreement to promote the use of reclaimed water proved to be the cheapest solution as compared to alternative ones such as sea water desalination and water transfer

from other areas leading to a win-win situation both for citizens and irrigators. Key aspects for the success of a water reclaimed agreement were the participation of stakeholders and public, sharing site-specific knowledge and expertise concerning environmental needs and conditions and social awareness and information campaigns for the benefits using reclaimed water to respond to water scarcity risks.

This section illustrates that cooperative agreements (voluntary or PES) are taking place in water policy in several places in Europe and beyond. Even though it would be imprudent to make generalized statements about the advantages of applying cooperative agreements, the following conclusions can be drawn:

- Cooperative agreements (CAs) have been introduced as supplements to existing *command and control* regulations, i.e. as part of *policy mix*.
- CAs target at achieving site-specific objectives in water catchments at minimum cost.
- CAs have met environmental objectives, however, their environmental effectiveness will become apparent in subsequent years.
- The economic benefits of CAs have been proved to be higher than their costs and less costly than alternative solutions.
- Parties involved in the CAs are better-off (win-win situation).
- Voluntary agreements are on their own innovative institutional arrangements. However, Payments for environmental services (PES) are difficult to implement in societies with advanced water regulations and institutions.
- CAs can keep transaction costs at a minimum.
- Trust, knowledge and public & stakeholder participation are key factors for the successful selection, design and implementation of a cooperative agreement.
- Clearly defined targets, robust monitoring system and control of the site-specific objectives are of paramount importance as it may give a chance to more ambitious agreements.

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