



Evaluating Economic Policy Instruments for
Sustainable Water Management in Europe

WP3 EX-POST Case studies
Financial compensation for environmental
services: the case of Evian Natural
Mineral Water

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Executive Summary

1.1 Definition of the analysed EPI and purpose

The Evian Company initiated in the late eighties a promising multisectorial water protection policy tackling wastewater collection and treatment, town and country planning, wetland protection, tourism, biodiversity and agriculture. This policy is still followed today. It relies on the association for the protection of the catchment area of Evian mineral water (APIEME), an association which comprises 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.

Its objective is to protect the Evian Natural Mineral Water (NMW) by promoting a sustainable development of its catchment area. The main principles of this participative protection policy are: i) favouring both the protection of the NMW resource and the local development; ii) involvement of collective projects only; iii) reliance on a strong technical support from scientists.

The present case study assessment focuses on the APIEME “agricultural economic instrument” policy which can be classified as a scheme of payment for ecosystem services (voluntary agreement between farmers and one industry), hereinafter referred to as the economic policy instrument (EPI). It is oriented towards the development of a modern environmentally friendly agriculture focusing on dairy production linked to cheese making under the protected designation of origin (PDO). Basically, the Evian Company help financing projects to maintain a land use on the catchment area presumed to preserve the quality of the Evian Natural Mineral Water.

Twenty years ago, two long-term evolutions could have affected this area and the NMW, even though the NMW was not reported to be threatened by any kind of pollution at the time the EPI was introduced: i) the evolution of agricultural practices from traditional dairy farming to more intensive agricultural practices, and ii) the drive to open up the area by improving links to other regions in France and to Switzerland.

We could have assessed the whole APIEME protection policy through the same approach than the EPI considering all assessment criteria. However, we chose to focus the analysis on agriculture, as considering the policy of the APIEME during the assessment might have included too many measures (mix of regulatory approaches and economic instruments) to conduct the analysis properly considering the whole policy of the APIEME.





This policy has not been assessed before and literature is relatively scarce except for hydrogeological studies. In addition, outcomes could not always be assessed with certainty due, amongst others, to the hydrogeological context of the aquifer as infiltration from catchment to spring takes more than 20 years on average. However, the involvement of local and strategic stakeholders and its potential of extrapolation to other EU areas (WFD, drinking water catchment protection, etc.) or environment protection sectors clearly justified this choice.

1.2 Introduction

Evian is one of the major brands of bottled NMW originating from preserved areas in France. Two specific zones are considered for this case study: the Evian spring area with a surface of 16 km², where the water outflows from the mineral aquifer, and the Evian catchment area, with a surface of about 35 km².

Land use in the catchment area is shared between agriculture (60 %; among which 51 % of meadows and around 9 % of crops represented by local market gardening, orchards and some maize for the cattle), woodland (20 %), wetlands (10 %) and 10 % of villages (Buric et al., 2011). The main economic activity in the impluvium area is thus agriculture, represented by dairy cow breeding for cheese production, which form part of a typical local PDO cheese making (*Abondance* and *Reblochon*).

The EPI was designed to maintain or increase farmers' income by reinforcing their link to the PDO system through collective projects funded by the APIEME. This redistribution of means from the beneficiaries of the NMW (the Evian Company and the villages located in the spring area) to the villages located in the catchment area also contributes to maintain traditional landscape and to preserve biodiversity through the type of agriculture it promotes.

1.3 Legislative setting and economic background

In France, the legislation for NMW is very strict: the purity, composition, temperature and other essential characteristics of natural mineral water must remain stable. The right to use the "Natural Mineral Water" label would be lost if mineral concentration was to change. In addition, NMW may not be the subject of any treatment except elimination of some natural unstable elements.

The Evian Company designed a participative policy which relies on voluntary actions (no legal obligation) to reinforce the natural protection of the aquifer. For each project, an agreement was signed by the APIEME and the project owner designed by the Gavot Plateau farmers' association (SICA). For instance, subsidies were targeting small to medium size farms, helping them to follow the European sanitary norms evolution and to favour close loops and a higher income.





In addition to these actions, a charter of good practises was developed with the contribution of the French National Institute for Agricultural Research (INRA), the SICA, farmers and the APIEME. Some of these subsidies were depending on the signature of this charter.

1.4 Brief description of results and impacts of the proposed EPI

Estimated TCs are relatively high in comparison to the cost of the EPI, both ex-ante fixed costs and ex-post variable costs. However, it appears to be a condition for the success of the EPI anticipated by the Evian Company before it implemented it. First, the partnership developed between the Evian Company and INRA in 1990 contributed to get a better understanding of the impluvium area in terms of ecological functioning and the diversity of practises and potential pressures. Thus it played a strong role in determining the preventive approach and actions as Evian did not have competencies in agriculture. The diagnostic helped to reduce asymmetric information while the results were shared with farmers. Involving INRA in the process finally contributed to reinforce reciprocal trust between the Evian Company and farmers.

Second, the creation of the APIEME allowed parties to build shared ownership on the issues and to take part in the decision making. It also gave space to discussion and negotiation by externalising the initiative. In addition, the creation of the SICA helped harmonizing the request of the farmers and contributed to reduce TCs, while the Chamber of agriculture provides technical support.

Finally, the delivery mechanism the Evian Company chose through the APIEME both contributed to the high level of TCs and helped reducing them. Indeed, the EPI allows flexibility (extension of the duration of subsidies) and requires regular meetings with stakeholders. But, it also prevents from conflicts and complex legal procedures - both associated with high transaction costs - by trying to reach compromises between the expectations of the Evian Company and the requests of farmers. The EPI has thus been welcomed by most of the stakeholders.

The outcomes of the EPI were more difficult to assess with certainty. First, the hydrogeological context of the aquifer made it difficult to assess properly final environmental outcomes: behavioural changes of stakeholders on the catchment area due to the EPI will not be reflected in the NMW quality before 2012. In addition, there was no specific quantified objective for agriculture. Finally the EPI has been performed in a context of multi-sectoral policies and regulatory instruments (policy mix) and specific outcomes of the EPI are difficult to isolate.

The design of the EPI directly contributes to the redistribution of means from the beneficiaries of the NMW (the Evian Company and the villages located in the spring area) to the villages located in the impluvium area. Even though this contribution appears to be low (less than EUR 35 per hectare for agriculture) in comparison to the





profits of the Evian Company or the tax revenues, the collective projects which were funded through the APIEME helped developing a modern environmentally friendly agriculture associated to the PDO system. It also contributed to limit the increase of maize surface and even reduces it in the catchment area, whereas the baseline scenario predicted an increase.

In addition, the EPI contributed to maintain traditional landscape and to preserve biodiversity through the type of agriculture it promotes. The use of pesticides has been reduced and the farmers were encouraged through the EPI not to use atrazine since 1994 while it was prohibited in France in 2003. Benefits from the EPI are difficult to measure but they might have been higher than the costs if we consider the EPI has a multiplier effect.

However, the number of farms continued to decrease in the catchment area during the past three decades and the tendency of intensification was confirmed in 2002 compared to the diagnostic INRA realised in 1993.

1.5 Conclusions and lessons learnt

On the whole, gathering all stakeholders and sharing knowledge and point of views to define and fund collective projects ahead of its time can be considered as a successful EPI, which contributes both to preserve the stability of the Evian NMW and to develop a modern environmentally friendly agriculture. Nevertheless, both this decrease and intensification are most surely lower than expected without the EPI.

The financial dimension may not be the most important one for explaining the success of the EPI as it remains relatively low in comparison to the benefits. Indeed, a good understanding of the situation helped defining relevant actions at the right scale. Technical support from INRA to the APIEME and from the Chamber of agriculture to farmers thus contributed to the success of the design and implementation of the EPI. The approach used to give room for discussion reinforced trust between parties. These three dimensions (financial, technical and social) and their relative importance in the process are thus considered as key factors to explain the success of the PES scheme.

The following criteria were identified as key factors for the success of the EPI: i) the dynamism and involvement of stakeholders; ii) the relatively small size of the territory to be protected; and iii) the quality oriented approach promoted by the APIEME and the SICA.





Table of Contents

Executive Summary	i
1.1 Definition of the analysed EPI and purpose	i
1.2 Introduction	ii
1.3 Legislative setting and economic background	ii
1.4 Brief description of results and impacts of the proposed EPI	iii
1.5 Conclusions and lessons learnt	iv
1 EPI Background	1
2 Characterisation of the case study area	4
3 Assessment Criteria	7
3.1 Environmental outcomes	7
3.2 Economic Assessment Criteria	11
3.3 Distributional Effects and Social Equity	15
3.4 Institutions	1
3.5 Policy Implementability	3
3.6 Transaction Costs	1
3.7 Uncertainty	1
4 Conclusions	1
4.1 Lessons learned	2
4.2 Enabling / Disabling Factors	3
5 References	1
6 Annex I: Pedigree tables	3
7 Annex II: Contributors to the report / Acknowledgments	1





1 EPI Background

In order to protect its Natural Mineral Water, the Evian bottling company designed in the late eighties a multisectorial participative water protection policy that included wastewater collection and treatment, town and country planning, wetland protection, tourism, biodiversity, and agriculture. Taking into account all these dimensions and the regulatory framework, the analysis will focus on voluntary agreements between the Evian Company and farmers, and analyse how this instrument performs as a payment scheme for ecosystem services.

What was the baseline before the EPI was implemented

The approximately 16 km² Evian spring area, where the Natural Mineral Water (NMW) outflows from the mineral aquifer, benefits from a very effective natural geological protection with a several decametres thick impermeable *moraine* (till, drift) layer that prevents any infiltration from surface water. In the spring area, the mineral aquifer thus benefits from a 3-fold protection: (i) natural geological protection, (ii) legal protection (the “Declaration of Public Interest” – DIP) that is mostly conceived to maintain the integrity of the impermeable cover of the aquifer, and (iii) technical protection (design and protection of the spring catchwork such as using stainless steel pipes, high quality grouting, but also protection at the surface: close buildings above the spring, alarms, etc.).

Springs under the Natural Mineral Waters designation must strictly maintain the stability of their mineral content (which is different from the drinking water or spring water labels as their mineral content can vary with time). No treatment of the water to be bottled is allowed under this designation. This stability relies naturally (i) on the hydrogeological inertia of the aquifer (in Evian, the mean transit time of the infiltrated water is more than 20 years) and (ii) on the natural protection of the aquifer (land cover, geo-eupuration in soils, wetlands, filtration within the aquifer, etc.).

However, the aforementioned three-fold protection does not protect the *impluvium* (watershed/catchment) area (about 35 km²) where rain- and snowmelt-water infiltrate whereas the high quality of the NMW was interpreted amongst others as the result of harmless traditional agricultural practices. Two long-term evolutions might have affected this area and the natural mineral water resource associated with it:

- the evolution of agricultural practices. In 1990, 80 % of the farms received a direct subsidy from the European Common Agricultural Policy (CAP) of up to EUR 4 000 on average which played an increasing role in the make-up of farm income (half of the income in mountain farming) (Bazin, 1994). But the Common Agricultural Policy did not benefit small and large-size farms in the same way and small scale hill farming might not have been profitable enough to keep their traditional practices and develop modern environmentally friendly practices. For instance, regrouping of land would have become an





option. With the removal of hedges, farmers would have used more fertilizers and pesticides;

- the drive to open up the Chablais territory¹ by linking it better to other regions in France and in Switzerland. At that time, it was question of building a new motorway which could have impacted the impluvium area directly by its position and indirectly by increasing tourism activity and urbanization. To this day discussions are ongoing on how to develop a multimodal transport scheme for this region.

More intensive agriculture and urban development might have become real threats for the Natural Mineral Water if preventive protection policies were not implemented in the early nineties (quantity impacts from soil impermeabilization, and quality ones). However, it is unlikely that water quality would have been left to deteriorate given the large economic interests of the Evian bottling Company in the area and protective measures would have probably been introduced. Nonetheless such actions would have been probably developed at higher costs, both in terms of direct investment and transaction costs.

Key features of the EPI

In the late 1980s and despite the fact that Evian Natural Mineral Water was not reported to be threatened by any kind of pollution, the Evian bottling company directors decided to develop a new water protection policy based on downstream-upstream relationships and on voluntary agreements.

These policies were thus launched almost 20 years ago (in 1992) when the association for the protection of the catchment area of Evian mineral water (APIEME)² was created: an association gathering the villages from the spring area that benefit from a government tax³ on the bottled water, the villages from the catchment area and the Evian company. The former (1/3, less than 5 % of their legal tax) and the latter (2/3) finance this association that works as a “*democratic water parliament*”⁴ and which provides funds to projects to both protect the water resources and to favour local development, particularly on the impluvium area (Buric et al., 2011).

¹ The Chablais area is an historic entity larger than the case study area (the spring and impluvium area). It hosts 62 villages and cities and 106 000 inhabitants, with an average of population density equal to 122 inhabitants per km². The Chablais area extends also in Switzerland.

² “*Association pour la Protection de l'Impluvium de l'Eau Minérale d'Evian*”

³ The French still active XIXth century Regulation on NMW that instituted a specific NMW tax (“*taxe de col*” or neck-fee) on the bottled NMW. This tax benefits to the municipalities where the NMW spring is emerging (Evian, Publier, Neuvécelle, and Maxilly in the case of Evian) but not to the municipalities belonging to the catchment area of the NMW.

⁴ More details and analysis of the role of this organization will be provided in the next sections.





The main principles of these participative protection policies relying on voluntary actions (no legal obligation) were and continue to be the following:

- the protection policies must both favour the protection of the NMW resource and the local development (economic and well-being aspects). They must, as far as possible, rely on win-win actions and downstream-upstream economical redistribution processes (that can be interpreted as payments for ecosystem services);
- the Evian bottling company does not undertake any land acquisition or direct subsidy such as hectare allowances for farmers. The protection policies only involve collective projects;
- the protection policies rely on a strong technical support from scientists from the Evian Company but also from external research or consultant inputs when necessary;
- the protection policies are multi-sectorial: agriculture, but also forest, villages (waste waters, road salting, urbanization...), natural spaces, etc.

The APIEME “agricultural economic instrument” policy is mainly oriented towards the development of a modern environmentally friendly agriculture, mainly aimed at dairy production and linked to the production of cheese under protected designation of origin (PDO). It is translated in the ground by limiting the number of dairy cows grazing on the impluvium and which are only fed by local pasture (actions are detailed in Chapter 3.1). These actions are seen as having prevented any shifting to intensive, highly polluting cattle ranching activities.

The policy of the APIEME has not been described as an economic policy instrument (EPI) in the literature yet. But it is one of the rare real cases of water-related payments for ecosystem services (PES) schemes in France (see illustration box below). Perrot-Maître (2006) referred to a similar case of PES involving the private sector: the Vittel (Nestlé Waters) policy for preserving the quality of their mineral water.

Definition of Payment for Ecosystem Services

Wunder (2005) defined PES through five criteria as “(i) voluntary transaction where (ii) a well-defined environmental service (or a land use likely to secure that service) (iii) is being “bought” by a service buyer (iv) from a service provider”. The fifth criteria defining a PES scheme refers to conditionality where the service provider secures service provision, this is PES scheme need to be truly contingent upon the service being continuously provided.

Thus both cases are PES schemes but with different delivery mechanisms (see section 3.5): Vittel undertakes land acquisition and direct compensation to farmers while Evian protection policies involve collective projects funded by the Evian Company and the cities from the spring area.



Preserving natural water quality by maintaining traditional agricultural practices that have been identified as being compatible is the main objective of the EPI. It will be analysed in the following chapters in a context of multi-sectoral policies and regulatory instruments (policy mix).

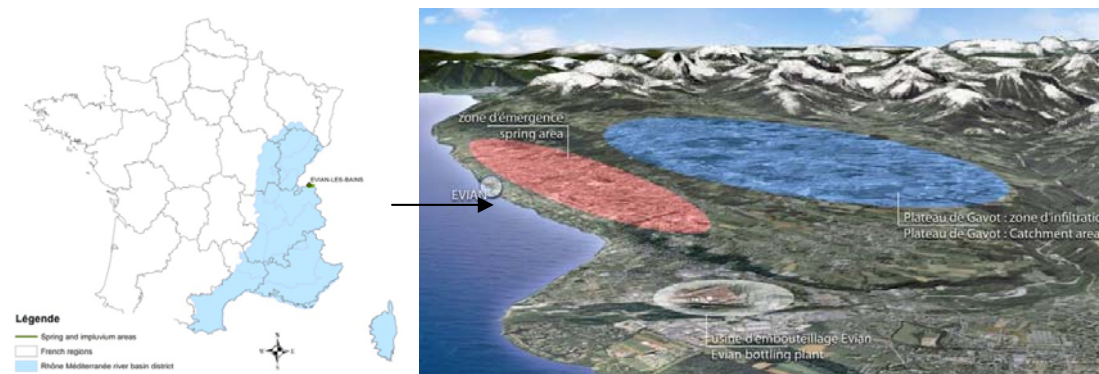
2 Characterisation of the case study area

Geographical characterisation maps

Evian is one of the major brands of bottled Natural Mineral Water originating from preserved areas in France. The city of Evian-les-Bains is located on the banks of Lake Lemman (or Lake Geneva) in the north-east of the Rhône-Méditerranée and Corse River basin district (Haute Savoie, French department in the Rhône-Alpes Region).

Two specific zones are considered for this case study (Map 2.1):

- Evian spring area (in red on the right hand map), where the water outflows from the mineral aquifer, which surface is 16 km² (1 600 ha). Villages located in the spring area are Evian-les-Bains, Publier, Maxilly and Neuvecelle; and
- Evian catchment area (in blue on the right hand map), called “*impluvium area*”, which surface is about 35 km² (3 500 ha). Villages located in this area are Saint-Paul-en-Chablais, Larringes, Champanges, Féternes, Vinzier, Lugin, Marin, Bernex and Thollon-les-Mémises.



Map 2.1 - Location of Evian spring and impluvium areas

Source: Danone research team (2011)

Environmental characterisation

The catchment area is located on the Gavot Plateau, at an elevation ranging from 800 to 1 200 m and exhibits a middle mountain climate. In turn, the spring area is located at an elevation around 400 m and benefits from a more temperate climate influenced by the Lake Geneva.



Land use in the catchment area is shared between agriculture (60 %; among which 51 % of meadows and around 9 % of crops represented by local market gardening, orchards and some maize for the cattle), woodland (20 %), wetlands (10 %) and 10 % of urbanised areas (Buric et al., 2011).

The Gavot Plateau wetlands were designated as a Ramsar⁵ site in 2008 (list of wetlands of international importance). The site (3275 hectares) is composed of seasonal and permanent freshwater marshes, forested and non-forested peatlands, rivers and streams. It supports a large number of species (particularly flora), and provides among others an important habitat for invertebrates and butterflies⁶. In addition, these wetlands play an important role for the surface waters quality filtering and denitrifying rain- and runoff-water and indirectly contributing to the purity of Evian-les-Bains NMW. Urban development and inappropriate agricultural practices were identified as possible threats to the hydrological balance conservation of the site.

The average annual precipitation in this area is around 1 100 millimetres per year at 800 m and increase with altitude (while national average is 770 millimetres per year). On average the region gets 1 815 hours of sunshine a year compared to national average of 1 973 hours per year. As such, this climate is a major constraint with regard to the agricultural activities (Buric et al., 2011).

Due to a particular geological configuration, the water of Evian is well protected in a confined (artesian) aquifer. Rain- and snowmelt-water infiltrates on the 35 km² impluvium area and flows to the spring through first a multilayer quite low hydraulic conductivity system (boulder clay vs. sands and gravels), during more than 20 years, giving to the water of Evian its particular composition (minerals) by water-rock interactions, and second, in the last part of the NMW transit, through high permeability sands.

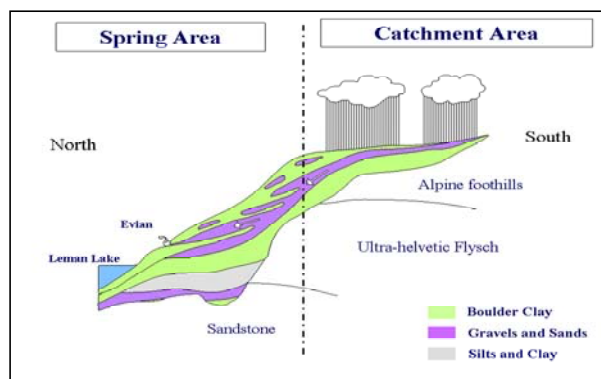


Figure 2.1 - Artesian aquifer of Evian

Source: Bligny, 2006

⁵ The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. <http://www.ramsar.org/>

⁶ Fiche descriptive sur les zones humides RAMSAR, version 2006-2008 <http://www.wetlands.org/reports/ris/3FR031-RIS2008.pdf>





Monitoring of the resource shows a sustainable water management from a quantitative point of view. Hydrodynamic modelling is being developed to refine these analysis and results and, among others, assess potential impacts of climate change. No other activities than Evian NMW production are abstracting water from this aquifer.

In addition to the geological natural protection, water from Evian, as a Natural Mineral Water (NMW), is defined by (1) its groundwater origin, (2) its purity and the stability of its mineral content and (3) the absence of any chemical treatment, and of any additive, disinfectant or preservative. Consequently there is no qualitative issue for this resource: concentration of nitrate is stable around 3.7 milligrams per liter while the maximum allowed nitrate concentration in France is 10 mg/l for infants, 15 mg/l for mineral water and 50mg/l for tap water; and no traces of pesticides were ever found (concentration are below the analytical detection thresholds); more generally, no traces of organics, mineral or biological contaminants were ever reported.

Economic characterisation

The population in the area is about 17 000 inhabitants (75 % of them are located in the spring area with a population density around 600 inhabitants per km² while it is around 100 inhabitants per km² for the impluvium area).

As both areas are not administrative divisions, specific economic information is not directly available for each of them. However, the impluvium area was indeed defined in 1992 based on available hydrogeologic information and political negotiation. Thus in the following chapters we might refer to:

- the 13 villages of Evian spring and impluvium areas: administrative and physical boundaries do not match exactly, but water management and Evian's water protection policies will be managed at this scale (28 232 inhabitants and around 211 inhabitants per km²);
- the Community of cities of Evian (called "pays d'Evian"): 16 villages are located in this area, representing 31 028 inhabitants. It includes all spring and impluvium villages plus three villages.

The Haute-Savoie department is amongst the richest department of France with a GDP for inhabitants of EUR 26 935 in 2009 (compared to EUR 27 397 on average for France and EUR 24 301 for the provinces, excluding the Paris area). Net income declared per household is higher in the Evian spring area (EUR 29 217) than in the impluvium area (EUR 26 355), meaning that the former is wealthier. But 21 % of people living in this area work in a region outside France (mainly in Switzerland). Net income looks similar in the Evian canton and in the Haute-Savoie department, around EUR 27 000 (source: INSEE).

The main economic activity in the impluvium area is agriculture, represented by dairy cow breeding for a typical local protected designation of origin (PDO) cheese





production (*Abondance* and *Reblochon*⁷). 55 farms, mainly small to medium-size farms, are located on this area covering 2 100 hectares of farm land (Buric et al., 2011). There are 163 farmers in the pays d'Evian, representing 0.7 % of total the population of 15 years old and over.

The Evian bottling plant is located in Amphion-les-Bains (Publier commune), next to Evian-les Bains. It constitutes one of the most important plants of its kind in the world, producing 1 500 million litres per year (2008). Evian sells in France and also, for more than half of the volumes, worldwide in about 130 countries. Evian is owned by Danone Group a multinational company which also owns *Volvic*, *Badoit* and *La Salvetat* Natural Mineral Water brands in France, and several other springs in the world. In France, more than 1 770 jobs are directly linked to the Evian Natural Mineral Water (over the 10 000 jobs that are linked to Natural Mineral Water in France) and indirect jobs would be three times more (around 30 000 jobs in France) (CSEM, 2007).

3 Assessment Criteria

3.1 Environmental outcomes

Environmental outcomes are difficult to assess in a policy-mix and long term preventive policy context. Before the APIEME was created and before actions aiming at maintaining traditional agricultural practices were developed, the quality of Evian Natural Mineral Water was excellent and monitoring did not report any change. However, Evian's preservation policy involves changes in farming practices and reduces pressures on the impluvium.

Collective projects and objectives

The main APIEME's projects in the field of agriculture in line with recommendations made by the French National Institute for Agricultural Research (INRA) in 1994 were the following (APIEME, pers. comm.; APIEME, 1992; Buric et al., 2011):

- subsidies to comply with standards of livestock buildings. In line with a French regulation⁸ defining standards to be complied with by the end of 2000, the EPI focused on i) impermeabilization and coverage with a roof of manure farm dunghills and ii) increase storage facilities. These subsidies aimed at both protecting the environment (by preserving surface and groundwater from point source pollution) and favouring agriculture by keeping this natu-

⁷ Annual production is around 1 500 tonnes of *Abondance* cheese and 15 000 tonnes of *Reblochon* cheese, while 750 tonnes of these PDO cheese are produced with milk coming from the impluvium area.

⁸ Water law of the 3rd of January 1992





- ral fertilizer for its spreading on the pastures during the spring and summer time (less mineral fertilizers costs for the farmer);
- an additional subsidy was defined in the same context for dairy farms to comply with standards for dairy production facilities;
- subsidies to help renovating and building cooperative dairies specialised in cheese production. They favoured milk processing operations and closed loops in order to maintain traditional farms and increase farmers' incomes;
- smaller projects deal with the prevention of any leakage of the pesticides spread on the few maize plots of the plateau. Technical studies implemented with the farmers allowed elaborating an adapted methodology. The resulting protocol does not ban pesticide use (the atrazine was substituted by other pesticides), and helps farmers to adopt environmentally friendly practices (shallow ploughing between the maize rows and light herbicide application on the rows). A new manure management plan was also designed in order to avoid the excess of fertilizer on specific plots;
- finally, technical support from the Chamber of agriculture was planned with experimental sites.

For each project, an agreement was signed by the APIEME and the project owner designed by the Gavot Plateau farmers' association (SICA). In addition to these actions, a charter of good practises was developed with the contribution of INRA, the SICA, farmers and the APIEME. Some of these subsidies were depending on the signature of this charter.

Effective change of practices and reduction of potential pressures on groundwater

Interviews with experts and the diagnostic of INRA (Christofini et al., 1994) indicated that, in the absence of EPI:

- agriculture may have continued its intensification and specialisation;
- the surface of maize in the impluvium area would have increased;
- the number of farmers would have decreased;
- milk production would have partly switched from products of quality (milk used for the production of PDO cheese) to industrial production (selling milk to cooperatives located in the plain).

From 1996 to 1998, almost all farmers located in the catchment area signed the charter of good practices (49/55) indicating a potential reduction of pressures. The remaining six farmers benefited from at least one of the projects of the APIEME in the field of agriculture. But they were not asked to sign the charter of good practices.

Comparing current data with information gathered by INRA (Christofini et al., 1994) will not show anything because the delineation of the area has changed and the methodology used by the research team in 1994 was more precise than what is done for agricultural census. In addition to this, the last social census for agricultural ac-



tivities was implemented recently in France and results are not available yet at the scale of cities. The last one dates from 2000.

However, the APIEME realised an inventory in 2002 with approximately the same methodology and typology than INRA (Christofini et al., 1994). There were 71 farms (livestock farming, mostly dairying, including part-time farmers) in the area instead of 100 in 1992 (also including part-time farmers), that is a decrease of almost 30% within 10 (55 farms) years. However, the number of professional farmers remained almost unchanged during the last 20 years (Buric et al., 2011).

The dairy farms' production was dedicated to the production of PDO cheese (*Reblochon* and *Abondance*), that is around 7.7 million litres of milk (about 770 tonnes of cheese) per year (LeHec, 2002) instead of 7.2 million litres of milk in 1993 (Christofini et al., 1994). In general, the dairy production is based on maize, which is considered as an important factor of nitrates increase (Perrot-Maitre and Davis, 2001). But the situation is different for the Gavot Plateau due to the regulation associated with the French PDO system. Developing modern environmentally friendly agriculture associated to the PDO system allowed to limit the increase of maize surface and even reduce maize surface in the catchment area (see figure 3.1), at least for the ten-year period considered (APIEME, pers. comm.).

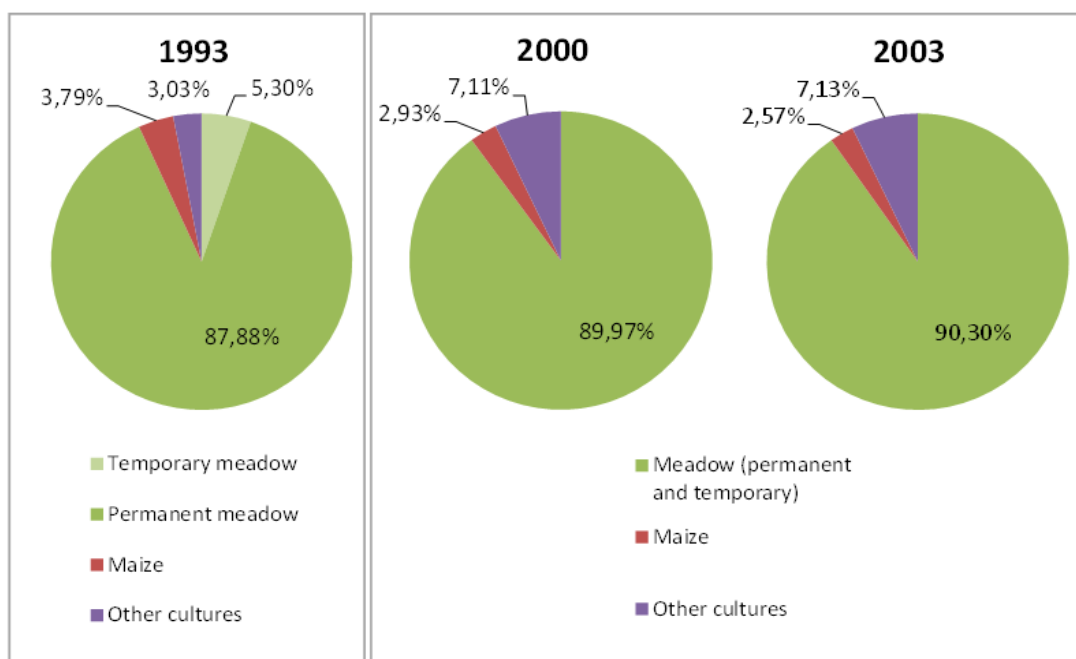


Figure 3.1 – Evolution of agricultural surfaces in the catchment area

Source: Author, based on INRA (1994) and APIEME (pers. comm.)

The APIEME also analysed the evolution of the diversity of farms from 1993 to 2002. New types of farms appeared since the survey undertaken by INRA (Christofini et





al., 1994) and farms tend to be more intensive in 2002 than ten years before. This tendency seems to be linked to the dynamic of the agricultural sector in the area: indeed, fifteen young farmers succeeded their parents in their activity (APIEME, pers. comm.). The objective of developing modern agriculture on the catchment area is thus partially fulfilled. Furthermore, farms should be less pollutant in average than before due to compliance with standards and new practices associated with the character of good practices.

The Gavot Plateau surface and shallow aquifers water observatory should help understanding the efficiency of new agricultural practices. But information was not available in time for the assessment.

Monitoring changes in water status and assumptions on EPI outcome

In line with European and French legislations and to maintain the NMW business, Danone Waters carries out around 750 test per year of water physico-chemical quality, microbiological analyses at source and tests of water quality on final products. All in all, thousands of tests per year are carried out.

If the APIEME was not created and the EPI not implemented (baseline scenario), the impacts of changes of agricultural practices observed by INRA (Christofini et al., 1994) early nineties would only start being measured today or in a few years considering the 20-year transit time of the infiltration. Thus it is not possible to assess the EPI through the monitoring of concentrations of pollutants in the NMW. By the way, these figures would not show any changes. Otherwise, Evian would have lost the NMW label.

In addition, the EPI is implemented in a policy mix context. Thus, it would be complex to isolate the impacts of the EPI on NMW quality. For instance, the APIEME contributed to (Buric et al., 2011):

- the improvement in the waste water network and treatment devices in the late eighties and the nineties. This action contributes to the reduction of pressures in the impluvium (nitrates, phosphorus and potentially micropollutants). APIEME's funding, added to the existing national and regional funding, allowed tackling wastewater' stream contamination issues much faster than in the other villages of the neighbourhood;
- preserve the Gavot Plateau wetlands, which covers about 10% of the surface of the impluvium. The wetlands contribute to maintain the surface water quality (Dorioz et al., 1996) and also constitute a biodiversity reserve of regional importance recognized in 2008 (this area was labeled RAMSAR at that time).

Landscape and biodiversity as co-benefits of the EPI

According to the definition of PES, Evian "purchases" from farmers a specific land use likely to secure the provision of natural mineral water - which is the main objec-





tive of the economic policy instrument. But traditional farming also contributes to maintain traditional landscape and to preserve biodiversity. This implies an increased flow of environmental services and in particular cultural ecosystem services. The APIEME launched in 2011 a specific study dealing with biodiversity in order to assess the benefits/impacts regarding biodiversity of all its policies and, if necessary to revise these policies.

Cultural ecosystem services refer to the aesthetic, spiritual, recreational, educational and other non-material benefits that humans obtain from contact with ecosystems (MA, 2005). Although these benefits had not been assessed quantitatively (neither in ecological nor in monetary terms), the TEEB (2010) refers to the social value of agricultural landscapes in Europe considering three proxies representative of societies' preferences: (i) protected agricultural sites, (ii) rural tourism and (iii) presence of labeled products. All of these variables are relevant for the impluvium area and have been impacted by the EPI.

3.2 Economic Assessment Criteria

When facing a situation of pressure or pollution, natural mineral water bottlers have five alternative options (Depres et al., 2008):

- doing nothing and relying only on natural protection;
- forcing polluters to change their practices relying on legal or regulatory actions;
- relocating their activity by choosing new and non-contaminated resources;
- buying all lands around their impluvium;
- achieving a contractual arrangement or a voluntary agreement with polluters.

When facing this choice in the early nineties, the Evian bottling Company was in the comfortable situation to have time: the water resource was not reported to be threatened, except by some chloride ion (Cl⁻) but such pressures was considered to be very limited. Chloride is non-toxic and occurs naturally in the environment (rainfall) but might have increased due to the intensification of agriculture. However, managers of the Evian Company understood that agricultural practices were evolving from traditional dairy cow breeding to a more intensive use of maize on the impluvium area. Furthermore, aspiration of better linking up the territory to Switzerland were also emerging: constructing a motorway on the impluvium area or rural preserved area to a more urban area would have affected at least the brand image of quality and purity, if not its content.

At that time, no specific study was undertaken to quantitatively define the least-cost alternative or to compare costs to benefits in order to support decision-making. However, the evolution in land use became rapidly obvious to the managers of Evian and they identified the need to reconcile the development of villages from the source and impluvium areas by integrating them into the decision-making process. The





mean chosen was to design win-win actions based on voluntary agreement and downstream-upstream financial redistribution that would maximise economic, environmental and social benefits.

Looking back, and in the context of this ex-post analysis, the following other options cannot be identified as feasible, can be considered as too risky or very expensive:

- the potential loss from doing nothing might have been too large in the long term. The probability was (and still is) uncertain because the functioning of the impluvium in term of water purification is not well known and transit time of the infiltrated water is long. But a change in the quality of water would have been disastrous both for the Evian Company and its employment area. Indeed recognised change in water quality would lead to the loss of the precious NMW designation. But even doubts concerning water quality might affect the company as the market for bottled water is very sensitive to water quality and consumer may switch to a rival product;
- the same occurs for the third alternative: choosing a new and non-contaminated resources would have led to a huge economic loss as Evian Natural Mineral Water is recognised worldwide and Natural Mineral Water cannot come from different springs and be sold under the same umbrella brand in France. Relocation was unrealistic for a brand such as Evian as it would require changing the brand's name and lose the brand image of quality attached to its location;
- using legal or regulatory enforcement to make polluters change their practices was not feasible for farmers as these latter were compliant with the law and regulations. The standards for water quality intended to human consumption are established by European Directives and translated in French laws. Regulatory threshold set by the Directives is much higher than the concentrations measured in the water of Evian (which allow for instance 50 mg/l of nitrate concentration for tap water and 10 mg/l for mineral water for infant feeding while concentration of nitrate is stable around 3.7 mg/l for Evian). In addition, regulatory enforcement has shown its limits: it was not effective in the Gavot Plateau when considering other sources of pollution such as the improvement of the waste water network and treatment devices; it was not effective either in changing agricultural practices affecting water bodies where nitrate is really an issue, causing the overgrowth of green algae in French Brittany for instance. Finally, considering the extension of the Declaration of Public Interest to the impluvium area won't have focused the right pressures and won't have led to any of the needed changes;
- finally, buying all (or part of) the lands of the impluvium area could have been an option but it was not realistic at that time for economic, legal and social reasons. The price of land in this area is quite high due to the proximity to the Lemman Lake and the Switzerland. In addition to this financial barrier, national laws prevent the purchase of agricultural lands for non-agricultural



uses. And finally, this policy might have led to social tension weakening the relationship between Evian Company and the local stakeholders.

Costs of the EPI design and implementation

The annual budget of the APIEME is around EUR 700 000. The part dedicated to agricultural actions represent around 13% of this total budget in mean, that is around EUR 85 000 per year and EUR 35 per hectare (considering agricultural surface). The sharing of the budget actions between sectors (urban, agriculture, etc.) and actions within the agricultural sector was decided when the APIEME was created and was respected in the long term (figure 3.2 and 3.3) although the distribution of this money did not respect exactly the planning. Budget forecast defined in the agreement signed by the parties is the following (APIEME, pers. comm.; APIEME, 1992):

- to comply with standards of livestock buildings and to comply with standards of dairy farms: both subsidies were designed for a six-year period from 1996 to 2001 and the total was constrained to a maximum EUR 33 500 yearly contribution from the APIEME;
- to renovate and establish cooperative dairies for cheese production: these subsidies were designed for a fifteen-year period from 1995 to 2009 and they were constrained to a maximum EUR 61 000 yearly contribution from the APIEME;
- to prevent any leakage of the pesticides or fertilizer spread on the few maize plots of the plateau: these projects were designed for five-year period from 1995 to 1999 and they were constrained to a maximum EUR 24 500 yearly contribution from the APIEME;
- technical support from the Chamber of agriculture: the APIEME contributed up to EUR 10 500 yearly to this action.

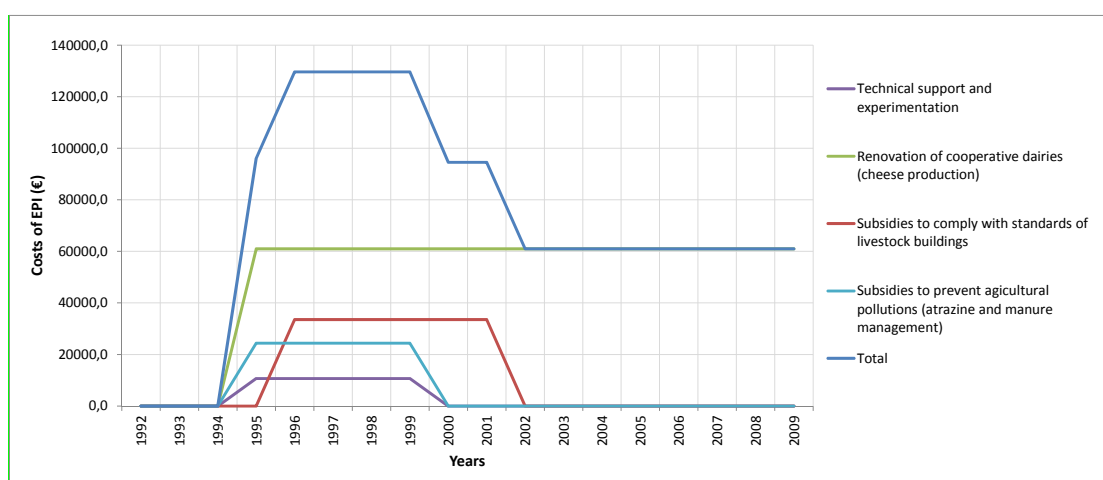


Figure 3.2 – Budget forecast for the EPI

Source: Author, based on Danone information





The effective total budget allocated to actions aiming at developing a modern environmentally friendly agriculture is even higher (more than EUR 1.5 million) than the budget parties agreed on (less than EUR 1.3 million).

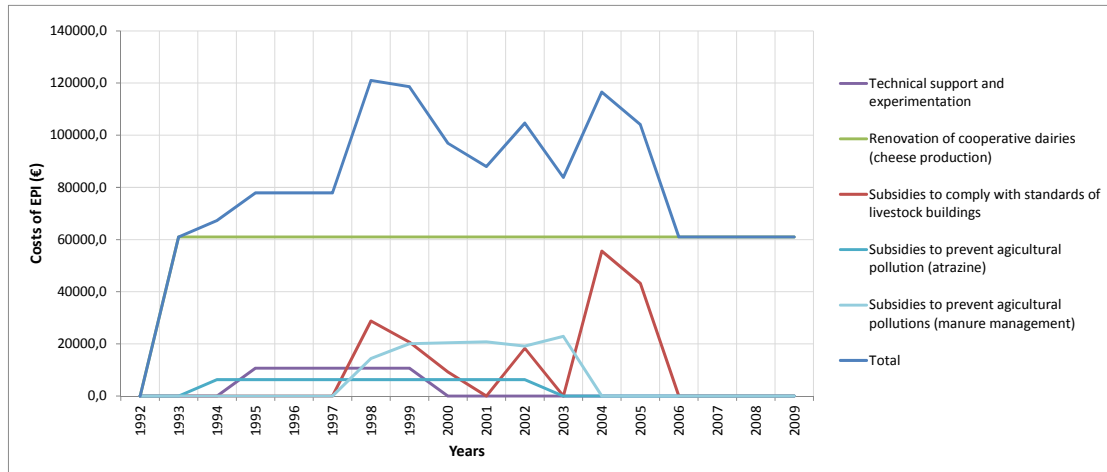


Figure 3.3 – Real budget for the EPI

Source: Author, based on Danone information

Assuming that the share of contributions to the total budget is the same, than shares to the budget of the EPI, most of the contribution comes from the Evian Company (more than two-thirds). Thus the Evian Company and the villages located in the spring area, which are the beneficiaries of the EPI, support the total cost of it. A little part of the total budget of the APIEME comes from subscriptions. It represents EUR 35 000 over the 19-year period of implementation, that is around EUR 170 per year per village. It is possible to conclude that there is no loser in this EPI and that the EPI mainly lead to win-win situations.

Does the EPI provide the right incentives?

Assessing the incentive effect of the EPI is complex as it is composed of various actions focusing different types of farmers. However, as part of the APIEME water protection policy, the EPI seems to provide the right incentives through maintaining traditional and sustainable agriculture practices while contributing to the reduction of pressures on water and increasing biodiversity (reducing both maize surface and the use of pesticides).

The EPI reduced asymmetric information

All stakeholders participated to the design of the EPI. The Evian Company shared the information of the diagnostic undertaken by INRA (Christofini et al., 1994) with farmers. This contributed to reduce asymmetric information as the diagnostic provides information on farmers' incomes depending of the type of farms. On the other hand, information on the Evian Company turnover is public although such information is not detailed





3.3 Distributional Effects and Social Equity

When looking at the wider impacts of the EPI, the main stakeholder groups affected are the farmers and the Evian Company, as well as the local community living in villages located in the catchment area and potential tourists. A wider survey would have been necessary to assess precisely how farmers feel about the EPI, but first indications are presented below. The focus of this chapter will lie on farmers and the Evian Company, but some considerations will first be presented on the other groups.

One of the co-benefits of the EPI should have been the improvement of sustainable tourism in the catchment area. Local initiatives have been reported at the farm level, for instance closing the loop by selling products on farm. However, it is difficult to separate real impacts of EPI from what would have occurred without the EPI considering that this type of activity has increasing recently throughout France.

The same conclusion goes for local community which benefits from the preservation of traditional landscapes. But in the absence of a systematic survey, it is not possible to conclude whether this benefit is greater than the opportunity costs associated with keeping the area relatively more isolated.

Did the EPI affect productive activities?

Regarding how the EPI impacts on farmers' activity (costs, profits, incomes), the first basic impact to be considered should be the redistributive effect of the functioning of the APIEME. Subsidies granted to farmers by the APIEME through the EPI come from the global budget of the APIEME, which is funded by the Evian Company (two-third) and the remaining by the villages located in the spring area. Thus money is redistributed from downstream (the beneficiaries of the EPI) to upstream (the farmers who contribute to maintain the quality of NMW). In addition, the contribution of downstream villages to the APIEME increased in 2001 from 3% to 4% of their tax revenues

This redistribution of money through the EPI compensates additional efforts farmers have to make (increase of production costs), for instance by reducing their use of pesticides. The EPI also helps small farmers to face additional expenses associated with new regulations (around EUR 300 per dairy cow for 16 farms for complying with standards of livestock buildings).

Precise impacts of the EPI on profits and incomes and the distribution of these effects between farms types have not been assessed.

The EPI implementation process provides education

Sharing a common understanding of the "system" through the study of INRA (Christofini et al., 1994) has been one of the co-benefits of the EPI during its design. Then technical support provided by the Chamber of agriculture contributes to im-





prove farmers' education even though heterogeneous distribution could not be addressed without a wider survey.

Staff increases as a result of the implementation of the EPI

Regarding the social outcomes of the EPI, at least a few jobs have been created for the implementation of the EPI. One of the representatives of the Evian Company for the APIEME is full time dedicated to the APIEME. But only a part of this job could be attributed to the EPI (from 10% to 40%). Partnerships with INRA and the Chamber of agriculture also generate one to two full time jobs for a few years.

The EPI also contributes to maintain the number of farms almost unchanged during the last 20 years (Buric et al., 2011). In fact, when considering all farmers including part-time farmers, the number of farms decreased by 30% in 2002 compared to 1993 (APIEME, pers. comm.) but they become more competitive. The actual effect of the EPI in comparison to the counterfactual cannot be assessed, even though the situation may have probably been worse without the EPI.

Political voice of stakeholders

The political voice of farmers has been heard through meeting during the design (surveys amongst other), implementation and operation of the EPI. They have greater say since the creation of the SICA and thus thanks to the implementation of the EPI. However, it is difficult to estimate how great the improvement was.

At the same time, villages located in the catchment area and the Evian Company have both benefited from the creation of the APIEME: at local scale, villages have improved their access to the decision-making process; the Evian Company found a new space for discussion at local scale and reinforced its legitimacy at international scale. However the role of the EPI is not clearly distinguished from the role of the APIEME.

Did social connections and relationships change?

With regards to social relationships, the APIEME, and especially the EPI, contributed to reinforced relationships between the Evian Company and farmers, but also between farmers. The so called "local water parliament" (Buric et al., 2011) as well as regular meetings between farmers, their representatives and the APIEME give room for farmers and villages to express their opinion and reinforce reciprocal trust.





3.4 Institutions

Legislative dimension

The NMW legislation is very strict in Europe and in France. The Council Directive of 1 July 1980 (80/777/EEC) defined the NMW as “microbiologically wholesome water [...] originating in an underground water table or deposit and emerging from a spring tapped at one or more natural or bore exits (annex I)”.

NMW differs from ordinary drinking water (tap water) by i) its nature, which is characterized by its stable mineral content and ii) by its original state. Both characteristics have to be preserved intact because of the underground origin and geological natural protection.

In addition, NMW may not be the subject of any treatment except elimination of natural unstable elements such as iron, manganese under certain conditions (only by authorized physical processes such as filtration or decantation) without altering the composition of the water as regards the essential constituents. This characteristic also distinguishes NMW from ordinary drinking water but not from spring water.

Finally NMW differs from spring water by its stability. The composition, temperature and other essential characteristics of natural mineral water must remain stable (80/777/EEC). The right to use the “Natural Mineral Water” label would be lost if mineral concentration was to change.

A list of requirements is specified in the Council Directive for applying to the NMW label among which requirements for geological and hydrological surveys, requirements for physical, chemical and physico-chemical surveys, and condition for the exploitation of NMW to avoid any possibility of contamination and to preserve the properties of water at source.

Cultural dimension

As mentioned in section 3.2, there is no legal constraint for the Evian bottling company in protecting the NMW and promoting a sustainable land use management on the impluvium area. However, by developing a water protection policy, Danone goes in the direction of the European water policy (the Water Framework Directive) and national water policies⁹ which promote preventive approaches instead of remedial measures in particular for drinking water.

Danone Waters also contributes to promote the use of Economic Policy Instruments such as payment for ecosystem services while France is traditionally a country based on regulation.

⁹ For instance, the law on water and the aquatic environment (LEMA 30-12-06).





Local Institutions

The most embedded institutions relevant for the EPI are found at local level because both the environmental asset (quality of NMW) and the EPI (voluntary agreement between farmers and one industry) are very specific. First, the quality and properties of Evian NMW used to be “miraculous” and “timeless” for consumers and the general public. People generally do not know where the drinking water they receive at their tap is coming from and get a poor understanding of groundwater functioning or problems (Rinaudo, 2008). The case of NMW reinforces this common perception as water emerges from the underground and people can only see the source. Most of the information was confidential in the nineties. One reason for this was the risk of misunderstanding. Communicating about a water quality preservation policy could have been counterproductive in that context. It was thus focused on experts or stakeholders capable of understanding these issues.

In addition, the relationship between the Evian Company and the farmers was complex in the nineties because most of the farmers used to be employed by the company. Thus, people living in the villages located in the catchment area were connected to the people living in the villages located in the source area and to the company. The company was used to negotiate with farmers in particular during the locally well-known strikes. But this link was becoming weak in the nineties as more and more people living in the villages located in the catchment area found jobs in Switzerland and got disconnected from the company. This situation might have made negotiations more complicated because of a loss of reciprocal knowledge, trust and understanding.

In that context, the implementation of the EPI benefited from three types of mediators:

- the SICA created in 1993 actively contributed to the partnership between farmers, the APIEME and the Evian Company. One of its members in particular played an important role and became its president. While he was experiencing the intensification and specialisation of agriculture in the Gavot Plateau and in its own farm, he decided to shift back to traditional farming and to promote products of quality (milk used for the production of PDO cheese and tourism). He fully contributed to the success of the EPI;
- the research team from the National Institute for Agricultural Research (INRA) who helped to switch from “ready-to-use” solutions at plot of land scale to solutions compatible with the maintaining of a traditional and sustainable agricultural based on quality products;
- the APIEME was created in 1992 but the idea of putting stakeholders together to think about a sustainable land management in the catchment area emerged in 1990. This association gathers the villages from the spring area benefiting from a government tax on the bottled water, the villages from the catchment





area, the Evian Company and national public bodies. This institution was one of the most important preconditions to the success of the EPI.

The idea of including the villages of the spring area was to apply the beneficiary-pays principle and increase the fairness of the instrument. Indeed the villages from the spring area benefit from an old French regulation that institutes a specific tax on bottled natural mineral waters such as Evian NMW. Thus the Evian Company gives money to these cities for each bottle of Evian sold while the villages of the catchment area do not receive anything. This specificity of NMW allowed to think about redistribution and made easier negotiation and agreement on the design of the EPI.

3.5 Policy Implementability

Flexibility

The EPI has been designed to be very flexible. First of all, the diagnostic (made by INRA) contributed to take into consideration local particularities, heterogeneous farming and a diversity of pressures. Thus a list of actions was developed considering three types of farms and various scales of action.

The creation of the APIEME, as a neutral organisation, gave space to discussion and negotiation. In particular, it was possible to extend the period of certain subcontracts allowing more farmers to benefit from the financial facilities aiming at complying with the standards of livestock buildings. Certain actions were also adapted considering the evolution of the legislation. The flexibility of the EPI thus contributed to make implementation easier.

The functioning of the APIEME in terms of funding also contributes to more flexibility. Part of the total budget of the APIEME is allocated to agriculture activities (around EUR 85 000 per year). However, the share can be adapted depending on collective projects which emerge: in 2012 a new project should be financed by the APIEME (investment costs only; farmers will pay the operational cost) in order to optimise manure management in association to the construction of a biomethanisation plant¹⁰. To finance this new project, the budget of the APIEME allocated to agriculture may increase up to EUR 200 000.

In some specific cases, the Evian Company can also add money when the annual budget of the APIEME is insufficient compared to the needs. In addition to this, the

¹⁰ The biomethanisation plant will be fed by agricultural waste mainly and by a few other local controlled wastes. It will produce on one hand heat and energy (electricity and gas) for a new building (the Gavot Plateau college gymnasium), and on the other hand natural fertilizer to be spread out on the farmers plots. This project should contribute to optimize fertilisation and reduce pressures on surface water and indirectly NMW: green fertilizer produced by the plant will be spread on all farmers' plots in the catchment area so as to apply the optimal fertilizing level without any risk of nitrogen leaching. It also contributes to develop the area in a sustainable way (production of renewable energy).





APIEME acts like a catalyst: collective projects are developed considering economic, environmental and social dimensions. Other financial sources are then involved to render the project feasible (for instance, villages located on the impluvium, water agencies, etc.).

Public participation

The contribution of stakeholders played an important role during the design and implementation of the EPI. As the instrument relies on voluntary agreements, farmers have been interviewed during the early stage of the design phase to identify which actions would be relevant. In addition to this, discussions and consultations were organized with farmers (the SICA) to negotiate the financial conditions of the contribution of the APIEME and define collective projects without individual contracting. From 2005 to now, regular meetings (from three to six times a year) are organized by the APIEME gathering the SICA, the Chamber of agriculture and two representatives of farmers from each villages (of the catchment area).

Other stakeholder representatives were consulted through the APIEME (villages and the Chamber of agriculture) and decisions were finally taken within the association chaired by the mayor of one of the villages located in the catchment area.

However, the creation of the APIEME was the initiative of the Evian Company, which is part of Danone Waters. It can be considered as the most important driving force behind the whole process and in particular the EPI. Danone Waters established in 23 countries around the World, sells around nineteen billion litres of water per year and bottles of Evian are sold in around 130 countries. Preserving the quality of the Evian NMW is thus a priority for the parent company. Evian's investment in terms of time, money, ideas and technical support seems to be one of the key of the success of the EPI and more generally the success of the APIEME and its projects. The effort made to understand farmers and the traditional agriculture, establish a dialogue with all stakeholders were at least as important as financial contribution and technical support.

Synergies between the EPI and sectoral policies

The EPI was designed to benefit from potential synergies with other policies. For instance, subsidies are allocated to small and medium farms to help them follow the European sanitary norms evolution, particularly for cow milking and milk processing workshops. Such incentives aim at maintaining farmer's activity and income in addition to European subsidies from the Common Agricultural Policy which do not target the smallest farms (Buric et al., 2011).

As shown in table 3.1, the objectives of the EPI are more ambitious than the objectives of EU policies related to water or nature protection and agriculture. However, the EPI is focused on one specific area while EU policies have a wider application.





Table 3.1 – Interactions with different EU policies

EPI-Objective	Protecting the Evian Natural Mineral Water (NMW) by promoting a modern environmentally friendly agriculture	
Other sectoral policies	Objectives of the sectoral policy	Synergies and barriers
Common Agricultural Policy	Promote an agriculture that is competitive on world markets, which respects very strict standards on environment, food safety, and animal welfare, within a framework of a sustainable and dynamic rural economy.	++ The EPI is complementary to European subsidies which do not target the smallest farms.
Water Framework Directive	Reaching good ecological status for all water bodies	0 The EPI and the WFD are not directly related as the former is more specific and restrictive than the latter.
EU Nature Conservation Policy	Ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora	+ No direct interaction. But traditional farming contributes to maintain traditional landscape and to preserve biodiversity (co-benefits).

Note: + represents a positive synergy between the objectives of the EPI and the other policy; 3 levels: + (low positive interaction), ++ (medium), +++ (high positive interaction)
 0 represents no discernible interaction
 - represents a negative effect between the objectives of the EPI and the other policy; 3 levels: - (low negative interaction), -- (medium), --- (high negative interaction)

Synergies with regulation rules can also be stressed while the EPI helps farmers to comply with standards so that they can maintain their traditional activity. Actions are then in line with regulations or even ahead of regulation: for instance, one action of the EPI aimed at reducing the use of pesticides and in particular prevent the use of atrazine. This organic compound was prohibited in France in 2003.

As catalyst, the APIEME may also try to attract funds to implement relevant projects in the catchment area. Most of the APIEME financial contributions are complementary to other subsidies.

3.6 Transaction Costs

Definition of transaction costs in the context of the EPI

No study could be identified which analyses in particular transaction costs (TCs) linked to the design or implementation of this PES Scheme in the available literature. Depres et al. (2008) considered the TCs in a similar case study which looked at the scheme developed for the Vittel NMW. They followed an operational approach referring to the successive phases of an exchange transaction: discovering, negotiating and completing the exchange of an asset. In other words, transaction costs occur during the formulation, the design and the development of the EPI as well as during the implementation and operation of the EPI.





Depres et al. (2008) also emphasized that the analysis of transactions costs through the understanding of bargaining depends on two basic points: first, the precise definition of the asset and then the understanding of the diversity and complexity of the involved parties. In the case of Evian, the protection of the NMW quality depends on land management on the catchment area, that is mainly agricultural practices, urban development, gritting and waste water treatment activities. Thus the Evian Company - considered as a buyer - buys a land use on the impluvium area presumed to preserve the quality of groundwater. But Evian Company had to deal with a diversity of land users.

Stakeholders involved

Two processes have to be considered and distinguished in the analysis: the design and implementation of the multisectoral water policy through the APIEME and the design and implementation of the transactions between the APIEME and the farmers through collective projects. Both are interconnected as the latter is part of the former.

They could have been assessed through the same approach considering all assessment criteria. However, we chose to focus the analysis on agriculture, as considering the whole policy of the APIEME during the assessment might have included a too diverse set of measures (mix of regulatory approaches and economic instruments) to conduct the analysis properly considering the whole policy of the APIEME.

- The APIEME involves the mayor of each village located in the catchment area (9) and in the spring area (4), two representatives of the Evian bottling company (Danone Waters) and one local representative of the French administration: the prefect¹¹. It also interacts with other structures such as the Community of cities of Evian, an intercity to which all municipalities from the spring and the catchment area belong, the Chamber of agriculture of the Haute-Savoie department, research institutes such as INRA or the France's leading public institution in Earth science applications (BRGM), consulting firms and the Gavot Plateau farmers' association (SICA). Although farmers are not participating directly to the functioning of the APIEME by attending the meetings but their interests are defended through professional organisations. In particular the SICA represents all the farmers of the catchment area, that is more than fifty farms.
- In addition to this, specific transactions between farmers and the APIEME required to deal with individual farmers, in particular during the design of the EPI through individual surveys. These surveys were part of the diagnostic undertaken by the INRA. Monitoring of the EPI is mainly done by one of the representative of the Evian Company at the APIEME.

¹¹ The prefect represents the national government at the local level. The prefecture is an administration that belongs to the ministry of the Interior.





Study background of the EPI

The choices of the EPI and its design have not been guided by any models or tools. However two types of studies were undertaken in order to help decision making:

- the first is related to the understanding of the hydrogeological functioning of the system, i.e. understanding where the natural mineral water comes from and how long it does take. These studies were essentials to give a space to the idea of protecting the water resource at the source by defining and delineating the catchment area. But they are not specific to the design of the EPI and will not be considered in the analysis of transaction costs. These studies were implemented at least since the sixties and are still ongoing;
- second, a partnership was developed between the Evian bottling company and a research team from INRA starting in 1990 and ending in 1997. The objective was to get a better understanding of the catchment area in terms of ecological functioning and human activities. The partnership played a strong role in determining the preventive approach and actions as Evian did not have competencies in agriculture and did not know i) which where the most relevant levies to maintain a traditional agriculture in the area and ii) how to reduce pressures.

An interesting part of this partnership was dedicated to make a diagnostic of current activities in the catchment area identifying potential pressures, in particular coming from agricultural practices (Christofini et al., 1994). This diagnostic last two years including a survey of farmers which aim was to develop a typology of farms based on practices and impacts on water quality.

The study undertaken by INRA used a holistic approach dealing with farms at various levels: from a plot of land to the milk industry. Furthermore, it considers both agriculture and also other land uses likely to have an impact on surface water quality and the infiltrated groundwater. Their conclusions indicate the need for a water preservation policy pointing to the fact that pressures existed and were increasing on the catchment area. However, the risks for the NMW were unknown, in particular because of stocking and denitrification phenomena occurring in soil and wetlands.

INRA contributed to understand the functioning of wetlands on the Gavot Plateau in terms of water purification (Dorioz et al., 1996). It played also a mediating role ensuring mutual comprehension and allowing negotiations between the Evian Company and farmers.

Implementation, operation and enforcement

Thanks to the recommendations of INRA (Christofini et al., 1994), it did not take much time to select the EPI (define which will be the projects funded) and implement it. Based on the diagnostic and their experience, the farmers created the SICA to harmonise their requests and put forward feasible measures. They were negotiated





and accepted by the APIEME. As such, both the INRA and the APIEME helped reducing transactions costs during the design and the implementation of the EPI.

Since 2006, from 3 to 6 meetings are organised each year, gathering one representative from the Evian Company, representatives from the SICA and the Chamber of agriculture and two representatives of farmers for each villages located in the impluvium area. These meetings aim at discussing progress, barriers and future initiatives of the EPI. Before 2006, similar meetings were organised but in a less structured and regular way. In addition, one of the representatives of Danone Waters is partly dedicated to the EPI, but the sharing has not been estimated.

The TCs associated to the monitoring and the enforcement (ex-post TCs) are quite low because most of the subsidies are distributed in exchange of invoice. However, transactions costs associated to the charter of good practices are not well defined, but they are probably low, potentially at the expense of the effectiveness of the EPI. Other monitoring costs are partly shared with other actions of the APIEME, reducing their importance for the EPI.

Records of meetings, discussions, and negotiations

The transaction costs reported (Danone Waters, pers. comm.) relates to the creation and functioning of the APIEME and to the initial studies undertook by the INRA. Estimation of individual contribution for meetings and other efforts (expressed in hours) are translated into monetary terms considering individual labour cost.

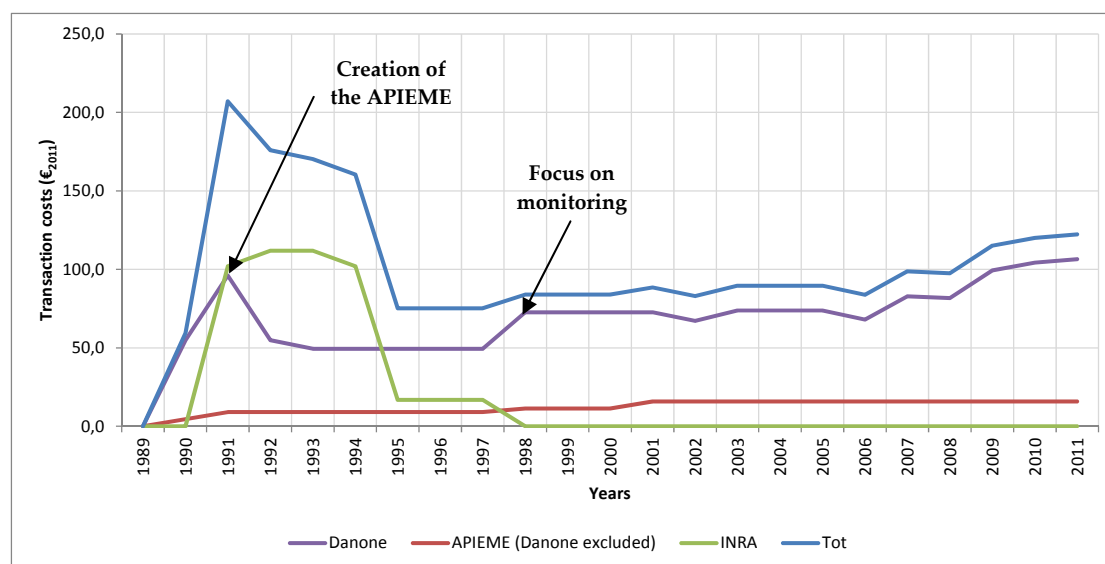


Figure 3.4 – Evolution of transaction costs related to the APIEME creation and implementation

Source: Author, based on Danone information





A specific analysis of transaction costs associated to the EPI was not feasible. Nonetheless the figure 3.4 shows interesting information:

- most of the transaction costs related to INRA could be allocated to the agricultural sector (the EPI) and in particular to the design of these actions;
- a significant part of transaction costs the Evian Company bears could be allocated to the EPI.

A few transaction costs are missing in the figure 3.4. For instance, i) regular meetings between the SICA, the Chamber of agriculture, representatives of the farmers and the APIEME as well as ii) the creation of the SICA in 1993 should be considered as TC and added to the figure 3.4.

Although i) information is still missing (other costs related to studies performed by consulting firms) and ii) transaction costs are probably underestimated because they are the ones already expressed in monetary terms, the figure 3.4 shows that transaction costs are likely to be important for this EPI (on average, TCs are close to the costs of actions) in particular during the design phase and also during implementation, although less so. This could be partly explained by the number of parties (around fifty farms) and their heterogeneity. Depres et al. (2008) remind us that the greater the number and heterogeneity of parties, the higher the transaction costs associated with designing, implementing and enforcing an agreement. The context of the EPI could also explain why transaction costs are high:

- the Evian Company is highly dependent on the quality and stability of the NMW;
- the Evian Company had time to gather stakeholders to develop a coherent protection policy as the quality of NMW was not threatened yet ;
- the objectives of the protection policy were ambitious: develop win-win actions, involve collective projects, consider the diversity of land uses; and develop global and long-term approach.

Synthesis of transaction costs

Table 3.2 tries to provide summarized information on the TCs of the EPI in its different steps of establishment: research and design, support to implementation, monitoring and enforcement. It indicates furthermore the level on which the TCs occur and their specific attribution to the EPI. As the quantification of the different TCs was not specific to the EPI but included other transactions costs linked to the APIEME, an indicative score is provided and commented.





Table 3.2 – Summary of transaction costs

Type of transaction costs	Level	Specific attribution to the EPI	Likely importance of the transaction costs	Explication
Research and Design	Local	High	+++	Specific studies have been carried out to support the design of the EPI, in particular the diagnostic undertaken (and recommendations associated) by the INRA. Part of lobbying costs related to the creation of the APIEME could also be allocated to the EPI.
Legal process	Local	Medium	0	No litigation was reported. The collaborative governance avoided most of potential conflicts between the Evian Company and farmers.
Support to implementation	Local	High	++	A contract between the Chamber of agriculture (CA) and the Evian Company was signed so that the CA provides technical support to farmers.
Operation	Local	High	++	Meetings gathering around 15 persons are regularly organised and one of the representatives of Danone Waters is partly dedicated to the EPI.
Monitoring / Enforcement	Local	Medium	+	Monitoring is not specific to the EPI. Considering collective projects helps reducing TCs linked to enforcement by reducing the number of parties. In addition, most of the subsidies are distributed in exchange of invoice, reducing enforcement costs.

Note: +++ indicates a very high importance of the transaction costs; ++ indicates significant transaction costs; + indicates low transaction costs; 0 indicates no transaction costs.

Indications on the impact of transaction costs on the EPI

The transaction costs are relatively high in comparison to the cost of the EPI. But this is a condition for the success of the EPI anticipated by the Evian Company before it implemented the EPI. It was necessary to give time and space for negotiation to get a compromise between the expectations of the Evian Company and the requests of farmers.

The budget allocated to the EPI (through the APIEME) might have been higher if the transaction costs could have been lowered.

3.7 Uncertainty

Definition of the objective

The objective of the financial compensation for environmental services provided by agriculture that the Evian Company developed through the APIEME is to preserve





the natural water quality by developing modern environmentally friendly agriculture on the catchment area. The target has been clearly defined in quantitative terms by the APIEME in 1992 but considering the whole water protection policy and not specifically the projects focusing agriculture, that is maintaining the purity and stability of the Evian NMW. We can infer a set of quantitative targets for each component of the Evian NMW: for instance, the concentration of nitrates has to be maintained around 3.7 milligrams per liter.

Specific objectives for agriculture (the EPI) have not been quantified in the agreements signed by parties, partly because scientific knowledge is insufficient to translate a reduction of pressure in the catchment into variations in the Evian NMW (Christofini et al., 1994). Time horizon was defined for the availability of means but not for the outcomes.

Measurability of success

The success of the instrument can hardly be quantified with sufficient confidence due to several reasons. First, the mean transit time of the infiltrated water is more than 20 years. Thus, increase or decrease of pressures in the catchment area due to the EPI (or external factors in action since 1992) will not be reflected in the NMW quality before 2012.

Second, the Gavot Plateau surface and shallow aquifers water observatory should help measuring whether the EPI is a success or a failure. But information was not available in time for the assessment. And quantified targets were not defined for agricultural practices, so there is no reference to compare to.

Finally, the EPI has been performed in a context of multi-sectoral policies and regulatory instruments (policy mix) due to the wide water protection policy the APIEME developed. The focus has been made on financial compensation for agriculture, considered as the EPI, in order to keep the assessment feasible. However, contribution of the EPI is difficult to isolate for measuring its success.

Attribution of achievements to the EPI

As mentioned before, it is difficult to quantify the contribution of the EPI to the fulfilment of the objectives. However it does contribute to the maintenance of an environmentally friendly agriculture on the catchment area (Danone Waters, pers. comm.).

Appraisal of the instrument at the time of introduction

In general, the EPI, and more broadly the water protection policy developed by the APIEME, has been welcomed from all different parties (INRA, pers. comm.). The mayors of villages located in the spring area were surprisingly enthusiastic regardless their financial contribution to the sustainable development of the catchment area. (Danone Waters, pers. comm.). However, some scepticism prevailed in the villages





locates in the catchment area on the rate defined for the marginal contribution of vil-
lages located in the spring (first 3% then 4% from tax earnings).

Pedigree tables for the most important information available on environmental objec-
tives, economic incentives, and distributional effects can be found in Annex I.





4 Conclusions

The Evian Company initiated in the late eighties a promising multisectorial water protection policy tackling wastewater collection and treatment, town and country planning, wetland protection, tourism, biodiversity and agriculture. The objective is to protect the Evian Natural Mineral Water (NMW) by promoting a sustainable development of its catchment area. This policy was launched in 1992 when the APIEME was created: this association gathered the villages from the spring area that benefit from a government tax on the bottled water, the villages from the catchment area, the Evian Company and national public bodies.

The present case study assessment focuses on the APIEME “agricultural economic instrument” policy (EPI) which can be classified as a scheme of payment for ecosystem services. It is oriented towards the development of a modern environmentally friendly agriculture focusing on dairy production linked to cheese making under protected designation of origin (PDO).

In France, the legislation is very strict for NMW: they must strictly maintain the stability of their mineral content and no treatment of the water to be bottled is allowed. In addition to the 3-fold protection of the spring (natural geological, legal and technical protections), the EPI - in combination with other actions of the APIEME - contributes to maintain the stability of the Evian NMW by improving the natural protection of the aquifer.

Estimated transaction costs are relatively high in comparison to the cost of the EPI, both ex-ante fixed costs and ex-post variable costs. But it appears to be a condition for the success of the EPI anticipated by the Evian Company before it implemented it. First, the partnership developed between the Evian Company and INRA in 1990 contributes to get a better understanding of the catchment area in terms of ecological functioning and the diversity of practises and potential pressures. Thus it played a strong role in determining the preventing approach and actions as Evian did not have competencies in agriculture. The diagnostic helped to reduce asymmetric information while the results were shared with farmers. Involving INRA in the process finally contributes to reinforce reciprocal trust between the Evian Company and farmers.

Second, the creation of the APIEME allowed parties to build shared ownership on the issues and to take part in the decision making. It also gave space to discussion and negotiation by externalising the initiative. In addition, the creation of the SICA helps harmonizing the request of the farmers and contributes to reduce TCs, while the Chamber of agriculture provides technical support.





Finally, the delivery mechanism the Evian Company chooses through the APIEME both contributes to the high level of transaction costs and helped reducing them. Indeed, the EPI allows flexibility (extension of the subsidies' duration) and requires regular meetings with stakeholders. But, it also prevents from conflicts and complex legal procedures - both associated with high transaction costs - by trying to reach compromises between the expectations of the Evian Company and the requests of farmers. The EPI has thus been welcomed by most of the stakeholders.

The outcomes of the EPI were more difficult to assess with certainty. First, the hydrogeological context of the aquifer prevents from assessing properly final environmental outcomes as it takes more than 20 years for the water to infiltrate and reach the spring; behavioural changes of stakeholders on the catchment area due to the EPI will not be reflected in the NMW quality before the 2010th. Then, there was no specific quantified objective for agriculture. Finally the EPI has been performed in a context of multi-sectoral policies and regulatory instruments (policy mix) and specific outcomes of the EPI are difficult to isolate.

The design of the EPI directly contributes to the redistribution of means from the beneficiaries of the NMW (the Evian Company and the villages located in the spring area) to the villages located in the catchment area. Even though this contribution appears to be low in comparison to the profits of the Evian Company or the tax revenues, the collective projects which were funded through the APIEME helped developing a modern environmentally friendly agriculture associated to the PDO system. It also contributes to limit the increase of maize surface and even reduces it in the catchment area, whereas the baseline scenario predicted an increase.

In addition, the EPI contributed to maintain traditional landscape and to preserve biodiversity through the type of agriculture it promotes. The use of pesticides has been reduced and the farmers were encouraged through the EPI not to use atrazine since 1994 while it was only prohibited in France in 2003. Benefits from the EPI are difficult to measure but they might have been higher than the costs if we assume that the EPI has a multiplier effect.

However, the number of farms has decreased in the catchment area for the past three decades (even if the number of full-time professional farmers remained unchanged) and the tendency of intensification was confirmed in 2002 compared to the diagnostic INRA realised in 1993. However, it was not possible to see if this trend was not partially controlled for by the EPI

4.1 Lessons learned

On the whole, gathering all stakeholders and sharing knowledge and point of views to define and fund collective projects ahead of its time can be considered as a successful economic policy instrument, which contributes both to preserve the stability of the Evian NMW and to develop a modern environmentally friendly agriculture.





Even though environmental, economic and social outcomes were not quantified with accuracy, the EPI seems to send right and coherent incentives to stakeholders with preliminary results showing that the situation evolves in the right direction (a sustainable development of the catchment area contributing to protect the NMW).

With regards to the lessons learned, the following can be cited: the financial dimension may not be the most important one to explain the success of the EPI as it remains relatively low in comparison to potential benefits (for the Evian Company, for villages located in the spring area and for the villages located in the catchment area). Indeed, a good understanding of the situation – i.e. the heterogeneity of farmers, agricultural practices and incomes and the diversity of pressures – helped defining relevant actions at the right scale (plot, farms and catchment). Technical support from INRA to the APIEME and from the Chamber of agriculture to farmers thus contributed to the success of the design and implementation of the EPI. Moreover, the methodology used to offer space for discussion (through the APIEME or regular meetings organised by the APIEME with representatives of farmers, the SICA and the Chamber of agriculture) are seen as having reinforced trust between parties.

These three dimensions (financial, technical and social) and their relative influence over the process were also described as key factors to explain the success of the PES scheme used by Vittel to protect its mineral water (Perrot-Maître, 2006). The water protection policy developed by the Evian Company is also in line with the final recommendation of Perrot-Maître (2006) by not focusing on one particular polluter but by taking a multisectorial approach. All potential sources of pollution or positive land use (and land cover) are taken into account by the APIEME through a coherent water protection policy.

In addition, the EPI also illustrates how the beneficiary-pays principle could and should be applied. The polluter-pays principle promoted by EU-treaty, and in particular by the Water Framework Directive (WFD), might not be relevant when pollution is low.

4.2 Enabling / Disabling Factors

With regards to the potential transferability of the instrument, a comparative analysis with similar PES schemes or water protection policy concerning both mineral water and tap water would be necessary to conclude. A first attempt was made by Depres et al. (2006) and the United Nation Food and Agriculture Organisation (FAO) made recently an inventory of PES “water for cities” cases (Buric et al., 2011). They identified thirty-six cases of PES around the world through a literature survey; three of them only were located in Europe and the case of Evian NMW was not considered as a PES.





However, with regards to the key enabling factors that allowed the EPI to succeed, the following can be cited:

- the dynamism and involvement of stakeholders, whether they are a Natural Mineral Water Company, a farmer or a mayor, play an important role in the success of this kind of long term process. In the case of Evian NMW, the first president of the APIEME, the president of the SICA and the chief executive officer of the Evian Company played a dynamic role in the whole process;
- the size of the territory to be protected: the larger the catchment (and use area), the more complex its protection is. In the case of Evian NMW, the catchment area is relatively small (35 ha) and the population density is relatively low. Farmers were thus able to gather in the SICA and the number of parties was then reduced;
- the quality oriented approach promoted by the APIEME might not be easily transferable. In that case, both the beneficiary of the PES and the provider of (ecosystem) service are engaged in quality process through the NMW or PDO labels.





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Personal communications

- Patrick Lachassagne: Danone Water France; face-to-face and telephone interviews in October 2011





- Jean-Jacques Beley: Danone Water France; face-to-face and telephone interviews in October 2011
- Cathy Le Hec: representative from Danone Waters France to the APIEME; face-to-face and telephone interviews in November 2011
- Jean-Marcel Dorioz: INRA; face-to-face interview in November 2011
- Jean Favre: ex-president of the APIEME and mayor of Champange; face-to-face interview in November 2011
- Pascal Tréboux: farmer and representative from Vinzier; face-to-face interview in November 2011
- Jean-Claude Vidal; ex-Danone Waters France, contributed to the implementation of the APIEME; telephone interview in November 2011
- Gérard Mialonier: ex-Danone Waters France, contributed to the implementation of the APIEME; telephone interview in November 2011



6 Annex I: Pedigree tables

The following table summarize the degree of uncertainty related to the definition of the objective of the EPI.

	Policy target (how much)	Policy deadline (when)	Reference
EPI to be assessed	The objective has been defined in qualitative terms: preserve the natural water quality by developing modern environmentally friendly agriculture on the catchment area	No deadline was defined but interventions were initially designed to last from 5 to 20 years	No reference has been clearly defined. However, the diagnostic realised by INRA (1994) could be used as the reference.
Pedigree	2	3	2

Table 6.1 – Pedigree table for the definition of the objective of the EPI

Note: Policy target: (1) quantifiable and clearly stated, (2) measurable in principle, qualitative levels of achievements (e.g. weak, substantial), (3) vague and hardly quantifiable

Policy deadline: (1) clearly stated; (2) stated in qualitative terms (short, medium, long term); 3) no statement

Reference: (1) clearly stated in quantitative terms and with specific reference; (2) not stated

Pedigree tables describing the degree of uncertainty for the most important information available on environmental objectives, economic incentives, and distributional effects are given below.

	Environmental outcomes	Economic incentives	Distributional effects
Financial compensation for environmental services: the case of Evian Natural Mineral Water	Objective: preserve the natural water quality by developing modern environmentally friendly agriculture on the catchment area	Number of farms changing their practices in the right sense	Employment, income changes and distribution
Proxy = variable used to describe the outputs/outcomes of the EPIs and their relationship to the policy target	Surface of maize, number of farmers, types of farms, (concentrations in surface water) → 1	Real budget for the EPI (per year, per farm) → 2	Changes in employment situation, sum of subsidies → 2
Empirical = the basis on which the performance assessment draws	Monitoring realised by the APIEME. All the information was not available → 3	Surveys realised by INRA (1993) and the APIEME (2002) → 3	Expert judgment → 1
Method = analytical tool used to assess the effects of EPIs especially if not estimated directly using empirical data	Direct estimation from empirical data → 2	Direct estimation from empirical data → 2	Direct estimation from empirical data → 2





Table 6.2 – Degree of uncertainty described thanks to the Pedigree table

Source: Author

The following uncertainty qualifiers have been used:

Code	Proxy	Empirical	Method
4	Exact measure	Large sample direct measurements	Best available practice
3	Good fit or measure	Small sample direct measurements	Reliable method commonly accepted
2	Well correlated	Modeled / derived data	Acceptable method, limited consensus on reliability
1	Weak correlation	Educated guesses / rule of thumb estimate	Preliminary methods, unknown reliability
0	Not clearly related	Crude speculation	No discernible rigor

Table 6.3 – Qualifiers used for the Pedigree table

Source: EPI guidance document





7 Annex II: Contributors to the report / Acknowledgments

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