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The clean-up of Lake Sempach - the raising from the dead: conditions for the success of environmental policy in Switzerland

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The Clean-up of Lake Sempach – The Raising from the Dead.

Conditions for the Success of Environmental Policy in Switzerland

Peter Knoepfel

1. Introduction

This paper focuses on the political-administrative decision-making processes involved in the 15-year saga of the clean-up of a lake in the Swiss interior situated in the northern, mainly agricultural hinterland of the canton of Lucerne. This case was chosen because it demonstrates almost all of the patterns typical for success in environmental policy processes in Switzerland. Indeed, this case can be seen as success (see figure 1), although the actual clean-up of Lake Sempach has still not been completed. The 1993 figures are still far in excess of the critical limit of 30 mg/m³, although today, only 1% of residents in the catchment area are not connected to a sewage treatment plant. Besides the reduction of the phosphorous content in the lake the success consists of a new action programme for the clean-up of the lake based upon an overall ecological management of the whole catchment area including all water cycles and water habitats and a concept for the "ecologization of agriculture" decided in 1992.

This study will attempt to illustrate these patterns for success (which could also be identified in some other 20 environmental policy related case studies not to be presented here). On the basis of these case studies it is now possible to identify a total of seven such scenarios. Thus, in the course of this paper the clean-up of this Swiss lake shall be presented (chapter 2) and discussed in conjunction with these seven basic patterns. Due to the restrictions imposed by this forum, it will not be possible to present these other cases. For more detailed information on individual cases, it is recommended to consult the relevant case study (Zimmermann & Knoepfel 1987; Knoepfel & Zimmermann 1993; Knoepfel 1990; Balthasar & Knöpfel 1994; Bussmann 1980; Knoepfel, Zimmermann, Baroni et al. 1992; Freiburghaus & Zimmermann 1985; Knoepfel & Rey 1990; Klöti, Haldemann & Schenkel 1993; Knoepfel, Imhof & Zimmermann 1994).
The Swiss government's response to a question posed in parliament in 1974 was confirmed by events in the late seventies and throughout the eighties. The text of the reply states that:

The increased contamination of most Swiss lakes due to excessive use of fertilizers is taking on alarming proportions. This is due, in particular, to the increasing inflow of phosphorous ... Thus, it can be expected in the future that the percentile responsibility for phosphorous inflow will shift more and more to agricultural activities as the phosphate levels in sewage can now be reduced by up to 90% by sewage treatment plants (Nationalrat 1974: 195).

**Figure 1 Course Taken by Total Phosphorous Content in Lake Sempach (in tonnes)**

![Graph showing the total phosphorus content in Lake Sempach](image)

Note: The points show the mean annual levels.

*Source: Gächter & Stadelmann 1993: 367*

And indeed, thanks to the (at that time) new Federal Water Protection Act\(^1\) which came into force on 1 July 1972, there was a major increase in the number of

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plants for the treatment of industrial and household wastewater during the seventies and eighties. The proportion of the population served by such plants rose from considerably less than 50% to more than 90% (1993). At the same time phosphate concentrations in most of Switzerland's approximately 20 lakes also continued to rise (EAWAG 1992: 7) until the end of the seventies; in some of the particularly badly affected lakes, among them Lake Sempach, phosphate levels only started to decline in 1985, despite the rapid construction of treatment plants in this area too. Thus, despite the general decrease in phosphate concentrations from industrial and household wastewater brought about by measures introduced to prevent water pollution, at the end of the eighties the condition of approximately half of the (mostly smaller) Swiss lakes remained a matter of some concern. High phosphate concentrations in surface waters lead to increased algal bloom which in turn causes oxygen deficiencies and reductions in fish stocks. The main cause of the high phosphate concentrations in this instance (which equalled if not surpassed the damage to water quality caused by nitrate concentrations in drinking water) is today clearly identified as intensive livestock farming. This in turn is controlled by general conditions set down in Swiss agricultural policy.

A small lake in the Swiss interior, Lake Sempach is a typical example of a surface water in Switzerland badly affected by the excessive use of fertilizers in agriculture; like two other lakes in the same area\(^2\) it has been artificially aerated\(^3\) for several years now (see so-called "internal measures"). As tests undertaken by EAWAG (EAWAG 1992: 30) have shown, this measure has led to a reduction in the phosphorous content of these waters. As will be shown in detail in Chapter 2, since the mid-eighties measures affecting agricultural practices in the catchment area of this lake have also been introduced with an aim to lowering phosphorous inflow.

These measures were implemented in 1983 by an association of local authorities comprising 13 local authorities (see so-called "external measures"). The special features of this approximately 14 km\(^2\), relatively shallow (average depth: 45 m) lake are the long residence time of the water (up to a maximum of 30 years) and the excellent records of the lake's history which go back to the beginning of the century (Gächter & Stadelmann 1993: 344). The records reveal an increase in phosphate levels from 1950, extensive fish death in August 1984 – the lake was formerly a renowned source of whitefish – and a reduction in phosphorous concentrations since 1984; however, levels in 1993 are still far in excess of the critical limit of 30 μg/m\(^3\).

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\(^2\) Lake Baldegg and Lake Hallwil.

\(^3\) Introduction of compressed air during winter months and pumping in of oxygen during winter months.
With approximately 65 km\(^2\) of its surface area taken up by lakes, the canton of Lucerne is the eighth biggest "lake canton" of the 26 Swiss cantons\(^4\). When the lakes became a topic for debate in Swiss water protection policy in the late seventies, Lucerne's surface waters proved to be one of the most alarming cases in need of immediate clean-up measures\(^5\). Lucerne's policies in the area of agriculture and water protection can justifiably be hailed as trail-blazing (Knoepfel & Zimmermann 1993: 149). The clean-up strategies first introduced for Lake Sempach were later adopted for Lakes Hallwil and Baldeg, and can thus be acknowledged as pioneering in the Swiss context.

The following presentation of the Lake Sempach case is based on a case study undertaken for educational purposes by the author with Willi Zimmermann in 1987 for the attention of the Federal Environmental Protection Office (Zimmermann & Knoepfel 1987: 11-151), a systematic implementation study on water protection in agriculture undertaken at the Institut de hautes études en administration publique (IDHEAP) in 1989/90/91 (Knoepfel & Zimmermann 1993: 149) and the 1993 reports on Lake Sempach compiled by the Naturforschende Gesellschaft Luzern (Lucerne Association for Natural Sciences). We also made extensive use of material from a diploma thesis which deals with the topic of the ecologization of agriculture at national level (Benninghoff 1993).

2. Chronological Account of Events Surrounding Lake Sempach Between 1976 and 1993

**Phase 1: Rude awakening – new departure (1978 – 1984)**

As shown in figure 1 above in this period the total phosphorous content of the lake again increased from 80 to more than 100 tonnes. This development alarmed the local authorities in the region and the cantonal government, and in May 1976 they commissioned EAWAG to undertake a study on the current state, ideal state and nutrient stress in the lakes of Lucerne and to suggest ways of cleaning up the lakes. In December 1978 the cantonal water protection and fishing authorities held the first conference on the problems of Lake Sempach. The conclusion reached by the authorities on this occasion was that something had to be done to save the lake. The construction of sewage treatment plants was to be accelerated. However, as early as this point, the head of the cantonal water protection authority observed:

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4 After Vaud (392 km\(^2\)), Bern (135 km\(^2\)), Thurgau (113 km\(^2\)), Neuenburg (88 km\(^2\)), Tessin (84 km\(^2\)), Freiburg (82 km\(^2\)) and St. Gallen (79 km\(^2\)).
5 Cases of similar gravity include Lake Ceresio, Lake Murten or Lake Pfäffik in Zurich.
It is not the job of the water protection authorities to formulate agricultural policy. However, we would like to appeal to politicians to at least make some attempt to bring agriculture and environmental protection into line with each other. Whoever thinks that all we need do is blame the farmers for excessive use of fertilizers on their fields is mistaken. We all influence agricultural practices with our lifestyles, productivity requirements and price policies. There is, therefore, a political problem that cannot simply be solved at Lake Sempach (Zimmermann & Knoepfel 1987: 57).

In August 1979 EAWAG presented its findings concerning the clean-up of the lake. In accordance with the specified requirements, it focused on internal measures to be implemented to save the lake. Three alternative suggestions were made: to aerate the bathyalimnetic water with oxygen, forced circulation or pumping of bathyalimnetic water (Zimmermann & Knoepfel 1987: 58). The same year, the Lucerne government commissioned AGBA6 to complete a detailed study on the "Pollution of land and water by agriculture in the catchment area of Lake Sempach with particular reference to phosphate levels". The report, presented in 1980, contains detailed records of livestock holdings, the area available for spreading farmyard manure, the capacity of slurry pits and phosphorous levels in the catchment area of Lake Sempach. The measures suggested for the reduction of phosphorous levels included intensive educational campaigns, the recording of nutrient levels for individual farm holdings, effective control of permits for the removal of slurry, the adaptation of slurry pit capacity and the introduction of restrictions on the use of fertilizers in vulnerable areas.

The local and cantonal authorities started by implementing the internal measures. An invitation to tender issued in May 1980 reveals that "aeration and forced circulation" were the measures selected for implementation (Zimmermann & Knoepfel 1987: 80). In the course of the extensive consultation procedures on these measures among the local authorities, official bodies, various organisations and individuals, criticism was voiced by the environmental organisations. The World Wildlife Fund noted, for example, that the fact that the clean-up of the lake was to go ahead was a welcome development but it could not be denied that the suggested clean-up measures aimed only at counteracting the effects of excessive use of fertilizers within the lake (and thus – the author) was merely attacking the symptoms. The proposed measures involved enormous costs in terms of technology and could, under certain circumstances, cause complete upheaval in the ecological balance of the lake. It was impossible to predict the potential affect on the flora and fauna. These measures would only mean high expenditure over years and decades without fundamentally improving the condition of the lake.

6 Arbeitsgemeinschaft Beratender Agronomen AG - Working Group of Consultant Agricultural Engineers
We are convinced that the priority should be shifted to external measures: improvements in fertilising practices, restricted use of artificial fertilizers, adaptation of livestock holdings, improvements in the treatment of household wastewater, promotion of phosphate-free washing powders etc. (WWF statement, quoted in Zimmermann & Knoepfel 1987: 96).

This position was strengthened by the fact that in 1981 excess nitrate concentrations\(^7\) (Knoepfel & Zimmermann 1987: 24 ff.) arising from agricultural sources were recorded in the Oberkirch drinking water supply. All parties involved were aware that the internal measures to improve the condition of the lake had to be accompanied by external intervention. For this purpose, in November 1983 the Lake Sempach association of local authorities was founded with nine associative and four contractual member municipalities elected by referendum. In accordance with its statutes of 16th November 1983 the association's aim was to "improve the condition of Lake Sempach by implementing internal and external measures". The association co-ordinates and monitors external measures implemented by member and contractual municipalities which are aimed at drastically reducing the phosphate levels in the lake. In addition, the association's statutes define the limits for mean total levels of phosphorous (upper limits 30 mg/m\(^3\)), the minimum oxygen content (4 mg/l) and for the maximum permitted level for algae production (150 g carbon per m\(^3\)). The association would assume the investment (about 2.2 million Sfr) and annual operating costs (about 700,000 Sfr) for the aeration plant. The ventilation began operating in summer 1984.

Parallel to these measures in the early eighties, there was extensive activity in the area of agricultural advisory services. In addition, the authorities of Sursee, a town on the lake, commissioned the FAP\(^8\) to produce a soil map of the land in the lake shore areas. The authorities were convinced that it would be necessary to introduce restrictions on the use of fertilizers in these areas. The survey presented in 1982 did, in fact, reveal high phosphate levels in the soil in these areas.

The cantonal authorities were also concerned about the alarming findings in the area surrounding the lake. In 1981, the canton water protection authority presented a report about the status of the clean-up measures. This report also warned about the dieback of the lake. The report identified the following three areas as a focus for additional external measures:

- Definitive action to complete development of treatment processes for domestic and industrial wastewater (with integration of a fourth level for phosphate filtration);

\(^7\) The "Siamese twins nitrate/phosphate" played a crucial role in the introduction of environment-oriented measures in agriculture in Switzerland in the late seventies.

\(^8\) Forschungsanstalt für landwirtschaftlichen Pflanzenbau Zürich/Reckenholz - Research Institute for Agricultural Cultivation in Zürich/Reckenholz
The elimination of uncontrolled discharge of domestic wastewater originating from farms in rural areas through the necessary clean-up facilities;

The issuing of clean-up orders to individual agricultural holdings (farmyard manure facilities, livestock holdings, fertilizer bans) (Zimmermann & Knoepfel 1987: 81).

Coinciding with the publication of the AGBA report, the cantonal authorities released a "Directive for Water Protection in Agriculture", which contained recommendations for water protection measures to be implemented by the public authorities. In an effort to promote acceptance of the quite unusual internal clean-up measures, the canton environment protection office organised an orientation meeting in December 1982 in Oberkirch; among the principle participants were farmers from the area around the lake. The canton succeeded in generating consensus among the farmers, participating local authorities and environmental groups concerning the need to act quickly in the implementation of both internal and external measures to save the lake. The head of the cantonal environment protection office was largely responsible for this breakthrough. It was his office that showed Switzerland how it is possible to embark on an ecological debate with the agricultural sector which need not necessarily end in conflict. The main characteristic of this strategy were the following ones (Knoepfel 1993: 461 ff.):

- **No break with the farmers**: The cantonal office for environmental protection (Amt für Umweltschutz – AFU) always discussed its measures with the farmers' organisations and the cantonal agricultural colleges. This meant there were no surprise coups as was the case in other cantons when measures were introduced in agriculture to protect water quality. The staff of the AFU, the cantonal centre for ecology founded on 4 April 1985, and the agricultural colleges always tried to establish objective dialogue with the farmers.

- **Cooperation with national institutions**: The AFU stayed in close contact with the Federal Environmental Protection Office and with the Federal Research Institute for Agricultural Chemistry and Environmental Health which had a considerable reputation outside the region for its role in environmental protection in agriculture. Representatives of Lucerne AFU participated in numerous expert commissions on this topic at national level. This involved the development and various revisions of the path forging water protection in agriculture from 1979, and the preparatory work on the new Federal Water Protection Act, passed by referendum on 7 May 1992. In this way representatives from Lucerne were able to discuss their problems in Bern and integrate them into the relevant national solutions.

- **Cooperation with the scientific community**: Whoever attended specialist conferences on the topic of water protection and agriculture will regularly have encountered members of Lucerne AFU. Word about the debate surrounding Lake Sempach and the measures undertaken to save it spread far beyond the
borders of the canton. Scientific contributions by Pius Stadelmann or Paul Bauman and their colleagues were highly respected. This conscious presence within the scientific community and the professional associations gave the AFU the necessary resonance in scientific publications which at the time were less concerned about environmental protection than is now the case.

- **Active Public Relations:** The organisation staged a number of public events in Lucerne communities and neighbourhoods during the period in question. These meetings were aimed not only at farmers but those groups who were critical of the internal measures for Lake Sempach (fishermen, environment organisations). In subsequent studies on agriculture and environmental protection we were unable to find another canton where such comprehensive, well-documented and competent public relations work was achieved as in the canton of Lucerne from approximately 1983 to the end of the 1980s (Knoepfel & Zimmermann 1990).

- **Solid scientific basis:** Considering the numerous uncertainties involved in the situation, the office made a consistent effort to keep itself informed by specialists in the field (such as EAWAG, AGBA, private engineering practices, IDHEAP9) in order to be able to present irrefutable arguments to partners in discussion.

- **Determination:** In contradiction to widely held belief, a willingness to negotiate and quest for compromise solutions did not exclude determination and decisive action. It was the AFU who prosecuted a farmer who on 3 March 1984 ostentatiously spread slurry before the very eyes of participants at a conference on the topic of "Water protection and agriculture". This case went down in legal history. In its famous judgement of 21 October 1984, the Federal Supreme Court supported the higher court of the canton of Lucerne by fining the farmer in question.

At the time national water protection policy was mainly concerned with the development of sewage treatment plants, and water pollution resulting from agricultural practices did not receive a great deal of attention.

On 7 December 1975, the Swiss people and cantons had already approved a new article in the constitution requiring that national water policy be developed in the direction of more thorough ground and drinking water protection10. This constitutional provision was intended to pave the way for the new Federal Water Protection Act of 1992; thus, water protection relating to agriculture was not a major political issue at the national level in the second half of the 1970s. Things

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9 In the early eighties, EAWAG executed several studies on the state of Lake Sempach, AGBA produced company records, soil analyses and fertilizer records and the IDHEAP examined the implementation of guidelines for water protection in agriculture in three test areas (Flühli, Grosswangen, Hochdorf).

10 And also quantitative water protection - Article 24bis of the present Swiss Constitution.
did not start to move here until the end of this phase (December 1979) when the Federal offices for the protection of the environment and agriculture jointly published their famous "Guidelines for water protection in agriculture" – the only (not legally binding) basis for state activity in this area until the passing of the Chemical Substances Decree11 in June 1986. There can be no doubt that part of the credit for this publication belongs to the increased concern expressed about the eutrophication of the lakes. These guidelines set down, for the first time, specifications for maximum livestock holdings,12 minimum capacity for slurry pits and made recommendations for the banning or restriction of the use of fertilizers in ecologically sensitive areas. The national authorities passed additional guidelines and regulations on the construction of slurry pits,13 general environmental issues in agriculture14 and about sewage sludge.15

Towards the end of the 1970s changes began to take place in agricultural policy. As a solution to the problem of milk and meat surpluses, the national authorities introduced milk quotas for individual farms with an aim to reducing meat production and promoting the transition from dairy to arable farming. Article 19 of the revised version of the Federal Agriculture Act, which was passed on 22 July 1979 and came into force on 1 January 1980, made provision for "measures to adapt livestock holdings to production and market conditions and ... to operating conditions and the domestic feed supply basis" (art. 19, sec. 1, lit. b).16 Concrete measures were introduced to reduce meat and egg production including the introduction of maximum figures for livestock holdings and the obligation to obtain a licence to open new livestock units. Financial incentives were also introduced for the reduction of livestock holdings. Bonuses were also to be introduced to promote the cultivation of indigenous animal feed. These measures were not, however, implemented in the interests of environmental protection. They concentrated on the effort to curb surpluses in domestic meat and egg production as part of the domestic tension between large, medium and small agricultural holdings.

12 Then still 4 cattle dung units (cdu) per ha; following the coming into force of the new Federal Water Protection Act on 15 November 1992 this has been reduced to 2 cdw per ha (Art. 14, section 4).
13 Notes on the planning and execution of individual agricultural plants from the perspective of water protection of April 1980.
14 "Umweltprobleme auf dem Lande, wie lassen sich Schäden in der ländlichen Umwelt vermeiden?" (Environmental problems in the country, how to avoid damage to the rural environment), March 1981.
15 Decree of 8 April 1981, then SR 814.225.21; now integrated into the Chemical Substances Decree, Appendix 4.5.
16 Federal Act of 3 October 1951 on the promotion of agriculture and the preservation of farm holdings (Agriculture Act), SR 910.1.
The Clean-up of Lake Sempach


On 7/8 August 1984 a total of 325,000 fish died in Lake Sempach. Approximately 26 tonnes of roach, bass, pike and other species had to be removed from the lake. The population was outraged and the government of the mainly urban community of Sursee, one of the lake shore communities, decided that the introduction of effective external measures could not be put off any longer. There was a danger of direct inflow of fertilizers into the lake, particularly from the lake shore areas. On 3 September 1984, the town council took the law into its own hands and passed restrictions and bans on the use of fertilizers in certain areas. In the subsequent court hearing (Zimmermann & Knoepfel 1987: 118), the town council emphasised that it made no sense whatsoever to finance the costs of measures which dealt only with the symptoms of the problem (internal measures); in view of the financial difficulties facing the public sector, it was impermissible to allow such a situation to continue. The town was not prepared to continue contributing to the costs of implementing internal measures if nothing was being done to tackle the external causes of the problem. In response to the charge that as a result of the introduction of these measures the farmers of the Sursee community were at a disadvantage compared to farmers from other lake shore communities, the town council replied that Sursee local authorities had treated all landowners in the area within its own jurisdiction equally. The town council could hardly be accused of unequal treatment on the basis of its decision because of the failure of the cantonal authorities and other associations to take appropriate measures.

Finally, the town council stressed,

> that we find it ridiculous that on the one hand surplus production in agriculture is financed using public resources, and on the other hand the environmental consequences of this intensive farming and this surplus production must also be financed using public resources. We are of the opinion that it would make more sense in environment terms and for public finances to reduce production levels through compensation for loss of income and contributions towards restructuring measures. In this way, it would also be possible to eliminate costs for direct

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17 As an "extra-economical" aim and an important part of agricultural activities, ecology is awarded a slightly higher status than in the 5th Agricultural Report (5. *Landwirtschaftsbericht* of 1976). The effective use of land with minimal environmental pollution and care of the landscape is added to the new basic principles to be implemented in the control of production; the question of the introduction of direct payments is also broached tentatively (264 ff. of the 6th Agricultural Report of 1984).

measures to clean-up Lake Sempach within a practical period of time (Zimmermann & Knoepfel 1987: 119).

The Sursee town council's decision was revoked by the Lucerne Government on 25 March 1985. Regulations on the use of fertilizers of this nature were indeed permissible under the provisions of the Federal Water Protection Act; in this case, however, the constitutional principle of commensurability had not been observed. The introduction of a general ban was inadmissible; restrictions on the use of fertilizers had to be specified for each individual holding.

Despite the negative judgement on the matter of the Sursee authority, in its "Report on water pollution prevention activities in the canton of Lucerne" of 26 February 1985, Lucerne Government showed greater willingness to implement a number of measures affecting individual holdings to prevent surface flooding from land used for agricultural production and reduce the annual discharge of phosphorous by at least 50%. In practical terms clean-up measures were ordered for all agricultural buildings – converted, temporary and new (Zimmermann & Knoepfel 1987: 108 f.). Moreover, the canton actually did put this willingness into practice by issuing several clean-up orders and setting up the cantonal Centre for Ecology and Agriculture on 4 April 1986. The establishment of this independent institution aimed at proving to farmers that even when harsh measures in the form of clean-up orders were being implemented it was still possible to engage in helpful advisory discussion. Consultancy and education about ecological matters in agriculture also constitute the main emphasis in the work done by this institution (Knoepfel 1990; Knoepfel & Zimmermann 1993: 209 ff.).

At national level, this phase was characterised by the coming into force of the Federal Environmental Protection Act on 1 January 1985\(^{19}\) and the publication by the Department of the Interior of the draft revision of the Federal Water Protection Act (November 1984). The Environmental Protection Act provides the national authorities with a legal basis for the issuing of regulations in the area of environmental protection and agriculture, for which the national authorities finally made very detailed provision in the Chemical Substances Decree\(^{20}\) which came into force on 1 September 1986. The draft revision of the Federal Water Protection Act contained – an already controversial – article on agriculture (art. 14), in which legal limits were to be specified for livestock holdings (3 cdu per ha) and minimum storage periods for slurry pits. On 26 March 1986, the Federal Court appeal submitted by the Sursee authorities was approved. It is interesting to note the line of defence taken by the Sursee authorities which clearly demonstrates the links between environment and fiscal policies: the Sursee local authority had hitherto made an annual contribution of roughly 100,000 Sfr towards the internal

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\(^{19}\) Federal act of 7 October 1983 on environmental protection, SR 814.01.

clean-up measures. These costs obviously decreased with the progressive improvement in the condition of the lake. An undisputed requirement to bring about this improvement was, however, a reduction in phosphorous discharge into the lake from the surrounding catchment areas (Zimmermann & Knoepfel 1987: 136). To adopt the individual approach holding by holding, as proposed by the Lucerne Government would mean a delay in protecting the lake which could take months, even years. This approach was simply impractical. In particular, it would lead to confusion and uncertainty among farmers as it could result in them being subject to different fertilizers regulations within their own areas:

In the present case, which involves a large number of small holdings farmed by different farmers, and for which it is necessary to control the excessive discharge of phosphorous from agriculture, such a procedure (holding by holding, auth.) is clearly impracticable (Federal Court, quoted in Zimmermann & Knoepfel 1987: 137).


The clear reduction in the total phosphorous content of Lake Sempach in this third phase from 1986 to 1991 is illustrated in figure 1 (chapter 1). The obvious improvement is due to the issuing of bans and restrictions on the use of fertilizers in all of the lake shore municipalities, intensive agricultural advisory activities and a recent clean-up campaign launched by the cantonal water protection authority. Immediately after the Federal Court supported the Sursee authorities' appeal to the administrative court against the canton of Lucerne, land owners and tenants affected by the decision founded a pressure group on 25 April 1986 which aimed at obtaining compensation for the loss in income and reductions in yields a result of the new restrictions (Zimmermann & Knoepfel 1987: 137 f). This ban on the use of fertilizers acted as a signal on the question of compensation which went far beyond the Sursee authorities' jurisdiction, and would exercise an important influence on protected areas in the other lake shore municipalities. The Sursee Town Council was quite willing to approach the question of compensation; it aimed at setting up annual compensation payments instead of a once-off payment. In this way the population and farmers should be continuously be made aware of the costs involved in environmental pollution. The solution finally agreed on was negotiated by with the help of the Lucerne farmers' association and the Swiss farmers' association.

Not least thanks to this compensation solution, the Sursee fertilizer zone concept in the form of the so-called 'lake shore belt concept' was adopted quickly and widely. The commissioned working group presented its "Concept for protective measures in the lake shore belt of Lake Sempach" in June 1986. This belt was fined as an up to 500m-wide band around the lake which, it was presumed,
drained through surface drainage, open or covered drains directly into the lake. The total surface of the belt measures approximately 200 ha; 140 ha of which are used for agricultural purposes. This corresponds to 3% of the land used for agricultural purposes in the entire catchment area. Although the belt covers a small part of the total catchment area,

and the tests and measures can, thus, only make a modest contribution to the clean-up of the lake, they are important. This report can be viewed as a test case for the feasibility of this method and the suitability of the measures for the remaining, far more extensive catchment area (Zimmermann & Knoepfel 1987: 139).

The concept distinguishes between four zones, based on the criteria of soil properties, vegetation/use, landscape topography form/incline and situation/distance from the lake, to which different fertilizer restrictions apply. The protective belt concept was to be implemented in accordance with the specifications of the association of local authorities in conjunction with the cantonal Centres for Ecology and Agriculture. On 1 February 1988 it was possible to introduce the relevant fertilizer and functional restrictions were issued without any major problems. The protective belt gave rise to

the extension of the lake shore area and was a model for the entire catchment area. Annual compensation payments for land in the zone under a total ban is 20 francs/a, and 8 francs/a in areas with severely restricted use of fertilizers (Gächter & Stadelmann 1993: 354).

During the time immediately after the declaration of the protective zone, there was a marked increase in agricultural advisory services provided to both individuals and groups. The Centre for Ecology and Agriculture and also the local agricultural college played a major role here. On the basis of studies undertaken in 1988 and 1990 (Knoepfel & Zimmermann 1990: 283 ff., 349 ff.) it was possible to demonstrate, that the level of scientific knowledge among farmers in a given municipality (Hochdorf) comparable to that of Lake Sempach was exceptionally high. With the combination of advisory services, campaigns and clean-up implemented in the problem areas, which became known as the "umbrella strategy", "the palette of classical regulatory intervention measures ... in the Lucerne problem areas ... might have been exhausted" (Knoepfel & Zimmermann 1990: 351).

The cantonal authorities supported the work of the Lake Sempach association, and also staged a comprehensive clean-up campaign until the end of the eighties. "The necessary clean-up operations have for the most part been completed (situation 1992 – the author)" (Gächter & Stadelmann 1993: 352).

A legal basis for these clean-up measures was provided by appendix 4.5 of the Chemical Substances Decree that came into force on 1 September 198621, and on the new "Directives on water pollution protection in agriculture" issued by the

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canton government on 1 January 1988. For the most part, the content of these
directives anticipated the new Federal Water Protection Act (art. 14)\(^\text{22}\) in that it
prescribed longer storage periods for slurry pits (between 5 and 7 months) and
new maximum limits on the amount of farmyard manure to be spread on soil at 3
cdu per ha. In addition, it introduced more stringent requirements for the licensing
of contracts for the removal of farmyard manure by the administration.\(^\text{23}\) These
directives, which were commissioned by the cantonal environment protection
authority and referred to an alarming increase in pig stocks in the canton and in
the Lake Sempach catchment area,\(^\text{24}\) focused on the necessity to reduce livestock
holdings – a measure justified in the commentary on the directives on the basis of
an agreement between the Federal Agriculture Office and the Federal Environ­
mental Protection Office of summer 1986 – and met with bitter opposition from
the finance department and farmers’ organisations. It was only when a report by
AGBA demonstrated that "only" 10% of Lucerne farms would be affected by this
measure that the finance department finally gave in.

Towards the end of this third phase, national water pollution policy finally
moved towards a harder line in the matters of water protection and agriculture.
The fertilizer regulations contained in appendix 4.5 of the Chemical Substances
Regulation, which the cantons were gradually "discovering" towards the end of
the 1980s, were given legal reinforcement by the new article 14 of the completely
revised Federal Water Protection Act of 24 January 1991. This act, which was
approved in the referendum of 25 April 1992\(^\text{25}\) and came into force on 1 Novem­
ber 1992, postulates balanced fertilizer levels for agricultural livestock farming,
prescribes a minimum storage duration of three months for farmyard manure
facilities and restricts the levels of animal stock in agricultural holdings to 3 cdu
per ha.

Towards the end of this phase proposals for a total of three popular initiatives
were submitted demanding more fundamental reform of agricultural policy, and
the unequivocal integration of ecological perspectives in this policy area.\(^\text{26}\) It was
not least in response to these initiatives, but also out of concern for the burgeon­
ing costs of providing national solutions for agricultural surpluses, that official
agricultural policy also began to change in the early nineties. What one director of


\(^{23}\) Proof that half of the farmyard manure produced can be used on the owner’s own or
leased land, distance between the supplier and recipient less than 5 km, mandatory soil
analyses at five-year intervals.

\(^{24}\) Cantonal: between 1978 and 1983 increase of 17.2%, catchment area of Lake Sempach:
increases of up to 30%.

\(^{25}\) A further-reaching popular initiative for water pollution prevention measures which went
beyond the new law was rejected by the people and cantons on this occasion.

\(^{26}\) See chapter 3, point 1.
a cantonal water protection authority had touched on at the conference on Lake Sempach on 21 December 1978, and had since then (i.e., with the justification of Sursee town council's ban or restrictions on the use of fertilizer in certain zones) been the subject of increasingly vehement demands throughout the country, found expression for the first time in the report published at the end of 1990. The report by the director of the Popp expert commission (Delamuraz 1990) was commissioned by the Confederate Department of Finance to examine the topic of "Direct payments in Swiss agricultural policy". In addition to recommending direct payments as a complementary measure to price policies, this report made the first official proposal for "primarily ecologically-oriented direct payments" to promote more environment-friendly production methods.


On 18 February 1992 the committee of the association of local authorities approved a report on the clean-up of Lake Sempach which had been compiled by the cantonal Centre for Ecology in Agriculture and the cantonal environment protection authority. During two seminars on the topic of "Methodology of lateral thinking" based on the Lake Sempach case study, new aims were defined for the clean-up of the lake on the basis of this report which were then approved on 22 April 1992 by the association of local authorities under the title "Concept for the clean-up of Lake Sempach". The main aim formulated in this concept was:

Instead of, as previously, aiming at a direct reduction in phosphorous levels in the lake and the improvement of oxygen levels, we have formulated a completely new aim, namely the recovery of the lake within a healthy catchment area. The catchment area must thus be managed and used in such a way that erosion and nutrient flooding can be reduced to a point where the lake can regulate itself (Lake Sempach Local Authorities Association 1992: 2).

The following sub-goals were also identified:

- the improvement and maintenance of water quality (avoidance of discharge in the form of wastewater, fertilizer, herbicides, impurities);
- the improvement and maintenance of the natural water cycle and water habitats (new environmentally sound drainage systems, restoration of natural waters, promotion of water retardation in the residential and rural areas);
- the guaranteeing of long-term, varied and economical use of water and land (including the maintenance of the natural water cycle, protection of ground and spring water);
The Clean-up of Lake Sempach

- protection and safety of residential and recreational areas for inhabitants (including preservation of species, landscape protection, protection and buffer zones);
- promotion of environmentally-sound practices (including compensation for multi-functional agricultural activities, e.g., direct payments for exceptional ecological services, payment of compensation for loss of income, incentive charges);
- "Ecologization of Agriculture" (reduction in livestock holdings and intensive tilling and feed production, optimisation of use of fertilizers with regard to balanced nutrient levels, maintenance and care of ecological compensation areas);
- co-ordination of water, nature, landscape and environmental protection in the catchment area and shared execution of measures to be implemented (including, regional development, hydraulic engineering and improved soil conditions (melioration);
- motivation, political influence and appeals to political authorities (including political activities, advisory services, information, public relations – particularly in schools, basic surveys).

Entitled "Tasks and Measures implemented by Lake Sempach Local Authorities Association", the operation and continued financing of internal measures is expressly identified as "fighting of symptoms", and is only to be continued "until the level of nutrients in the lake has been reduced to a point where artificial aeration is no longer required" (Lake Sempach Local Authorities Association 1992: 4).

The supply of oxygen was to be reduced to the bare requirement and the financial resources which would then become available were to be used to finance external measures and ecological incentive. Among the water pollution prevention measures financed by the association were the implementation of general sewage systems in the residential areas with the aim of achieving water retardation, the promotion of retardation basins, wetlands and seepage areas, the introduction of mandatory authorisation for new drainage systems and ballasting, and co-ordination with regional development. The association of local authorities demanded that the canton develop a concept for environmentally-sound agricultural practices in the canton of Lucerne, introduce mandatory declaration of the phosphorous content of feeding substances and issue a protective order for Lake Sempach. The particularly vulnerable part of the lake shore belt (zone A) was to be transformed into a nature protection zone. Covered and built-over streams were to be revitalised. With these new aims the local authorities association was pursuing not only the complete integration of lake protection policy in general ecological policy but also the integration of agricultural policies in the efforts to achieve protection.
Whilst the cantonal authorities were rather more subdued in their activities during this phase (the environmental protection and agriculture dossier was, it appears, passed internally from the Environmental Protection Office to the Agriculture Office\(^\text{27}\)), a remarkable change in direction took place at national level during the last phase in the Lake Sempach case which can justifiably be identified as ecologization. The following six factors were the source of the political impetus here:

- During the Uruguay round in the General Agreement of Trades and Tariffs (GATT), the extremely protectionist Swiss agricultural policy, with its numerous production fees, import restrictions and structural protection contributions, came under increasing international pressure. The partner countries demanded free access to Swiss agricultural markets in exchange for the advantages of access to free trade for industry, trade and services. This resulted in an increase in interior pressure on agricultural policy from industrial, trade and services pressure groups; these economic sectors, vital for the strongly export-oriented Swiss economy demanded a liberalisation of agricultural policy. The only form of direct payments that comply with GATT regulations are product-independent direct payments, which can ultimately be paid as compensation for agricultural measures which protect the landscape and environment.

- Despite being expressly excluded from the treaty, protectionist Swiss agricultural policy came into increasing discredit among EC countries during the negotiations to establish a European Economic Area (EEA). To guarantee a favourable climate for negotiation, there was increasing support for concessions in this area both abroad and at home. Although the EEA treaty was rejected by the people and cantons in the referendum of 6 December 1992, such liberalisation measures will be required in any future moves towards closer relations with the EC.

- In all these proposals for popular initiatives mentioned earlier, the abolition of product-related agricultural subsidies is demanded in favour of product-independent direct payments. In this, particular ecological services (organic farming, integrated production, care of ecological compensation areas) are given particular emphasis. These popular initiatives enjoy wide support.

- In 1991/92 as part of their nature and landscape conservation policies, individual cantons (particularly Aargau, Bern and Solothurn) began to promote ecological services provided for farmers through cantonal subsidies. The pressure from cantonal nature and landscape and also water pollution prevention policies rose sharply in this period.

\(^{27}\) According to internal information from the Lucerne Environmental Protection Office, March 1993.
On 7 May 1992 the people of Switzerland issued a clear signal by approving the – controversial – Federal Water Protection Act for agriculture also. The referendum to oppose the act, which was initiated amongst others in farming circles, was unsuccessful. The pressure that water pollution policy could exert on national agricultural policy clearly increased as a result of this referendum.

There was a dramatic deterioration in national finances during 1991 and 1992. Even agricultural policy could no longer be protected from expenditure cuts. An, if possible, cost-saving change of regime seemed and seems on the cards for fiscal reasons.

It was against this background that the Federal Agricultural Agency produced its Seventh Agricultural Report in January 1992 (Siebter Bericht über die Lage der schweizerischen Landwirtschaft und die Agrarpolitik des Bundes and – more or less simultaneously – announced on 27 January 1992 the revision of the agriculture act to make provision for the introduction of direct payments. The draft legislation was debated by the Federal Parliament with remarkable speed and passed on 9 October 1992.

Canton administrations throughout the country are currently preparing the first instalments of payments for both categories of direct payments in accordance with article 31A (payment to standard operations which replace previous product-linked subsidies) and 31B (payment for special ecological services). With the introduction of these measures, late 1980s agricultural policy, a seemingly unshakeable giant, has been undermined in an amazingly brief period of time, and finally so fundamentally restructured that practically nothing remains of its previous basic principles based on environmentally-unsound productivism. This will definitely lead to ecological improvements in the area around Lake Sempach.

3. Patterns of Success Scenarios Observed During the Four Phases

On the basis of an examination of approximately 20 case studies known to us on the decision-making processes behind the implementation of Swiss environmental policy by cantons and local authorities we have observed seven patterns of "success scenarios"; the following five of them can also be found in the case of Lake Sempach:

1. Direct democratic (regional or national) pressure generated by popular initiatives or referendums which elevate basic questions arising out of local ecological conflicts to national issues: During the third phase (1986 – 91) policies concerning "Environment and Agriculture" came under direct democratic pressure from several angles and as a result the controversial topic was temporarily promoted from the numerous cantonal and regional implementation fronts to the level of central state policy formulation. This "promotion" in
the status of the topic can undoubtedly be explained by the increasingly sharp confrontations between agricultural policy and water protection policy aims in the events surrounding the sensitive aquatic ecosystems of the lakes in central Switzerland. The pressure on agricultural policy during this phase was (still) clearly coming from environmental policy and not, as in the years from 1972 to 1993 (phase 4), from international agricultural affairs or fiscal policy. In the run-up to the referendum, the groups behind the three popular initiatives circulating on the political arena and the support committee for the new water protection legislation with its stringent measures directed at agricultural practices all made express reference to such executive conflicts. The consensus was that these problems could only be solved through an ecologically-based change in agricultural policy conditions.

On the basis of these popular initiatives, 1989 to 1991 can justifiably be identified as an era of radical change in the thinking of Swiss associations, parties and administrative bodies in the areas of agriculture and ecology. The environment became an increasingly popular subject among the Swiss public during this phase28 (UNIVOX 1992: 21). Characteristically, the pressure came to a certain extent from the streets or from environment groups; the political parties represented in parliament originally devoted much less attention to this issue than one is led to believe listening to their protestations then and now. They joined the debate later on and finally transformed manifest popular demands into legislative policies29 (Knoepfel & Zimmermann 1987: 127 & 187) with the new Federal Water Protection Act of 24 January 1991 and the preparation for the revision of the Federal Agriculture Act. Prior to this there was a kind of corporate consensus between associations, federal agencies and even agricultural research bodies that ecological regulations "may impose important framework conditions for agriculture but should not directly affect the central controlling aspects of traditional agricultural policy" (Knoepfel & Zimmermann 1987: 188). Thus, ecology-based regulations in the area of agriculture should be kept below the threshold of direct democratic politicisation (Knoepfel & Zimmermann 1987: 187). However, increased awareness of environmental issues, reports of the head-on conflict between environmental and agricultural policies on implementation fronts and, no doubt, the wrangling in farming circles over the distribution of increasingly

28 Waterways protection and protection of soil from contaminants were until and including 1991 among the three areas (with prevention of air pollution) which (a representative sample) of the Swiss population surveyed by UNIVOX identified as requiring far more action from the authorities.

29 This is even more true for the initial phase of the debate on the topic of "Environment and Agriculture".
diminished resources\textsuperscript{30} (Knoepfel 1989; Knoepfel 1988) paved the way for environment pressure groups to escape from the old neo-corporate system for the negotiation of interests and take their place on the direct democratic stage that is so characteristic of Swiss public affairs (Knoepfel 1989: 192 f.).

2. \textit{Surmounting of zero-sum scenarios through the introduction of rewards, compensation etc.} for particularly worthwhile services to the environment. Without the compensation regulation passed immediately after the coming into force of the Sursee fertilizer restriction zones, it would not have been possible to generalise this measure in the form of the protective belt introduced by the association of local authorities on 1 January 1989 which included all member areas. The situation would have stayed at an unproductive standstill, and the farming inhabitants who constituted the majority in some of the lake shore municipalities would have been the obvious losers. Through the payment of relatively low financial compensation to this group, it was possible to reduce the potential for conflict and overcome the expected opposition. The principle of paying compensation for loss of earnings adopted in this case as opposed to the strict application of the polluter pays principle has meanwhile become commonplace in a number of central Swiss cantons (Solothurn, Bern and Aargau); it has also become an integrative part of the new agricultural policy in the form of the new article 31b of the Federal Agriculture Act (see phase 4). Paradoxically, in such cases the enforcement of polluter-oriented environmental policy can only be helped by a temporary change in direction to the principle of common responsibility. In the phase 4 the payment of compensation to farmers in the form of direct payments for exceptional ecological services, which was finally introduced in Art. 31b of this act, is also a prime example of the surmounting of a traditional zero-sum scenario which had consistently characterised the conflict between farmers and the environmental bodies since the mid-seventies. Direct payments make it possible to implement ecological changes previously demanded of the farmers to no avail. The concrete form this ultimately takes within the framework of an integrated observation of a cycle can be clearly observed in the new concept for the clean-up of Lake Sempach of 1992 which is quoted extensively in an earlier section.

3. \textit{Parallel interests in environmental and important non-environmental poli­cies.} The reasons given for the solitary path of the Sursee authorities in phase

\textsuperscript{30} The founding of the Small Farmers' Association is typical for this development. The "splintering of actors" in the domestic agricultural scene can be observed as early as 1987 and represents early divisions leading to the development of the ecologicalization of agriculture and the demise of agricultural political neo-corporatism through the intervention of several minority groups rising through the "direct democratic or concordant democratic cycle".
2 shows the clearly parallel nature of the interests behind the Sursee authorities' environmental and non-environmental fiscal policies. In line with good Swiss tradition, their indignation and political will in favour of protecting the environment would, no doubt, have been considerably less fervent if they had not seen themselves as having been cheated in the contributions they paid for the internal measures to save the lake; after paying almost 200,000 Sfr per year to finance the prestigious ventilation plant, damage on a completely unexpected scale is incurred several months after it starts operation despite the implementation of the vastly expensive "machinery". It can be assumed that this financial argument was the last straw for some of the previously more reluctant members of the Sursee town council.

In the course of formulating this account of the fourth phase in the clean-up of Lake Sempach it became sufficiently clear, that by 1992, at the latest, the time for separate debate on agricultural policy and agriculturally-oriented environmental policy, which had characterised the scene until the late 1970s (Knoepfel & Zimmermann 1987: 146 ff., 188),31 was at last coming to an end. Under pressure, as described in a previous section, from GATT, the EC and fiscal policy, official agricultural policy began to play the "ecology card". Environmental and agricultural policy began to grow together to a new ecological policy because agriculture saw that its continued political existence was only possible on the new basis of an integrated ecological policy. The sustained protection of rural ecosystems rich in diverse species and – of equal value – the supply of healthy agricultural products for the country – was identified as the new task of agricultural policy in serving the public interest. In this respect, the formerly antagonistic interests of the two policy areas today are, at least, in part parallel. For without the tilling of arable land in accordance with ecologically sound agricultural practices, Switzerland's diverse rural ecosystems cannot be protected in a sustained fashion because such man-made natural areas quickly succumb to an uncontrollable deterioration if they are not taken care of through cultivation. Thus, ecological policy needs farmers whose income can profit from the broad political consensus of ecological policy.

4. Local opposition to regional or central state public policies of environmental or non-environmental nature. Local opposition to public policies is adequately documented in the Lake Sempach case study in the form of the solitary decision of the Sursee town council to introduce zones with bans or restrictions on the use of fertilizers in phase 2. This solitary initiative was not only an expression of opposition to what the Sursee authorities saw as the too

31 In the form of the so-called "intermediate" ecological regulations for agriculture which did not in the least affect the central controlling dimension of traditional agricultural policy.
one-sided policy of internal measures adopted by the association of local authorities; it was also an expression of protest against what was described as "nonsensical" national agricultural policy (a stance which at the time was even more isolationist). Someone has to take the first courageous step forward. Objectively speaking, the Sursee town council was in the best position to do this because of all the municipalities in the catchment area of the lake it had the most urban population; and agricultural interests were and still are clearly in the minority here. The incident that prompted what even the participants acknowledge as a very daring step was the fish death of 7/8 August.

5. Development, expansion and diffusion of scientific knowledge on important ecological issues. During the first clean-up phase, which was characterised by widespread scientific uncertainty and political polemic, the establishment of a more reliable scientific basis from a neutral source recognised by all sides constituted a major characteristic of the policy of pursued cantonal water protection office. This is clearly demonstrated by the commissioning of EAWAG to analyse the condition of the lake, study the different lake-internal measures and undertake periodic testing of the lake water at a later stage, and also by the involvement of the (local!) engineering consultancy AGBA (whose members included agricultural engineers closely involved in the local agricultural community) which provided a survey of phosphorous levels in the region and later for individual holdings. The same applies for the approach adopted by the Sursee local authority which prior to issuing its ban and restrictions on the use of fertilizers in certain zones commissioned the Federal Research Institute for Agricultural Cultivation (FAP)\(^{32}\) to undertake extensive soil surveys. Findings from numerous research projects undertaken by the internationally renowned FAC commissioned by local authorities in the Lucerne region during this period are also available (Zimmermann 1990: 106-116). Similar evidence of the diffusion processes initiated during this phase can be observed, for example, in the establishment and operation of the nature laboratory by the Federal Environmental Protection Office and the canton (Knoepfel & Zimmermann 1987: 48 f.). The establishment of the cantonal Centre for Ecology and Agriculture which, among other things, created favourable conditions for the diffusion of information about ecology in agriculture, in a context removed from both policy and police, can also be seen as part of this deliberate strategy. All of these efforts represented a conscious attempt to bring about better interfaces between science and practice (Freiburghaus & Zimmermann 1985: 13 ff., 40 ff., 57 ff., 79 ff.). As other case studies, for example on policies to protect the quality of drinking water, the regulation of sludge or organic farming (Knoepfel & Zimmermann 1987),

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32 Eidgenössische Forschungsanstalt für landwirtschaftlichen Pflanzenbau
have shown, the availability and diffusion of basic scientific information is of central importance in the breakthrough phase in the process of ecological change. Such scientific knowledge paves the way for the emergence of a political-administrative platform which is essential in the establishment of trust in the dialogue between the diverging interest groups.

Two other patterns of "success scenarios" we can frequently find in Swiss environmental policies are not present in the lake Sempach case. These are the parallel development of public environmental policy and important private interests in the realisation of ecological projects (e.g. of the so called "eco-business") and the case of local opposition to private projects of widespread regional import (e.g. big shopping centers etc.).

4. Some Conclusions

The 15-year history of the still incomplete clean-up of Lake Sempach combines most of the typical conditions for success which could be identified as significant factors contributing to breakthroughs in Swiss environmental policy. In addition, some of the decisive breakthroughs are characterised by the multiple transformation of issues on their way from the implementation front "up to" central state policy formulation and back. This difficult path is not always crowned with success. Even on the way up, the original issue can be blocked by opposing administrative, political and social forces, and blunted or transformed into a harmless desirable state of affairs. Uproar at local executive levels can be shelved or neutered at canton level. Some environment issues ran out of steam on their way to Bern, or they were raided by political highwaymen.

Failures in the mobilisation of environmental policy issues for which political potential did exist at local level are above all common in transport-oriented air pollution control and noise policies and in land-use planning policy. They can often be explained by difficulties in (inter-community) communication between central town authorities drained by taxes and increasingly wealthy suburban municipalities in the urban agglomerations. This tension between municipalities can be explained in Switzerland by the fact that executive instances rarely exist between the local authority and the canton, which is why environmental pollution caused by traffic occurring at regional level does not have access to suitable initiatives for the representation of the problem at national level (Klöti, Haldemann & Schenkel 1993; Knoepfel, Imhof & Zimmermann 1994).33

Similar blockages of various types are also familiar in the progression of issues from national via canton to local authority level; such situations are generally

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33 Two studies on environmental policy undertaken as part of the national research programme "Cities and Transport" reached the same conclusion.
referred to as implementation deficits. Such deficits are meanwhile less manifest than unsuccessful ecological decision-making processes concerning a controversial environmental issue adopted by the political-administrative bodies. They are often a failure to approach such issues in the relevant executive areas at all. The increase in the number of activities — still undeniable today — that pollute the environment in rural areas through the construction and operation of roads, high-voltage power lines, telecommunications facilities, public transport, etc. paints a far darker overall picture of Swiss environmental policy resulting from failure of the authorities to intervene than the "major" success stories highlighted in individual case studies. Given that they were used for demonstration purposes in training courses on environmental policy and administration, it can be assumed that the selection of these success stories is not an entirely objective choice. Even if this process involved the identification of the specific conditions that lead to environmental policy set-backs, it would surely be better for practitioners and postgraduate researchers to concentrate on identifying and defining the crucial factors for the promotion of past and future environmental policies.

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