

The challenge of soil erosion management in Switzerland: a socio-anthropological analysis of public policy construction and implementation

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Résumé

En 2014, le « Rapport agricole » annonce que la fertilité des sols agricoles suisses est compromise à long terme, et que l'une des causes principales est l'érosion hydrique. Le problème de l'érosion des sols n'est pourtant pas récent. Il est étudié depuis plus de cinquante ans et intégré dans des politiques agro-environnementales depuis plus de vingt ans. Or, malgré des améliorations notables, les experts s'accordent à dire que le problème persiste. Ce constat préoccupant laisse à penser que les instruments de mise en œuvre ne parviennent pas à induire les changements désirés dans le rapport société-sol, et que la gestion de cette ressource doit encore être améliorée.

Cette recherche socio-anthropologique vise à enrichir le débat concernant le problème de l'érosion des sols agricoles en particulier, et de la gestion de leur fertilité en général. Elle a pour objectif de proposer de nouvelles approches méthodologiques pour les preneurs de décisions. Trois résultats préliminaires sont présentés dans cet article : (1) La gestion de l'érosion des sols souffre d'une grande complexité: des connaissances scientifiques font défaut, les compétences et les responsabilités sont divisées, et l'expertise sur le terrain requiert du temps, de l'argent et un personnel qualifié. (2) Les politiques publiques contre l'érosion des sols doivent être perçues comme le résultat de négociations et de compromis plutôt que comme de pures solutions d'experts. (3) Les instruments de mise en œuvre, tels que les programmes de lutte contre l'érosion, engendrent des effets non désirés qui réduisent leur efficacité.

Ces premiers résultats visent à démontrer que l'érosion des sols est aussi bien un problème social qu'environnemental. Ils illustrent comment, face au caractère multidimensionnel (écologique, agronomique, économique, politique et social) de l'érosion, la recherche scientifique est amenée à considérer certains aspects du problème (i.e. dégâts on-site), à en délaissier d'autres (i.e. coûts économiques des dégâts off-site) et à négliger une compréhension globale des enjeux (i.e. la recherche en sciences sociales). Ils révèlent ensuite comment le processus de construction des politiques mène à des solutions satisfaisantes plutôt qu'optimales. Finalement, ils montrent que

les instruments de mise en œuvre devraient davantage être perçus comme le problème à anticiper et à résoudre que comme les porteurs d'une solution à appliquer.

Mots clés : érosion des sols, fertilité des sols, politique agro-environnementale, mise en œuvre, gestion durable des sols

Abstract

Switzerland's 2014 "Agricultural Report" asserts that the fertility of Swiss agricultural lands is compromised in the long term, and that one of the major causes is water erosion. Yet, the problem of soil erosion is not recent. It has been studied for more than fifty years and included in agro-environmental policy-making for more than twenty years. However, despite significant improvements, experts agree that the problem persists. This worrying result suggests that agri-environmental instruments fail to induce the desired changes in society-soil interactions, and that the management of soil resources must still be improved.

This socio-anthropological research project aims at enriching the debate on the problem of water erosion of arable lands in particular, and of arable soil fertility in general, with the goal to propose new methodological approaches for decision-makers. Three preliminary results are presented in this paper. (1) The management of soil erosion suffers from a high degree of complexity: scientific blind spots remain, organizational responsibilities are fragmented, and expertise in the field requires trained personnel, time and money. (2) Public policies around soil erosion are best understood as the result of negotiation and compromise, rather than of optimal expert determination. (3) Implementation instruments such as erosion control schemes generate undesired consequences that reduce their effectiveness.

These preliminary results demonstrate that soil erosion is both a social and an environmental problem. Moreover, they illustrate how, faced with the multifaceted nature of soil erosion (ecological, agronomical, economic, political and social), sci-

entific research is inclined to focus on some aspects of the problem (i.e. on-site damage), overlook other aspects (i.e. economic costs of off-site damage), and neglect a comprehensive understanding of the issues (i.e. social science research). They also reveal why the process of policy construction leads to suboptimal solutions. Finally, they suggest that the formulation of effective

implementation instruments should be understood as a challenge to be anticipated, studied and solved, and not as a purely technical matter.

Keywords: soil erosion, soil fertility, agri-environmental policy, implementation, sustainable soil management

1. Introduction

According to the Routledge Handbook of Hazards and Disaster Risk Reduction, soil erosion is a major environmental hazard with potentially disastrous implications worldwide (WISNER, GAILLARD and KELMAN 2012). In Europe, experts agree that water erosion is one of the principal threats to land use (HELMING, RUBIO and BOARDMAN 2006), and in Switzerland, research demonstrates that since the 1960s water erosion of agricultural lands has worsened. This is due to increases in the exploitation of sloping terrain, of the surface area devoted to corn crops and of the size of individual fields. The gradual degradation of soil structure caused by the mineralization of organic matter and the increased use of mechanization further exacerbates this trend (MOSIMANN et al. 1991). The Swiss map of erosion risk, which uses a USLE/RUSLE-based model approach, estimates that 45% of Switzerland's agricultural surface is characterized by low, 12% by moderate and 43% by high potential erosion risk (PRASUHN et al. 2013).

In order to respond to this situation, beginning in the 1980s Swiss authorities gradually established a comprehensive legal, regulatory and administrative framework to prevent and mitigate soil erosion of arable lands, and more generally, to preserve long term soil fertility. In parallel, a significant number of instruments for the implementation of these policies have been developed by federal and cantonal authorities. Yet, despite decades of scientific research and policy implementation, cantonal and federal experts agree that erosion continues to be one of Switzerland's major agri-environmental problems (OFAG 2012; OFEV and OFAG 2008), and that arable soil fertility is compromised in the long term (OFAG 2014a). While public policies concerning soil erosion are based on solid ecological and agronomical knowledge (MOSIMANN et al. 1991; WEISSHEIDINGER and LESER 2006), it has become clear that agri-environmental instruments fail to induce the desired changes in society-soil interactions. These worrying results suggest that something is missing in the management of soil resources, and that additional efforts are called for.

This socio-anthropological research project aims at enriching the debate on the problem of water erosion of arable lands (hereinafter "soil erosion")

in particular, and of arable soil fertility in general, with the goal to propose new conceptual tools and methodological approaches for decision-makers. Issues surrounding soil erosion management not only pose ecological and agronomic problems, they also raise pressing economic and political questions. Our opinion is that these issues must be addressed together, in a single interdisciplinary research design, in order to gain new perspectives on the problem and its solutions.

In this paper, we present a study we are conducting in the cantons of Fribourg, Neuchâtel, Vaud and Bern. Our research design includes three main aspects: **(1)** Analysis of the soil erosion problem in its complexity: its causes, impact/costs, and stakes. **(2)** Analysis of how public policies concerning soil erosion and qualitative soil protection have emerged and been consolidated over the last sixty years. **(3)** Analysis of the effectiveness of agri-environmental policy, with a careful look at the instruments used to implement it.

In this article, we outline some preliminary results of each of these aspects of our research, based on our review of the literature as well as on a first set of interviews and field observations.

2. Methodology

Our methodology is that of ethnographic inquiry (BEAUD and WEBER 2003; BECKER 2002). Unlike the hypothetico-deductive reasoning and quantitative data analysis central to much of the so-called "hard" sciences, the ethnographic approach relies on iterative and inductive reasoning, and on qualitative data analysis (OLIVIER DE SARDAN 2004).

In this research, we mobilize two broad sets of methods. First, through document analysis, we review the current scientific literature (in ecology/pedology, agronomy, geography, sociology, anthropology and political science), the official position papers (FAO, OCDE, European Union, Swiss Confederation, cantons, Agridea etc.), the federal and cantonal legal frameworks and instruments of implementation, and the media (newspapers, magazines, press release, popular science writings, etc.).

Secondly, we conduct on-site observation and interviews (fieldwork) in order to document and interpret the perceptions and practices of actors interacting around the problem of soil erosion. We

will conduct about thirty non-directive interviews with farmers, field advisers, scientists and public officers at the federal, cantonal and municipality levels, and will take part in approximately twenty administrative meetings and information and training sessions. We have chosen the cantons of Fribourg, Neuchâtel and Vaud as our principal foci, as there are important differences between the situations and policy orientations in these three cantons that will provide us with useful comparative perspective.

We ask the following main questions: for whom, why, where and how is soil erosion considered problematic? What are the limits of scientific expertise in this area? How do actors involved in the problem of soil erosion interpret and use relevant policy instruments and with what effects?

3. Preliminary results

(1) The management of soil erosion suffers from a high degree of complexity: scientific blind spots remain, organizational responsibilities are fragmented, and expertise in the field requires trained personnel, time and money.

Water erosion is a natural phenomenon, magnified by human activities such as farming (BOARDMAN and POESEN 2006). Risk of water erosion depends both on natural (e.g. rainfall regime, natural properties of soil), human (e.g. land use practices, size and spatial layout of plots) and hybrid factors (e.g. agricultural soil properties, hydraulic characteristics of the slope), that all vary in space and time (MOSIMANN et al. 1991). Impact

of water erosion is conventionally divided into on-site damage – which includes soil degradation, declining soil fertility, decline in crop yields, desertification, loss in carbon storage (with effects on climate change), reduced infiltration and water storage capacities – and off-site damage – including eutrophication of water courses and lakes, destruction of wildlife habitats, siltation of dams, reservoirs, rivers and infrastructure, and property damage by muddy floods (BAKKER et al. 2007; HELMING, RUBIO and BOARDMAN 2006; LAL 2004). In sum, water erosion of arable lands is a multidimensional phenomenon whose risks and damage are difficult to evaluate and to map (BOARDMAN 2006; PRASUHN et al. 2013). Its causes are numerous, extending beyond agricultural practices to decisions about zoning, land improvement programs and territorial development. Its direct and indirect costs are difficult to calculate. Furthermore, it involves important and divergent stakes: ecological and agronomical of course, but also economic, political and social.

Studies in the social sciences demonstrate that the complexity of environmental problems makes decision- and policy-making particularly difficult. Public authorities must act on incomplete knowledge, arbitrate between divergent and sometimes incommensurable value systems, and accommodate specific forms of expertise and the working cultures of a variety of administrative sectors. As a result, public policies are often incomplete, fail to set clear objectives and leave a wide margin for interpretation (LASCOURMES 2012).

Our preliminary results corroborate these observa-

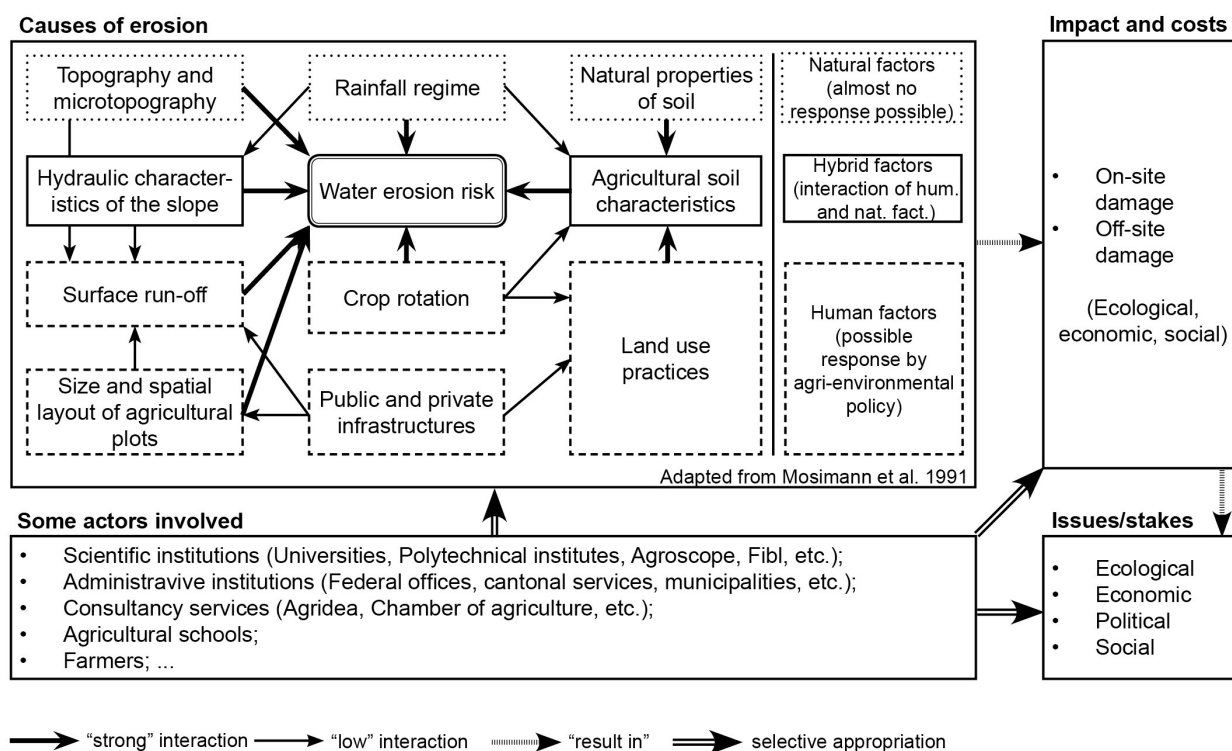


Figure 1. Water erosion of arable lands, a complex multidimensional phenomenon

tions, although additional analysis is called for. First, we observe that the complexity of soil erosion leads to serious methodological problems. Indeed, some European soil experts note that “comprehensive understanding of soil erosion is still very difficult” (HELMING, RUBIO and BOARDMAN 2006). While this failure can be explained by the large variety of questions that erosion raises, we believe a further factor can be identified: the over-reliance on studies based on “hard” science research design and methodologies. The last forty years of research about soil erosion in Switzerland has been carried out by soil scientists who mainly focus on ecological and agronomic questions, and specifically on the on-site effects of erosion. This process of selective appropriation – focusing on some aspects of the problem while ignoring or minimizing others – is an understandable reaction in the face of complexity. However, it has led to the emergence of blind spots. On the one hand, ecological and agronomic knowledge gaps and controversies remain (BOARDMAN 2006); on the other hand, social science-based studies of the economic, social and political aspects of soil erosion are scarce. For example, the temporal and spatial variations of soil erosion, as well as its off-site impact, causes and costs, remain understudied in Switzerland (LEDERMANN et al. 2010). Indeed, the only social science research on questions of soil erosion in Switzerland focused on the adoption of no-till practices by farmers (SCHNEIDER et al. 2012; SCHNEIDER et al. 2010; SCHNEIDER et al. 2009). In sum, no study has attempted to encompass, in a single research design, soil erosion in all of its complexity in order better to analyze the effectiveness of Swiss public policies in this area.

Secondly, the multidimensional characteristics of soil erosion (agronomic, environmental, territorial) make administrative management difficult. Public attempts to manage soil erosion and qualitative soil protection require coordinating the actions of a number of legal and administrative jurisdictions, such as federal offices, their departments and sections, cantonal services, chambers of agriculture, etc. Each of these institutions has its own history, experts and strategies, and each of them has to deal with conflicting issues. Consequently, erosion management is exposed to the organizational division of expertise and responsibility, as well as to a varying political context.

Thirdly, expertise in the field requires trained personnel, time and money, as each case of erosion seems to be different, calling for individualized solutions involving different group of actors (farmers and their neighbors, field advisers, municipalities, cantons, etc.). Trying to understand the problem in its totality on the basis of a single farm plot or even a single farm is often an inadequate research strategy (LEDERMANN et al. 2010). Thus, defining the causes of damage, and identifying the potential actors or organizations in

a position to respond to these causes, takes a form of comprehensive expertise that few are in a position to provide.

(2) *Public policies around soil erosion are best understood as the result of negotiation and compromise, rather than of optimal expert determination.*

Decades of research on public policy in the social sciences demonstrate that developing a policy involves more than solving problems; it first involves “building” problems – identifying them, characterizing them and interpreting them (ANDERSON 1988). As case studies have shown, for any given problem, some dimensions and issues will be inevitably overlooked, ignored or eliminated, while others will be selected, highlighted and reformulated. According to LASCOUMES and LE GALES (2012): “The construction of a public problem can be defined as a process in which a group of private and public actors interact in order to impose their representations and interpretations of an issue, and to guide its management and the actions to be taken” (our translation). In other words, building a public problem means naming and framing it, assigning blame or responsibility and finally claiming its place on the political agenda (FELSTINER, ABEL and SARAT 1980). This last step includes making alliances (lobbying) in a search for political support, in order to arrive at the final stage, which is decision-making. In sum, social science studies of the construction of public policies demonstrate how decision- and policy-making are the result of collective action structured by power relations and requiring the constant adjustment of conflicting interests. Decision-making could be summed up as the quest for the best compromise.

Our preliminary results seem to corroborate these insights. Soil erosion and, more generally, soil fertility protection did not become a political issue subject to agro-environmental policies overnight. Their emergence and development are the result of the mobilization of public and private actors over decades. Building on scientific research on erosion in developing countries undertaken at the Swiss Polytechnic Institutes of Zürich (ETHZ) and Lausanne (EPFL), soil erosion in Switzerland was mentioned for the first time at the political level in 1973 when the Federal Council established the Leo Schürmann Committee in order to develop Switzerland’s first Environmental Act. Article eight specifies that erosion and compaction are both problems in Switzerland, that priority zones of high risk must be mapped, and that measures must be taken to prevent the problem. Over the course of the 80s and 90s, the legal bases for erosion management and qualitative soil protection were created and consolidated. This evolution was the result of a combination of several factors: the progress of scientific research, the effects of public and pri-

vate lobbying, the consequences of environmental disasters on public and political opinion (e.g. Bhopal in 1984, and Schweizerhalle in 1986), and finally, the political, economic and administrative impact of a number of international projects such as the 1991 doubling of the European pipeline that crosses Swiss territory.

Following a long decision- and policy-making process, the problem of soil erosion finally found its way into the Environmental Protection Act (USG/LPE) of 1983 and its Ordinance relating to Impacts on the Soil (VBBö/OSol, 1998), into the Agricultural Act (LwG/LAgr) of 1998 and its Ordinance on Direct Payments (DZV/OPD, 2013), and into the Water Protection Act (GSchG/LEaux) of 1991. By integrating soil erosion within the legal framework, the Swiss political-administrative authorities were forced both to discuss this phenomenon and to choose an explanatory model. In the language of political science, they were obliged to identify both the target groups and the beneficiaries of their policy propositions, including indirect victims and beneficiaries (KNOEPFEL et al. 2010).

The result of this process has given us the multi-faceted agro-environmental framework within which the problem of soil erosion is currently addressed. On the one hand, relevant environmental legislation (USG/LPE, VBBö/OSol) considers soil erosion as a problem of long-term soil fertility and points in general terms to all of the actors potentially responsible for erosion. It also prescribes the technical measures required to address these problems, and defines indicative values for meas-

uring success. Agricultural legislation (LwG/LAgr, DZV/OPD), on the other hand, considers soil erosion as a problem of sustainable use of natural resources and focuses specifically on agricultural practices aiming at preventing and mitigating erosion.

Just as important as how the problem was framed for action by certain administrative sectors is the fact that it was not problematized by others. Thus, neither the Spatial Planning Act (RPG/LAT), nor the Ordinance on Land Improvements (SVV/OAS) deals directly with soil erosion or qualitative soil protection (excepting SVV/OAS, art. 14, sec. C). Furthermore, the mapping of high-risk areas, as suggested by the Schürmann Commission in 1973, has still not been introduced into the legal framework. Another interesting fact is that, in comparison to the average soil formation in Switzerland (MOSIMANN et al. 1991; WEISSHAIDINGER and LESER 2006; ALEWELL et al. 2015), the indicative value for erosion should be of 0.5 t/ha/yr. The values of 2-4 t/ha/yr set out in the VBBö/OSol represent, in the eyes of several soil experts, the result of a compromise.

As these inconsistencies and regulatory gaps demonstrate, public policies around soil erosion can be understood as the result of negotiation and compromise, rather than of optimal expert determination. According to one expert: "We must always keep in mind that legislation gives a picture of the political, economic and social balance at any given time. And qualitative soil protection is no exception to the rule."

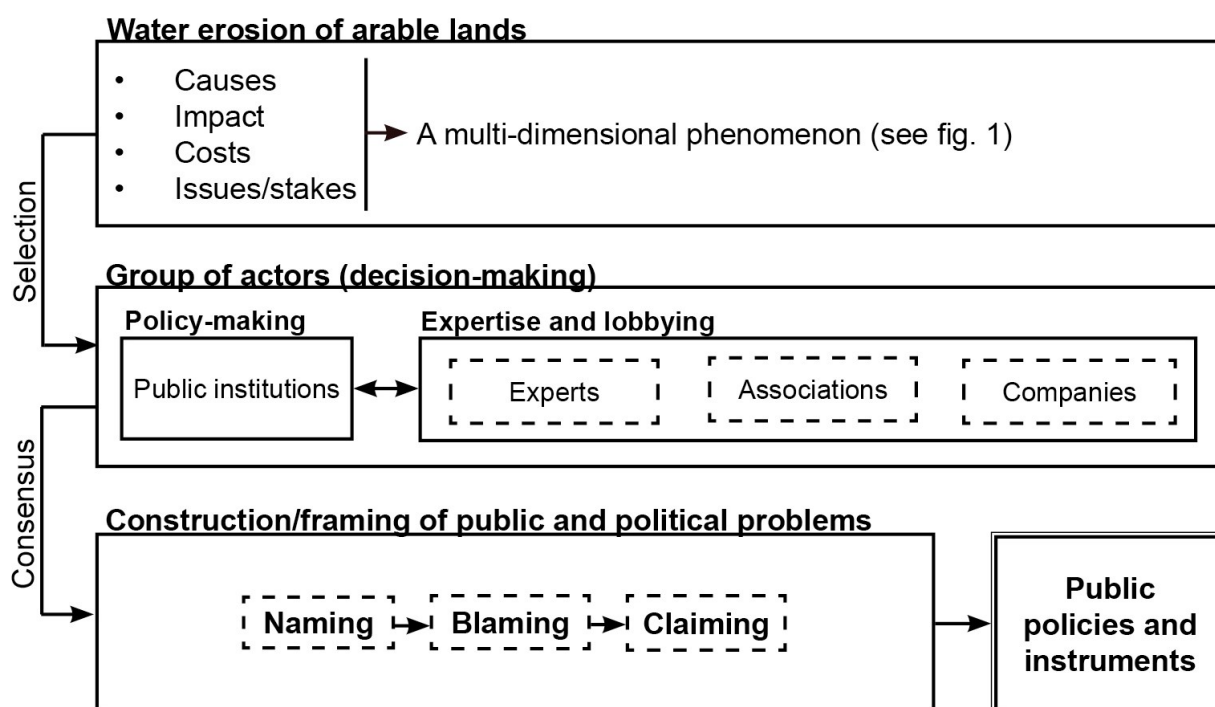


Figure 2. From a problematic situation to public policies

(3) Implementation instruments such as erosion control schemes generate undesired consequences that reduce their effectiveness.

Social scientific analyses amply demonstrate the fragile and uncertain capacity of public policy to solve problems (LASCOUMES and LE GALES 2012). There are a number of reasons for this. Firstly, public policies propose generic solutions, while the implementation process is confronted with the biogeographic, administrative and political characteristics of specific territories. Secondly, instruments are not “pure” or “neutral” technical tools. Rather, they reflect values and produce effects on social actors that can be quite different from what their designers expect or desire. More precisely, policy instruments induce a specific awareness of the phenomenon by ordering and ranking the stakes and considerations at hand. In so doing, they necessarily empower certain actors and penalize others, thereby create incentives for re-appropriation or inaction by the actors concerned (LASCOUMES and SIMARD 2011). In sum, social analysis of policy instruments shows how frequently they are unable to transform social practice because they are diverted from their original purpose toward unintended uses.

Our first observations demonstrate that the success of soil erosion management does not depend only on technical understanding of the problem and on the capacity to developing instruments to solve it. Effectiveness rests equally upon the economic, social and political dimensions of implementation.

In Switzerland, the guiding framework is legal and administrative, leading to the development of tools such as erosion control schemes, the cross-compliance system (OFAG 2014b), guidelines (OFEV and OFAG 2013) and a map of erosion risk (PRASUHN et al. 2013). Despite their importance, these tools represent the result of a long process of consensus-building through compromise.

The case of soil erosion control schemes in the cantons of Fribourg and Vaud perfectly illustrates these social, economic and political constraints on implementation. This instrument aims at mapping, preventing and mitigating soil erosion of arable lands on the basis of control and incentive strategies (SAGRI 2007). Although they are considered to be a coherent administrative solution by many experts, their effectiveness is generally viewed as limited: controls are not made assiduously by the farmers responsible for checking up on their peers, the identified cases are not systematically addressed by the different cantonal services, political support and administrative staff is lacking, etc. In the language of the social sciences, the actors refuse to be enrolled in the problem as framed. As a consequence, inertia and resistance obstruct the successful conduct of the scheme.

These unintended consequences may be explained by two factors. First, erosion control schemes are based on a strong vision of the ruling-ruled relationship. This leads to asymmetrical relations of power between the State (controller) and farmers (the people controlled) that can generate suspicion and conflict. Secondly, efficient

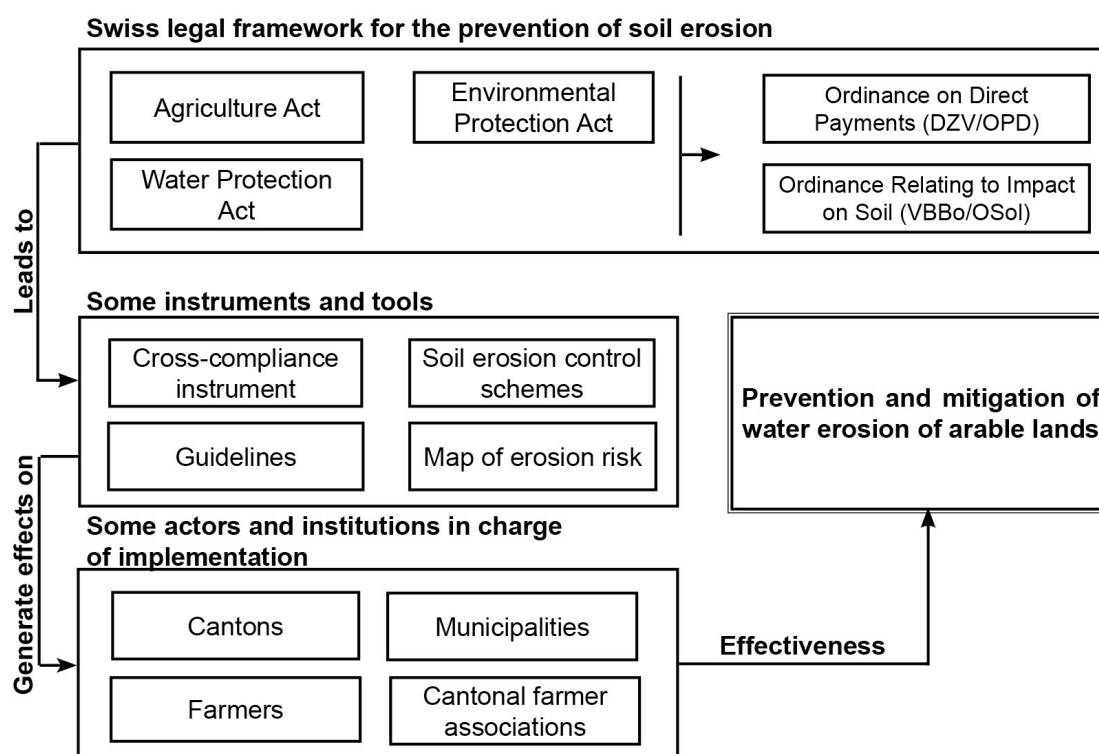


Figure 3. Effects and effectiveness of instruments and tools

erosion control schemes require strong political support. However, given the lobbies and stakes at hand, politicians and administrators tend to avoid the conflicts that can be generated by implementation.

4. Discussion

This ethnographic inquiry aims at painting a general picture of the way water erosion of arable land is experienced, studied and managed by key actors in Switzerland, with a focus on the cantons of Fribourg, Vaud, Neuchâtel and Bern. Unlike the soil science approach, the ethnographic approach does not lead to technical and quantitative solutions. However, we argue that it is the only approach able to encompass this complex problem in its totality (including its ecological, agronomic, economic, political and social aspects). In our discussion, we focus on three results of our study, as conducted thus far.

(1) Soil erosion is both a social and an environmental problem. More precisely, it is a complex socio-environmental problem closely but indirectly linked: to the evolution of agriculture and its public policies; to the evolution of farmers' life- and work-ways; and to policies in the area of territorial development and land improvement. Agricultural practices are the most direct causes of erosion but they are certainly not the only ones. Yet, scientific research on erosion has thus far not analyzed the interactions between these various forces. This selective appropriation is not without consequences, and raises the question of the limits of the ability of science (both "hard" and "soft") to take into consideration all the issues surrounding a given problem, thereby guiding public decision-making. Put more provocatively, perhaps, the fact that our study opens new ground in research on soil erosion in Switzerland is a part of the problem that we propose to study here.

(2) In parallel to the issue of scientific knowledge production, we highlight the need to understand current public policies on soil erosion as the result of consensus-building processes that have taken place over a long period of time and have involved different groups of actors. This observation leads us to consider public policies on soil erosion as satisfactory solutions rather than optimal ones, and to think about new ways to improve consensus-building. Our approach will address this challenge by integrating the experience of science studies (AKRICH, CALLON and LATOUR 2006; CALLON 1986; LATOUR 1991). One of the key insights of this literature is that grasping environmental problems in their complexity may generate more incertitude and insecurity. For instance, if Swiss soil fertility is compromised in the long term, will it be able to feed future generations? What is the role of insurance policies (i.e. Schweizer Hagel, liability insurance) with respect to the persons/organizations in charge of environmental

damage? Should fertile soil be understood as a public good?

According to some experts in socio-technical problems and public policies, part of the solution to this increased complexity lies in hybrid forums, where uncertainties can be subject to public debate (CALLON, LASCOUMES and BARTHE 2001). Hybrid forums are seen as spaces of democratic deliberation where all the actors concerned – experts, politicians and laypersons – can come together in order freely to discuss technical choices and their social, political, economical and ecological impact. In this context, controversies are not considered dysfunctional. Rather, they are seen as an opportunity to survey all the stakeholders, dimensions, questions and alternatives surrounding a problem, in order to improve its "framing", and to stabilize the issues and the roles of each party. Following this logic, we can ask what types of debate (public, political, expert) took/take place around the problem of soil erosion and soil fertility protection in Switzerland today? Did these issues become a public concern or did they remain an expert problem? How do stakeholders such as the population, farmers, associations, politicians, scientists, public institutions and the agri-food sector take part in these discussions? And what do these debates reveal about what is problematic, and about what are the real goals of present and future policies?

(3) This leads us to the question of the effectiveness of agro-environmental policies, and to the ways in which its instruments have been appropriated (or not), and their consequences. Although erosion control schemes are considered to be a success from the administrative point of view (all cantons have created them and identified the local actors responsible for overseeing them), their actual impact on reducing soil erosion remains limited. The good news is that from a social science perspective, this resistance and inertia can represent part of the solution. By analyzing the way actors such as public officers, field advisers and farmers appropriate the instruments at their disposal, we can understand perceptions and highlight conflict zones, uncertainties and controversies. In this regard, our observations show that, from the point of view of a majority of farmers we met, the problem of soil erosion is not primarily one of long-term soil fertility, as problematized by the environmental legal basis. This difference in perception illustrates the gap between farmers' and official views. Schemes and measures can be good in theory, but if they are not socially implementable, their impact remains limited. Following this observation, implementation instruments should be considered as a problem to be anticipated and solved, and not as the solution in and of themselves.

This project considers one issue – soil erosion – that poses challenges for farmers, public authorities and scientists. As such, it reveals the multiple

stakes involved in sustainable management of soil fertility. Three key questions remain open for decision-makers and we will tackle them during the remainder of the research period: (1) Without systematic monitoring of soil fertility (biological, chemical, physical) how can experts, politicians and citizens assess the urgency of the problem? (2) Do current indicators for agro-environmental monitoring reflect the actual state of soil fertility? (3) In a changing and uncertain world, what is the socio-environmental resilience of Swiss agriculture today?

5. Conclusion

Our goal in this research project is to play our part in solving the challenge posed by soil erosion of agricultural lands in Switzerland in particular, and by the sustainable management of soil fertility in general. By using the insights of social science, we propose new concepts and methods for decision-makers. We believe our approach can allow key actors concerned by this problem to “think outside the box”, helping to change perceptions, avoid pitfalls, and open up new avenues for exploration.

Our first conclusion is that the complexity of environmental problems such as soil erosion implies new fields of research and new types of management. Our second conclusion is that new democratic processes for resilient policy construction are needed. As a third conclusion, we point to the way in which implementation instruments should be considered as the problem to be anticipated and solved and not as solutions in and of themselves.

Though the urgency of soil erosion and soil fertility degradation is not yet quantified – and this gap should be filled – it is nonetheless clear that the ecological/agronomical, economic and social consequences of these problems may be disastrous in the long term. Swiss soil has never been under as much pressure as today, and its protection will require courageous political decisions. New modes of management are needed in order to preserve this vital resource, and to avoid costly off-site damage on human infrastructures and natural habitats. Our aim as we complete this project over the next two years is to pinpoint specific adjustments in overall soil management policy that will address these shortcomings in a politically realistic and socially sensitive manner.

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