

Strategic management of environmental decisions: the role of social, policy, and cognitive networks

by

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PhD thesis

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Table of contents

Foreword.....	4
I. Introduction	5
1. Motivation	5
2. Thesis outline.....	8
3. Social networks, personal norms, and collective actions for sustainability	12
a. Environmental dilemmas and social capital	12
b. Decrease and transformation of social capital.....	13
c. The macro model of pluralist democracies	14
d. A look at consumer society	17
e. Problems selected for detailed analysis	21
II. Effective participation in collective decisions	23
1. The selection of opinions: answer or publish	28
a. The idea in brief.....	28
b. Implementation and practice	29
c. Summary	32
2. The selection of initiatives: applications for official support.....	33
a. The idea in brief.....	33
b. Implementation and practice	35
c. Summary	37
3. Diversification of strategic uncertainties in the business of environmental policy	38
a. Uncertainty in environmental problem solving	38
b. The analogy and the ensuing hypothesis.....	39
c. The survey	43
d. Statistical evaluation	44
e. Summary	45
4. Policy measures to address bird interactions with power lines – a comparative case study of four countries	46
a. An environmental policy network	46
b. Common features of the problem	47
c. Country-specific solutions.....	48
d. The interplay of structure, dynamics, and context.....	53
e. Summary	54
III. Individual decision making	56
1. Individual belief systems.....	56
a. The role of personal beliefs	56
b. Belief systems as statement networks.....	57
2. Decisions in environmental dilemmas	61
a. The cognitive war to save the planet	61
b. The dilemma of human-environment interaction	61
c. Today’s dilemma	64
d. Dealing with the dilemma	66
e. Summary	71
IV. Conclusions	72
References.....	77
Appendix 1.....	88
Appendix 2.....	91

Foreword

I grew up in the age of forest destruction, climate change, and rapid social restructuring. I was 6 when the iron curtain fell, 14 when the Kyoto protocol was adopted. From the beginning, my worldview was strongly influenced by easily available information about global environmental challenges and humanitarian crises. Very early, I came to know about threats to biodiversity in various ecosystems and my eyes were opened to human suffering. Not only did a vast number of books and an increasing flow of information through the internet enhance my understanding of theoretical and practical aspects of such problems, but also they strengthened my affiliation with nature and fellow humans. At the age of 18, I was quite sure I wanted to make a difference. Since then, I have been searching for the most appropriate ways to make maximum positive impact. Studying environmental decision making offered the possibility to understand processes which may determine the fate of humanity. In September 2007, I became a full-time student of environmental issues.

With a background in natural sciences, I turned to the social aspects of sustainability. I always enjoyed crossing disciplinary boundaries: for me, every time it is a pleasure to understand the basics of a new research area. Due to the complexity of social and environmental issues, this is not an option, but an imperative in sustainability science. The intention of my theoretical studies was to find connections between existing pieces of knowledge and integrate them into new structures. My work is inherently multidisciplinary: social and political studies, economics, psychology, and cognitive science are woven together by the analytical thinking I learned as a physicist. The issues I deal with may seem simple if compared with the topics of more traditional disciplinary research. However, this simplicity can add special value to potential findings: the more basic mechanisms we uncover, the more people may understand and use our results. Although I consider myself a generalist, I often had to go deeper in given branches of science to present my ideas to a professional audience. Hopefully, this doctoral thesis will satisfy both generalists and specialists and also remain an interesting reading for the general audience.

From a thesis-writing point of view, however, rules of my doctoral school are not very fortunate for students who do research in many different fields. According to the regulation, each and every thesis statement must be supported by a scientific article and at least four papers are needed altogether. Although I wrote more than enough articles, several of which were published in leading international journals, I do not have four papers about one narrow topic. Consequently, my thesis cannot avoid being a mosaic. Different issues, different scales, and different methodologies are integrated in the dissertation whose clear aim is to raise efficiency of environmental problem solving. The unusual diversity of this work is a direct consequence of the generalist, problem-oriented scientific approach I have taken.

Obviously, I cannot solve all problems mentioned in the thesis. The scientific contribution I attempt to make is not always the demonstration of evidence of efficiency in environmental problem solving brought on by a specific solution method or cognitive pattern; several times I just try to point out new opportunities or highlight new aspects of environmental decision making. Whether or not my suggestions and policy recommendations would evoke positive changes can sometimes be questioned; however, without such uncertainties, any changes are unlikely to happen. Throughout my dissertation, I will argue for new directions on a scientific basis.

I. Introduction

1. Motivation

In the first decade of the third millennium it was due time to write a book about *Rescuing a Planet under Stress and a Civilization in Trouble* (Brown, 2006). Lester Brown, one of the preeminent thinkers of the environmental movement, not only argued for the restructuring of the economy, but also pointed out why it needs to be done at a wartime speed. In the latest version of his regularly revised book he calls for a “great mobilization to save civilization” (Brown, 2009). However, it is still not clear for all: do we really need to change so much? Isn't it natural that humans exploit their environment to achieve well-being? Isn't it natural that societies develop in an uneven fashion and some people have a lot more than others? Aren't the current decision-making frameworks appropriate to promote freedom and democracy, which is the best possible option for humanity and its environment?

To answer these questions, let me go back in time to see our options. Humanity, like any other species, always had an impact on its environment. The systems we created were very different from two key aspects, though. First, the extent of stability varied considerably. Some human communities lived in dynamic equilibrium with nature; others triggered trend-like or abrupt changes in parameters describing the state of their local environment (Diamond, 2005). Second, the quality of life in different systems showed significant variations. Although it is very hard to measure the well-being of humans, let alone whole ecosystems, we can still say, for example, that certain societies gave most people opportunities to fulfill their basic needs in a Maslowian sense (Maslow, 1970), while others failed to do so. Let me analyze the current global system from these two aspects.

Today, the global natural system, of which humanity is a part, is further from equilibrium than ever before. A number of strongly linked mega trends have unfolded in the last few decades. In the following, I succinctly refer to three of these: changes in species abundance and diversity, changes in land use, and changes in global material flows.

We are not the first civilization to kill animals and plants and drive species into extinction, but we are the first to do it in all kinds of ecosystems at the same time. The IUCN reports that 44% of 47677 animal and plant species surveyed are threatened with extinction or classified as near threatened (IUCN, 2009). With 1 to 2% of the biological richness already gone, we are on the verge of losing nearly half of the diversity that evolved through millions of years. This staggering loss is a part of a more general decline: population numbers are falling in various ecosystems. Globally, 90% of big fish are gone (Myers and Worm, 2003), 85% of oyster reefs have been lost (Beck et al., 2009), stocks of large predators of the sea, whales, and sea turtles are down 80% from the 1950 levels (Jackson, 2008). 70% of coral reefs are destroyed or damaged (Wilkinson, 2004) and in marine ecosystems it is hardly possible to find healthy species close to their original abundance (Jackson, 2008). The future of spectacular and life-supporting annual events like the salmon run in North America is now uncertain (Wakefield, 2001). On land, migrations of large mammals like the caribou, the American bison, or Africa's wildebeests are in serious declines, some have vanished entirely (Harris et al., 2009). Iconic animals like lions in Kenya or koalas in Australia are slipping towards local extinction (Barley, 2009; Tabart and Possingham, 2009). Tropical terrestrial species populations declined by 46 percent on average in just 35 years (WWF, 2008). Freshwater inhabitants are probably even more threatened than terrestrial and marine species.

However, the picture is not so bleak everywhere. Successful conservation projects indicate that nature is still able to renew itself: species can come back to life, the complexity of nature can return to undisturbed systems. For example, highly managed marine ecosystems where overfishing is reduced show clear signs of recovery (Worm et al., 2009). There is startling

evidence that most ecosystems globally can, given human will, recover from very major perturbations on timescales of decades to half-centuries (Jones and Schmitz, 2009).

A second example of imbalance concerns land use. We are not the first civilization to use land for agriculture and other human purposes, but we are the first to do it on a planetary scale. Our generation leaves a vastly changed global landscape behind. Croplands, pastures, and rangelands expand at the expense of natural habitats. The Amazon rainforest, the largest forest on Earth, is cleared for cattle ranching and other agricultural purposes. In four decades, we have lost or transformed nearly 40% of this paradise (Butler, 2008). Nearby cerrado grasslands are destroyed for the same reasons, but at a double rate (Klink and Machado, 2005). Hotspots of biodiversity in Southeast Asia are converted to palm oil plantations. Indonesia, the largest producer, loses 2% of its forest cover annually (Butler, 2006). In semiarid regions of Central Asia and the Sahelian zone of Africa overgrazing turns grasslands into deserts. Hundreds of villages are abandoned year by year. The world is quickly losing soil accumulated over long stretches of geological time (Brown, 2009, p. 32-38). Logging and extraction industries are also responsible for massive transformations of land cover: large tracts of forests fall every year in the war ravaged Congo or the remote Tasmania (Hance, 2009). As part of a general trend, we now turn to the tropical and cold regions after having lands in the temperate region transformed. Ecosystem degradation, freshwater decline, pollution, and greenhouse gas emissions are all strongly linked to land use changes (Foley, 2009).

Nevertheless, there is still hope: at least 20 percent of land deforested in the Brazilian Amazon is regrowing forest (INPE, 2009), aid groups and farmers now cooperate to re-green the Sahel (Block, 2009), and successful ecological restoration projects deliver benefits to both humans and nature around the globe (Halpern, 2003; Edwards et al., 2009). The innovative potential to improve the fertility and productivity of our lands has never been greater.

A third challenge to restore balance with our environment concerns material flows. It has happened before that a civilization used significant amounts of different materials and polluted areas far from their settlements, but never before did humanity dominate the material cycles of the majority of the elements in the periodic table (Klee and Graedel, 2004); and never before did we produce global pollutants like greenhouse gases that threaten the stability of Earth's climate. Today we do both. While resource needs put an enormous pressure on local natural environments, waste causes both local and global problems. Unidirectional material flows change natural systems and mechanisms that support our very existence. The upset carbon, nitrogen, or phosphorous cycles are just the most known examples of material imbalance: consequences range from climate change and ocean acidification to freshwater pollution and the development of dead zones in the world's oceans.

However, there are glimmers of hope: we realized many of the problems and tried to reduce some of the large-scale effects. The reduction of nutrient runoff from agricultural lands, improving municipal waste management, or the global struggle to fight climate change show that there are serious efforts to give answers to some of the pressing problems we caused.

Notwithstanding the value of environmental protection, we have to concede that we are out of balance with nature. Regrettably, practices that cause this imbalance do not deliver well-being to an overwhelming majority of human population on Earth. Basic needs like the need for food, shelter, or safety are not satisfied for billions. More than 1 billion people are starving (WFP, 2009), 24000 are estimated to die every day due to malnutrition (FAO, 2008). 2009 saw people in Cameroon stealing meat from lions to survive (Schoe, de Iongh, and Croes, 2009) and others in India killing each other for extremely scarce water resources (Chamberlain, 2009). A 100 million people are homeless (Capdevila, 2005), 1 billion live in slums. In the third world, safety is threatened by diseases nearly unknown in countries with modern healthcare. Pneumonia, diarrhea, measles, and preventable epidemics like malaria and

AIDS are the deadliest killers. Yearly 9 million children under 5 die (Wardlaw et al., 2010), approximately 18 times the Hungarian population in this age group.

To give a balanced view of the situation, it is important to see that the current system also has substantial advantages. Outside sub-Saharan Africa, life expectancy rose in most countries in the last few decades. Until recently, as food production grew, the number of hungry fell year by year, most especially in China. Extreme poverty was eradicated in regions of Southeast Asia, healthcare systems improved. The majority of people in the developed world did not have to experience serious crises. From a material point of view, hundreds of millions could sustain a relatively high standard of living with various kinds of new opportunities. Novel forms of entertainment, mobility, and information flows offered a contribution to the well-being of many.

However, recent trends show that, besides the tragedies mentioned before, successes achieved so far are also in peril. Food security, for example, is deteriorating. Massive trends like population growth, increasing consumption of animal products, a rising demand for biofuels, falling water tables, the scarcity of agricultural land, and climate change make it increasingly problematic to meet global demands (Brown, 2009). Half of the world's population is expected to face severe food shortages in a few decades time in the 'business as usual' scenario (Battistil and Naylor, 2009). It will also be increasingly difficult to provide access to safe drinking water for billions. Without major changes, the ranks of slum-dwellers are projected to swell to 2 billion by 2030 (UN HABITAT, 2003). Amid these circumstances, it will not be easy to fight life-threatening diseases or concentrate on human well-being.

While increasing consumption is a necessary concomitant of improvements in well-being in developing countries, to date, the rush for growth is not restricted to the third world. The wealthiest 20% using approximately 80% of all goods and services also wants to consume more. Inequality soars: the income of the wealthiest 500 individuals equals the combined income of the poorest 416 million (UNDP, 2006). A few years ago a study pointed out that the 3 richest men on Earth had more assets, than the poorest 48 countries together (Worldwatch Institute, 2002). In a world governed by money, certain persons are more powerful than millions of others together. That results in unbelievably unequal life-chances and false priorities. In 2009, bonuses of 9 large banks with a collective deficit of \$ 81 billion exceeded \$ 32 billion (Story and Dash, 2009), an amount that would have been sufficient to provide basic healthcare for all, globally. The money, instead, was spent in consumer societies. From the global well-being point of view, this is highly inefficient: e.g. while fifty percent of children in Madagascar suffer retarded growth due to a chronically inadequate diet, food wasted last year in the United States could have fed 220 million people properly (Hall et al., 2009). While the size of an average new home in the USA well exceeds 200 square meters, 3.5 million people experience at least temporary homelessness in the same country in a year (US Census Bureau, 2008; Burt et al., 1999). In the Philippines, hospitals for the rich look like luxury hotels, while the poor can either give manual artificial ventilation to their sick relatives themselves, or let them die (Opitz, 2007). To make things worse, the poor often subsidize the rich by bearing the costs of their environmentally disruptive activities (Dasgupta, 2010), by paying hefty interests on their loans (Millet and Toussaint, 2009), and by participating in the world trade system whose rules work for the rich (Oxfam, 2002).

Apparently, the present world order is neither environmentally sustainable, nor socially acceptable. Humanity is at a crossroads: either we implement major changes quickly, or further large-scale irreversible deterioration of the planet and the people is inevitable. Business as usual has started to read like the end of the world: in his "wake up call", UN Secretary General Ban Ki-moon said that "business as usual is not an option" to protect the world's biodiversity (Ki-moon, 2010); a landmark International Energy Agency report concludes that "a global revolution is needed in ways that energy is supplied and used" (IEA,

2008); a *Science* study testifies that in food production “challenges amount to a perfect storm” and “navigating the storm will require a revolution” (Godfray et al., 2010); and for all these revolutions a new economic model is necessary, because “growth isn’t possible” (nef, 2010). In a very general sense, “the status quo ... is no longer an option” (Steiner, 2010). Planetary boundaries will in one way or another limit our possibilities (Rockström et al., 2009). What combination of economic, political, and natural effects will do this, we can not be sure yet. What is sure, however, is that our planet can not support the western model of economic growth in the 21st century. A paramount task is to plan and implement innovative solutions for a very different future.

2. Thesis outline

As the simultaneous environmental and humanitarian crises are directly or indirectly linked to human decisions and behavior, studies of decision making processes are essential to improve well-being and mitigate the instabilities in the human-nature relationship. We have to pay attention, among others, to the institutional frameworks of decision making, strategic concerns, and psychological motivations behind individual and collective behavior. Accordingly, social sciences like politics, economics, sociology, or psychology are very often central to sustainability studies.

The fact that all these disciplines will be touched upon in my thesis, but none of them will be singled out as the primary approach indicates my methodological affiliation with ecological economics. Indeed, I not only share interest with ecological economists in issues like intergenerational equity, irreversibility of environmental change, uncertainty of long term outcomes, or sustainable development; but also accept that social science is unavoidably normative. Based on my value system and the way I address problems in coupled human-environment systems, I consider myself a student of ecological economics.

As such, I set research objectives for my thesis with a clear normative orientation: I will look at an individual who is concerned about the current negative social and ecological trends and try to give new insights about his/her action opportunities. Today, straightforward options for those who want to make a difference include political participation, civic engagement, and personal-level decisions and activities. For example, concerned citizens may talk to their representatives to influence their opinions and decisions, join civil associations to work on specific issues, or make efforts to live sustainably and encourage others to do so. However, all these options have their own problems: decision makers may not listen to reasonable arguments (Rasmussen Reports, 2010), civil associations may not get support or make strategic mistakes in the increasingly intricate policy networks (Greaves and Grant, 2010), and unsustainable lifestyle choices may prevail due to cognitive reasons (Takács-Sánta, 2007). The overarching aim of my thesis is to study these cases, identify sources of inefficiency, and point out improvement opportunities.

Although the motivation behind all my studies is essentially the same, the methodologies I apply and the types of conclusions I reach are very different. First, my own frustrating experiences as an activist in the current institutional environment were good triggers to search for better solutions. After ideas of institutional innovations were born, I had to bring in several threads from literature to place my argumentation on a solid foundation. Other times, I observed how certain environmental policy systems worked, made surveys, and gave scientific descriptions. In these cases, I drew conclusions regarding actors’ strategies. Lastly, in the cognitive analysis of individual decisions I used a new model that we developed to describe belief systems to better understand environmental behavior and formulate psychologically sound policy recommendations.

Obviously, only tiny parts of the problems are addressed in my thesis and solutions are neither complete, nor without controversy. The conclusions I reach and the policy recommendations I make are diverse and it is impossible to tell how exactly the state of different socio-ecological systems would change if all my advices were heeded. Due to the complexity of the issues and the often unpredictable behavior of social systems, my predictions about direct and indirect effects are conditional (Kornai, 2008). However, I still hope that the reasoning in the following sections will be sound enough to convince most readers that the effects I describe are relevant and the institutional, strategic, and cognitive changes I suggest would improve well-being and mitigate instabilities in the human-nature relationship.

In Section II, I investigate specific problems of participation in environmental decision making. Prospects of meaningful participation for a given actor in a policy system are usually dependent on the connections it has to stakeholders and its resources like money, powers, information, or knowledge. My theoretical and empirical studies will focus on these relations and resources in concrete policy situations: committed citizens contacting decision makers, grassroots groups initiating financially and environmentally beneficial projects, environmentalists lobbying to change the behavior of companies, and conservationists working to resolve a nature protection issue. What institutional settings could serve our collective interests better? What factors are at play in strategic planning when we strive to make human activities sustainable? How should we evaluate these factors? I try to answer such questions for specific cases in four subsections.

I begin with the analysis of communication between citizens and decision makers. I briefly summarize why political scientists mostly think that a more inclusive and responsive democracy would contribute to our collective well-being. I emphasize the role of deliberation in environmental policy. My research question in this subsection is the following: How could we improve communication between citizens and decision makers to further participation, especially at the local level? I try to answer this question by suggesting an internet-based method to regulate communication in a way that creates motivation for decision makers to consider the most valuable public comments. I argue that it is possible to bring down some of the barriers that hinder the application of useful public inputs in policy. I show how this new practice could contribute to the success of electronic democracy and demonstrate its applicability and feasibility in the Hungarian context.

My second institutional suggestion resembles the first one in that its possible application is also not restricted to environmental issues, but it could also significantly help concerned actors to promote sustainability. The topic is grassroots activism; the recognized weakness of the current system is that it does not support grassroots actors from a hierarchical point of view. How could we alleviate this deficiency and complement available financial, informational, and capacity-building support opportunities with a mechanism that is designed to provide hierarchical support? I suggest a solution and show that a cost-effective portfolio of support methods should, in some cases, include such an element to give official hierarchical backing to projects. By reviewing regulative, normative, and cultural/cognitive aspects of the problem and the proposed solution, my approach can be classified as new institutionalist. (More specifically, sociological institutionalists use these categories to classify ‘pillars’ of the institutional order.) The conditions under which the new practice would probably be useful are stipulated.

After the institutional part of the dissertation, I turn to another field where I think there is a possibility to improve the effectiveness of environmental associations: strategy. To define effectiveness in risky policy situations, I draw on an analogy with stock markets to show that the optimization of expected outcomes is not a sufficient strategy to maximize perceived utility. What else matters, then? Do actors in environmental policy – like investors in stock

markets – consider risks when they compare different options? I conducted a survey to prove that Hungarian environmental NGOs tune the riskiness of their strategies in their individual relations according to the number of partners they are connected to, a behavior that can be attributed to risk aversion. If the ideal strategy rests on an optimal trade-off between expected outcomes and risks associated with the given strategy, then the diversification of strategic risks is an opportunity policy actors should be aware about.

More partners – riskier strategies. In accordance with the previous conclusion, this relation can be observed in the comparative case study I report in the last subsection of Section II. However, my particular intention is not to empirically check this relation, but my aim is to give comprehensive strategic advice to conservationists in a nature protection issue I personally know. The problem whose mitigation I try to facilitate is that birds get electrocuted on and collide with power lines. The reason for which I think conservationists often need strategic advice to improve their efficiency is that problem solving takes place in policy networks. In these systems, actors necessarily rely on each other and neither command and control regulation nor market-based coordination is possible, so new ways of thinking must emerge. Strategic planning in such dynamic situations is difficult and thus green groups cannot always successfully represent environmental interests. This challenge is increasingly common in environmental problem solving but there are no general solutions: in-depth studies are required to elicit the role of various factors of strategic importance in different cases. To help conservationists, I try to understand how policy networks organized to mitigate bird – power line interactions work in four countries on three continents. Due to the diversity of possible strategies ranging from cooperation to litigation, the main research question I ask is the following: What are the most relevant factors conservationists should rely on when they choose between strategies and how should they use this information? The analysis of this complex management issue in a socio-ecological system shows how I suppose different factors should be considered and weighted against each other to make optimal strategic decisions.

While Section II is about effective social participation, Section III is mostly devoted to individual-level aspects of environmental behavior. Change, after all, may come about as a consequence of millions of individual decisions. Therefore, what happens in people's minds can be pivotal from an ecological point of view. My goal is to use cognitive insights to help people organize their thoughts in an environmentally appropriate way, which is perhaps the principal condition of eco-friendly behavior. I also study communication strategies to identify effective ways of facilitating sustainable decisions. The ensuing policy recommendations and communication advices are aimed to evoke behavioral change by making ecologically sound decisions psychologically favorable.

Since my cognitive studies regarding environmental decision making focus on the belief systems of individuals, I first refer to behavioral science to highlight the role of beliefs in behavioral decisions. Then I succinctly outline my cognitive theory about belief structures and argue that statement networks can be suitably used to model mental representations. I give several examples to explain how the objective to preserve consistency drives changes in opinion systems. Apparently, I cannot claim that my model is fully appropriate to describe human thinking and reasoning. However, there are at least three reasons to use this new method in the cognitive analysis of individual decision making. First, structural properties in statement networks can be defined and studied: the distance between two beliefs, for example, may determine how they can be connected in an argument, or the centrality of a statement can be quantified. Second, opinion changes can be modeled very easily (compared to earlier models) as transformations of the statement network. New statements can be integrated to process inputs, others can be deleted to restore consistency, and the rules of these processes

can be defined in accordance with several aspects of real-life observations. Third, this is a new model whose potential has not been fully exploited yet, so I hope to produce original results by using it. Unsurprisingly, the first segment of belief structures where I try to understand how the system works and how it can be changed by communication is the one where environmental beliefs are stored.

Like most of the times in social science, there are significant methodological constraints: I cannot run and repeat experiments over and over again under identical conditions to investigate belief systems and assess their roles in behavior. Policy decisions must be made without the full knowledge of the consequences. What I can do, however, to justify policy recommendations is find similar situations to the one I am dealing with and use experiences accumulated there. Obviously, due to different contexts, temporally or geographically distant events give only partial guidance, but policy makers have to put up with this. In the case of environmental decision making, system-level problems of the globalizing consumer society call for the analysis of cultures that were able to exist in a dynamic equilibrium with their environments.

In what structural ways were typical belief systems in these successful regimes different from the opinion networks that are common today? How would it be possible to change contemporary structures for the better? Is it possible to choose between environmental policies based on these cognitive insights?

I try to answer these questions by comparing ancient and present belief systems and endeavor to draw up a favorable belief structure that, in my view, should be built up in the future. I review the psychological advantages and challenges of the recommended policies and communication strategies.

Although my intention is to give advices that can be used across sectors and scales, I am aware of the fact that it is impossible to describe the entirety of the problem we are facing today. Population, lifestyle, technology and a number of other factors have different roles in different localities and the cognitive processes I investigate are just elements of the puzzle. Reality and its mental representations mutually affect each other, so it is impossible to give a full description by focusing exclusively on beliefs. However, the rationale for my efforts is that the way people in consumer societies organize their thoughts is one of the major factors that determine the fate of our planet. I try to better understand how core beliefs are linked to statements of environmental concern in western societies and make assumptions about the behavior we can expect as a consequence. Natural human self-defense reactions to green persuasion strategies and the way we prioritize economic interests over environmental protection are presented together with possible opportunities to change these cognitive patterns. Conclusions about the effective management of mental representations may be used together with results from the more voluminous pragmatic policy literature.

Thesis statements in Section IV give a summary of the scientific results of Section II and III.

Before going into details about the seemingly loosely related issues outlined above, the third subsection of the Introduction asks questions that bridge the various topics of my dissertation. How do personal beliefs influence different forms of participation? What are the most important changes in political and economic systems that affect the chances of effective participation in environmental problem solving? What roles do sociological and cognitive factors (more exactly: relationship systems and individual norms) play in the interactions of the state, business, and civil sectors?

In my answer, I delineate a descriptive model of societal macrostructures whose aim is to explain observations about our collective ability to counteract negative trends. Issues that I analyze later in detail and others not covered in my dissertation are combined to illustrate

several aspects of the current global social restructuring. The identified connections between social, economic, and political processes allow me to point out feedbacks that massively influence chances of successful collective actions. Obviously, the picture I draw about the social context in which concerned citizens find themselves when they want to act for the environment is still very incomplete. Many details are purposefully neglected and it is impossible to justify all simplifications without normative arguments. In the description of various processes I do not try to review all competing theories; instead, I refer to the ones I most agree with and use them to build my model. Consequently, this part of the thesis is not a full-fledged scientific analysis of problems of collective action in society, rather a manifesto of my worldview in a field which is crucial to raise efficiency in environmental problem solving. Due to the inextricable connections between positive and normative arguments, ecological economists increasingly resort to such introductory chapters. In my opinion, the values emphasized here (horizontal ties between citizens, socially developed norms, participation, etc.) are important for concerned citizens to make a difference, so this introductory part helps to understand their role when they reoccur in the subsequent sections. Methodologically, the ‘system approach’ (the fact that I deal not just with details but with a system as a whole) (Kornai, 2008) is an attempt to highlight the interconnectedness of the individual issues of my thesis. Through collective action theory, all subjects from electronic democracy to cognitive psychology are again linked to environmental protection.

3. Social networks, personal norms, and collective actions for sustainability

a. Environmental dilemmas and social capital

For more than four decades now, several pressing environmental problems have been understood as collective action dilemmas (Hardin, 1968; Olson, 1971). To a great extent, humanity’s imbalance with nature stems from our joint inability to protect our common heritage. Public goods like forests, oceans, or the atmosphere are not preserved in social dilemmas where individual and collective interests are at odds with each other (Kollock, 1998). Persons, regions, countries, and federations are tempted to follow short-term interests and exploit respective levels of communities in today’s multi-level governance systems (Bache and Flinders, 2004). Environmental pollution is a typical social dilemma: lots of different actors contribute to a public bad (pollution) to maximize individual profits, but the whole society including the polluters could be better off if no one polluted. In the lack of control, common-pool resources are often overexploited. In general economic terms: if many actors engage in activities whose external costs exceed private net benefits, societal well-being can decrease.

However, if a community understands the situation, it may develop norms, rules, and incentives to mitigate the problem. Then, people may invest into public goods, adopt low discount rates, and choose strategies favoring sustainability goals. Cooperative behavior based on reciprocity can evolve without external enforcement (Ostrom, Walker, and Gardner, 1992). Whether it does or not, strongly depends on the people involved. Accordingly, the four key conditions for the successful management of shared environmental resources are information, identity, institutions and incentives (van Vugt, 2009).

These conditions govern actions from the beginning to the eventual solution or systemic collapse. First of all, without information about different scenarios, it is impossible to understand the dilemma. It is crucial to be aware of the causal relationship between strategies chosen and potential outcomes. If the need for collective actions is realized, identity largely

determines the point when people begin to cooperate: the later it happens, the more difficult situation they have to face. When communities address the problems, coordination is needed to ensure that actors choose cooperative strategies in the dilemma. Informal or institutionalized norms (regulations) and incentives are the main options to facilitate cooperation. To make norms work, communication is invaluable (Pogrebna et al., 2008), but information about other actors' stances, endowments, past behavior, and collective outcomes are also factors of huge importance (Levati, Sutter, and Heijden, 2007). Successful reciprocal relationships need trustworthy partners, too.

To construct a system where information can easily flow, communication is effective, trust is strong, and thus positive outcomes justify cooperation, advanced relationship systems are needed. Powerful norms and good connections between social actors can open the door for direct and indirect reciprocity and make cooperation a stable strategy in an evolutionary sense (Szabó and Fáth, 2007).

Social networks, information flows, communication, and trust are notions jointly referred to as social capital (Putnam, 1993, p. 35-36), which is clearly inevitable for success in problems of collective action. It is not surprising that, in a contemporary context, hallmarks of a successful region include high newspaper readership (higher information levels help to realize problems), strong choral societies and football clubs (places for communication), or high voter turnout rates (strong civic engagement) (Putnam, 1995). What is more, Arefi identifies collective actions as an indicator of social capital (Arefi, 2003, p. 384). Thus, studies about transformations in social capital have to be incorporated in sustainability literature.

b. Decrease and transformation of social capital

In the past few decades traditional forms of community engagement, social norms of reciprocity, trust and civic networks declined in most western-type societies. Steep falls were registered in a variety of indices related to social capital. Trust, for example, is fading away in almost every country across different institutions from national governments to NGOs, to the UN and corporations (GlobeScan/World Economic Forum, 2005). If we do not believe in these organizations, there is less motivation to follow their norms or get involved in their activities. In the United States, memberships fell in most social groups from religious congregations to labor unions and bowling clubs (Putnam, 1995).

In the lack of dense social networks that facilitate coordination and communication and amplify reputation, chances of collective action are reduced. Negative political, economic, and personal impacts are tangible. Democracy is threatened from several aspects. The buffer between the state and the individual is losing strength thus permitting higher levels of manipulation in 'mass societies' without secondary institutions. Besides, the forum for individual political expression is disappearing (Kornhauser, 1959). The latter effect is equal to the emergence of collective action problems: opinions can not be translated into actions because individuals are ineffective alone and they can not find places to pursue their ambitions. This facilitates the accumulation of tensions in society.

At the same time, nation states, the traditional guards of social welfare and ultimate coordinators of concerted actions are under double pressure. Their legitimacy is questioned by an increasingly individualized society, while transnational companies threaten their economic sovereignty (Beck, 2000). Although it is obvious that states have not lost all their powers and probably they will still be important throughout the 21st century, their potential to alleviate social polarization and to rebuild fading solidarity between classes is limited. Perceptions that democracy is in crisis are strengthening around the globe (Batalov, 2005).

On the other hand, there are conspicuous countertrends. While traditional duty-based citizenship is eroding, other forms of public engagement are spreading (Dalton, 2008). Different types of advocacy groups, where bonds between members are weak and mainly common ideas or interests serve as organizing principles, are gaining support. Furthermore, many citizens believe that their mobilization, e.g. going online, can influence the world. Their unconventional ways of public activity require novel forms of communication giving rise to mass self-communication including blogs, videos, mobile-based pictures and reports, etc. (Castells, 2007).

Obviously, different associations' contribution to success in collective actions is different. Relations can be personal, virtual or symbolic, allowing for different forms of communication and information flows. The role of norms in different associations also varies. Groups where problems of collective actions are realized and norms develop in an evolutionary way can flexibly set rules to different needs. In the case of social heterogeneity (bridging), flexibility is even greater. If members choose their groups on the basis of pre-given norms, usually less flexible and more homogeneous associations come into existence (bonding). Moreover, norms are also needed to obey regulations – following rules has its impact on cognitive structures. It is not easy to coordinate in groups where individuals are not trained to follow rules thus making associations with norms more conducive in the need of collective actions.

Nowadays, there are significant changes in society affecting both the conditions of associations' formation and their effectiveness, leading to restructured societal arrangements. To understand what happens in civil society and collective decision making systems, a narrowly focused approach is not appropriate (Ehrenberg, 2002). The state and businesses have to be analyzed, too, to integrate phenomena of different segments of society into a macro-level model, where propagation of effects between different fields can be traced. To build a general theoretical model, the main building blocks will be the three sectors: public, private, and civil society.

Since I investigate macro-level phenomena, full accuracy can not be expected from the presented model. I try to demonstrate major mechanisms being responsible for changes in macro-indices and do not pay attention to details without large-scale effects. I do not focus on national characteristics but try to identify common features of different societal settings. The explanatory power of the method outlined is obviously restricted; however, relevant conclusions can be drawn regarding a number of topical questions raised in the literature of collective actions in society.

The goal is to find connections between social, economic, and political phenomena, to identify feedbacks and interplays of changes in different sub-systems. To bridge politics-centered, society-centered and economic considerations (Newton, 2006), the focus of the analysis will be on the role of norms and relationship systems. Norms, because they are not only essential in the growth of social capital, but also largely determine the directions of actions in society; and relationship systems, because apart from constituting social capital they strongly affect efficiency of actions across sectors and scales. The identified connections have far-reaching consequences regarding the strategic management of environmental dilemmas.

c. The macro model of pluralist democracies

To begin the macro-level analysis, let me start with social associations. In cases where collective actions are required, norms can develop in an evolutionary way if the conditions mentioned above are met in a community (Ostrom, 2000). These norms then contribute to collective success or disappear if they fail to do so. Successful norms help collective actions

and strengthen associations whose members, in turn, reinforce norms. Similarly, relationship systems built up in associations enhance group efficiency that helps further linking in personal networks. As Robert Putnam puts it in his groundbreaking paper (Putnam, 1995, p. 67) ‘networks of civic engagement foster sturdy norms of generalized reciprocity and encourage the emergence of social trust. Such networks facilitate coordination and communication, amplify reputations, and thus allow dilemmas of collective action to be resolved’. By representing these positive feedback loops, we can start drawing the model (Fig. 1).

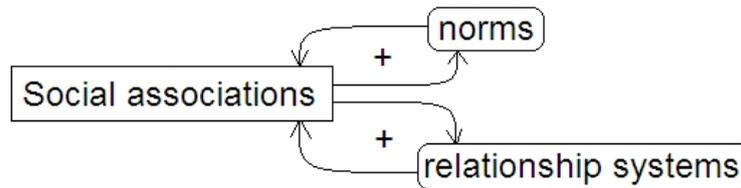


Fig. 1 Positive feedbacks in associations

Here I note that “cause or effect” questions are asked repeatedly in literature (Putnam, 1995b; Portes, 1998; Schultz, 2002) regarding a number of different factors influencing social capital. However, in systems with feedbacks, the same factor can be both a cause and an effect at the same time. As it is often impossible to separate these notions, accusations of logical circularity are many times off the mark. Top-down and bottom-up phenomena are simultaneously shaping outcomes: individual stances and societal structures mutually affect each other and jointly determine outcomes. Albeit I started the investigations from the individual, top-down impacts must not be overlooked.

Another matter of interest here is that these feedbacks are not purely based on game theoretic considerations. Robust psychological processes may enable norms to persist even if they are sometimes irrational from an evolutionary game theory point of view. Nevertheless, the illustrated feedbacks are present and remarkable in irrational cases as well.

Now, let me turn my attention to links between social associations and the state. Putnam argues (Putnam, 1995, p. 66) that ‘the norms and networks of civic engagement also powerfully affect the performance of representative government’. Connections between social associations and states are bidirectional. On the one hand, state norms are mainly constructed from different group norms in pluralist liberal democracies, and networks of the social sector are used in many ways to achieve political success. On the other hand, associations can receive support from the state. Without going into details about these complex processes, I point out crucial feedbacks.

First, the more populous given groups are, the stronger their direct political representation will be facilitating heavy support from the state to the given groups. E.g. religious politicians are more likely to help religious groups they belong to. This feedback alone can have an enormous impact on the political life of a country (Al-ghamdi, 2000).

Second, in general, the more extensive the personal network of an association is, the higher the probability is that their aims are politically supported. Obviously, politicians weight group interests by their membership that can be mobilized in elections. E.g. the American Association of Retired Persons can efficiently put through its interests and gain political support due to its mass membership (over 35 million members) (Morris, 1996).

Third, the more effectively a given organization communicates its message about its norms to the society, the more it is able to form the public opinion, the stronger its indirect political representation will be (Adams and Ezrow, 2009). As a negative example: weak environmental organizations are politically ignored if the number of people who embrace their norms is insignificant.

Putting the state into the picture, we can draw the next stage of the model under construction (Fig. 2).

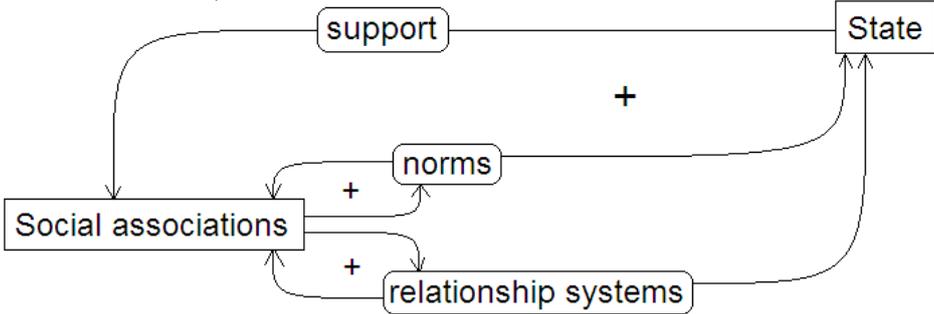


Fig. 2 Positive feedbacks in relations of social associations and the state

Obviously, it is the role of businesses that is still missing. First, let me analyze the connection between civil associations and companies. Scholars like Putnam (1995) or Portes (1998) cite a number of studies describing how social networks contribute to the success of business functions. Moreover, norms flow from the civil sector to corporations in strong democracies, because the image of companies is largely dependent on the extent to which they accept norms coming from the society. In turn, corporations can contribute to the maintenance of social networks by supporting different organizations. However, business outreach towards civic organizations is dependent on the compatibility of business interests and the norms advocated by the given group.

On the other hand, there are important state-business ties that we need for a realistic model. As the focus of this analysis is on collective actions in society, I do not try to capture the large variety of state-business connections. I distinguish between two broad categories: regulations and connections based on money matters. Regulations are deemed to be manifestations of socially evolved norms transmitted by states to companies, while different flows of money are to some extent analogues to the “support” arrow from the state to social associations. In the latter case interactions are bidirectional: financial resources stream from businesses to the state and vice versa.

Now, we are ready to delineate the coarse model of pluralist democracies as it is shown in Fig. 3.

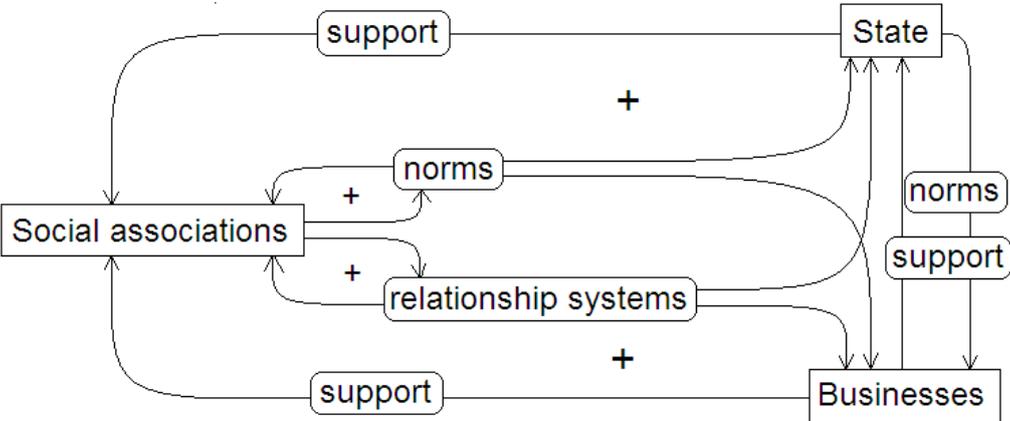


Fig. 3 A macro-societal model of pluralist democratic systems

Based on the macro-societal model of pluralist democracies, the first conclusions can be drawn. To begin with, I argue that long-lasting trends in social capital’s changes instead of

short-term ups and downs are due to positive feedbacks. Obviously, there are minor fluctuations in different memberships, attendances or other actions, but the steady decline reported by Putnam and a number of other scholars is associated with positive feedbacks in Fig. 3. Today, weakening organizations fail to produce strong norms leading to a degradation of internal and external forces (norms and social networks, state and business support) that shore up associations. As opportunities to act collectively are lost, individuals recognize their inability to bring about changes paving the way for reduced political activity.

Endpoints of trends in social capital's changes are equilibria: stability can be achieved in societies where social associations flourish (Tocqueville, 1969, p. 513-517) or in regimes where they are insignificant like in post-communist countries (Geremek, 1992; Howard, 2002).

Second, changes in given relations may lead to restructurings in other connections. If social actors are unable to give norms to the state, other potential sources will be tapped. Businesses will increasingly attempt to influence rules and regulations and politicians will try to shape values and norms. Both phenomena are tangible today: I will discuss later how transnational companies strive to redraw the global picture of social arrangements, while the emergence of a new kind of political leadership aspiring to form the public opinion instead of executing people's will is the subject of numerous studies (see e.g. Körösi, 2005). So, evolutionarily developed norms are replaced by business interests and the accidental aspirations of individuals in power.

Third, it is important to point out that a specific social arrangement with given groups, norms, and ties is just a snapshot; system-level outcomes may lead to changes in its structure. Perceptions of different actors are formulated throughout processes in a given arrangement, and disagreeable outcomes may lead to endeavors to modify structures. Such system-level feedbacks usually affect norms first. Processes are similar to the evolution of norms at the lower (group) level: changes in norms may result in structural variations. The Putnam article itself was, for example, a review of system-level outcomes that spurred thinking about different arrangements offering higher efficiency in collective actions. In the case of individual organizations, a decline of the association and its norms can have immediate negative consequences triggering the revival of norms and thus potentially contributing to the revitalization of the association. In other cases, however, system-level effects may occur too late or take too indirect forms to save the organization from the weakening cycles of Fig. 3.

d. A look at consumer society

From an environmental point of view, one of the key questions related to social change is how consumer society spreads, retreats, or changes its patterns amid pervasive effects of globalization. In my view, consumerism is one of the greatest threats to social and natural capital worldwide, so I devote a couple of paragraphs to the analysis of transformations that enabled its rise and I draw up a flow chart of self-reinforcing effects to identify possible intervention points.

First, I look at interactions between the state and businesses in democratic systems and point out immediate consequences of changes in these ties. Liberal democracies emphasize individual rights versus authorities and rights of different groups versus states; the weaker against the stronger, the smaller against the bigger. Far-reaching rights apply to legal persons (through corporal personhood) as well, inseparably linking the idea of free-market and competition to economic liberalism. However, motivations of corporate entities in capitalism are often purely economic. Their ambitions to maximize profit are sometimes in stark contrast with the social optimum. Inappropriate principal-agent relations also increase the moral

hazard: for instance, short-term interests of business managers often override the importance of shareholder values. Consequently, in the lack of effective regulation, companies are inclined to turn social and natural capital into financial capital. Market efficiency does not serve societal interests unless conditions of perfect competition are met, and these are, obviously, not met. (Companies move to countries where environmental and human rights regulations are weaker; they do not inform customers about product impacts; they do not include destruction of social and natural capital in their pricing mechanisms etc.) Actually, markets tend to diverge from idealistic conditions in some aspects; e. g., the global rise of oligopolies can be witnessed today. In the light of the financial crisis we have to see that not even purely economic success can be guaranteed in highly efficient markets (Soros, 2008).

Still, in the name of efficiency we increase moral hazard by failing to effectively regulate profit maximizers and by collectively taking the various risks arising from their shortsighted behavior. Too often, corporate interests overrule public interests – the flow of norms towards businesses in Fig. 3 is obstructed. Politicians themselves largely contribute to the process, illuminated by always needed short-term financial benefits resulting from economic efficiency. Tight money supply is higher on the agenda than unemployment problems (Steger, 2002, p. 272) or environmental matters. Politicians' ignorance of non-monetarized costs comes from the fact that they seek reelection in relatively short periods, let alone the incomprehension of complex effects of decisions on well-being or corruption. Due to vested interests, the regulatory capture is sometimes apparent.

Moreover, as the significance of labor is increasingly eclipsed by the importance of capital and knowledge in production due to profitability concerns, technological advancements, and a constant pressure for innovations, unemployment soars. The mobility of transnational companies has grown with developments in communication and transportation systems, giving them strong bargaining positions: they claim for subsidies and infrastructural investments from states to ease unemployment and pay taxes in the given country (Beck, 2000). States are played out against each other giving rise to an inter-state social dilemma. Nowadays, without sufficient coordination and communication states mutually exploit each other by giving larger and larger subsidies to transnational companies to win the battle for investments. In the lack of reliable data from comparative studies, I tend to believe that this situation does not raise welfare on a global scale by increasing the absolute amount of investments, but further enriches the biggest corporations while countries' revenues fall. If so, national welfare provisions have to be cut back. According to uneven bargaining positions between states and large businesses, norms flow in unnatural directions. The contest to offer the most business friendly environment forces states to accept business norms. The state assists corporations to increase their leverage vis-a-vis workers (Steger, 2002).

In line with emerging success factors (high levels of capital and knowledge), a similar struggle for qualified workforce takes place contributing to the restructuring of personal networks. The contrast between internationally mobile skilled professionals and unemployed or partly employed masses fighting to survive is conspicuous. Legitimacy of nation states is lost due to different reasons: the former class does not need it for personal success, while welfare can not be provided for those striving to make a living. Furthermore, poverty significantly correlates with low levels of civic engagement (Alex-Assensoh, 2002) and unequal distributions of financial assets lead to the concentration of power further depressing chances of public activities (Fried, 2002). Deprived of its role in both production and consumption (Beck, 2000), the lower class loses the chance to enforce its economic interests unlike in early capitalism, when their role in production enabled the rise of trade unions.

Second, a strengthening business sector is increasingly efficient in getting across to people with its economic norms. At the same time when companies started to dominate the list of the

world's largest economic entities, corporate actors gained control over mass media. Advertising campaigns and other forms of marketing in the era of advanced electronic communication actively spread norms that reduce chances of people to group in order to act collectively, mainly because messages are centered around individual success often measured by the level of consumption. These effects are of utmost importance in a world where television watching is the main discretionary activity and advertisements can make up a quarter of the broadcast time.

Media, apart from being a tool in the hand of large corporations, has its own role in the process. Programs are designed to fit in the prevailing system of norms in society, so they reinforce present norms regardless of their conduciveness to societal problem solving. According to McChesney (2001), the global media system 'is better understood as one that advances corporate and commercial interests and values and denigrates or ignores that which cannot be incorporated into its mission'. This positive feedback became particularly fast and strong when sophisticated audience measurement became available. As corporate media is most interested to sell its products in the 'attention economy' where the wealth of information creates a poverty of attention (Simon, 1971, p. 40-41; Davenport and Beck, 2001), reinforcing feedbacks are inextricably linked to business norms. Moreover, media screens an untrustworthy, cruel world to raise attention – this 'mean world effect' adds to the erosion of trust in society, and time is eaten up by television watching instead of public activities resulting in a further reduction of social connectedness and engagement (Putnam, 1995b).

Again, the problem is that market norms are very often incompatible with evolutionary developing norms of successful societies, and do not lead to the social optimum. Furthermore, not only do business norms replace traditional values, but also they can lead to the atomization of the society. Individualized entertainment for example is a factor that surely assists market efficiency but significantly reduces social capital. Hence, different prerequisites of collective actions are affected simultaneously by the business sector: personal networks and traditional norms erode simultaneously as companies gain advantage in the fight for people's minds.

Another field where economic forces exert profound effects on macro-societal outcomes is banking. Money, as we know it today (not backed by commodities, charged with positive interest), embodies the market norm that the competitive economy must grow forever. Competition to obtain the money necessary to pay the interest, which is money not created in a physical sense, is structurally embedded in the current system. To avoid inevitable bankruptcies, growth is the alleged solution to create value to back the credit money. In addition, interest revenues contribute to the accumulation of wealth: there is a systemic transfer of wealth from the bottom 80% of the population to the top 20%, especially the top 10%, due exclusively to the monetary system used, and independent of the degree of cleverness or industriousness of the participants and recipients – a classical argument so often presented to justify large differences in income (Lietaer and Belgin, 2006). Increased competition, a pressure for growth, and social polarization are effects not to be overlooked when studying collective actions, especially in an environmental context.

Third, according to transformations in the role of businesses, relations between the state and civil sector alter, too. Changed norms will gain political influence: increasingly materialistic voters will expect their representatives to serve purely financial interests. As solidarity fades away and people care less about others' interests, politicians have to face a social dilemma: it is a winning strategy in elections to slightly improve the financial situation of many people by gravely exploiting other classes – worsening the case for the society as a whole. The same holds for all decisions where serious detrimental effects are perceived by only a few. If vital interests are played down, aggressive and desperate reactions are likely to occur.

Today, personal projects (fostered mainly by the wealthier class) and resistant identities (countering negatively perceived trends) are dominant sources of political stances (Castells, 2004), resulting in problematic flows of norms from social associations to the state. As mentioned earlier, in societies with weakening political activity and strengthening individualization, the opportunity of norm construction is handed over to the business sector and politicians.

The situation is aggravated by the ignorance of people. In attention economies political messages must be kept to a minimum; scandal politics leaves not much room for political programs. Thus, people are scarcely informed about problems that would require collective actions.

At the same time, individual opinions (formulated amid strong political and business influence) gain importance from a new aspect: political actors rely increasingly on opinion polls – that gives rise to a new short-term positive feedback. Again, this feedback reinforces existing norms.

In addition, given their withering power in the economic system, the lower strata could turn to political solutions – but their chances to act politically are rendered difficult in the lack of social and political associations, too (Kornhauser, 1959). Given this dire situation, gradualist political approaches can not be expected. In Steger’s phrasing (2002): ‘The disintegration of positive “bridging social capital” brought on by laissez-faire capitalism was followed by the generation of negative “bonding social capital” responsible for extreme forms of exclusivism’.

Changing norms, individualization, fading solidarity, poor information levels, and short-term feedbacks close the vicious circle in consumer societies (Fig. 4).

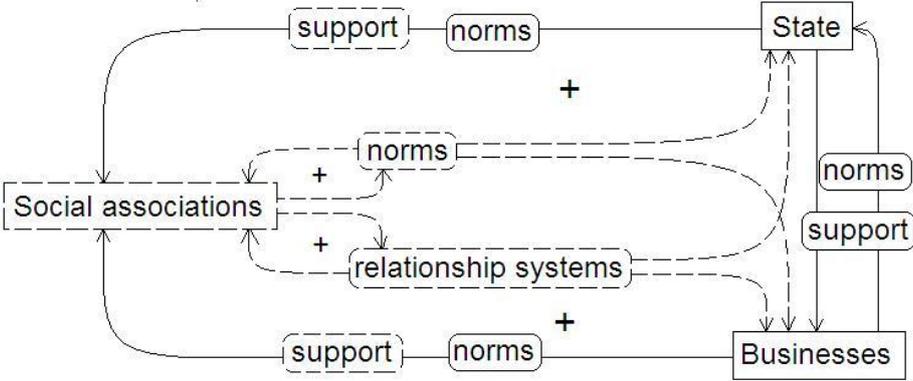


Fig. 4 A macro-societal model of consumer society (dashed lines represent problems)

In summary, the intrusion of business into politics and social systems (Soros, 1998) is deemed to be responsible for most negative aspects of consumerism.

In accordance with Schultz (2002), the effects of economic changes are deemed to be central. Voicing benefits of market efficiency politicians and business leaders established systems that undermine sustainability from several aspects: the same transformation from the social optimization of social associations to the market optimization of businesses evokes problems of collective actions and by destroying social capital creates an environment where it is difficult to bring about these collective actions. Thus, I argue that the lack of control over the most powerful companies (being a collective action problem itself) played a major role in the process leading to the restructured social arrangement called consumer society. Bolstered by technological changes it enabled the unnatural direction in the flow of norms that reshaped connections between the social sector and the state. As Steger (2002, p. 272) asserts: ‘In a

world organized around the notion of individual liberty understood primarily as unrestricted economic entrepreneurship, traditional communal values of cooperation, solidarity and civic participation are trumped by competitive market norms’.

The chart flow of some important processes is depicted in Fig. 5. Note that arrows represent causal relations, so all closed loops are positive feedbacks.

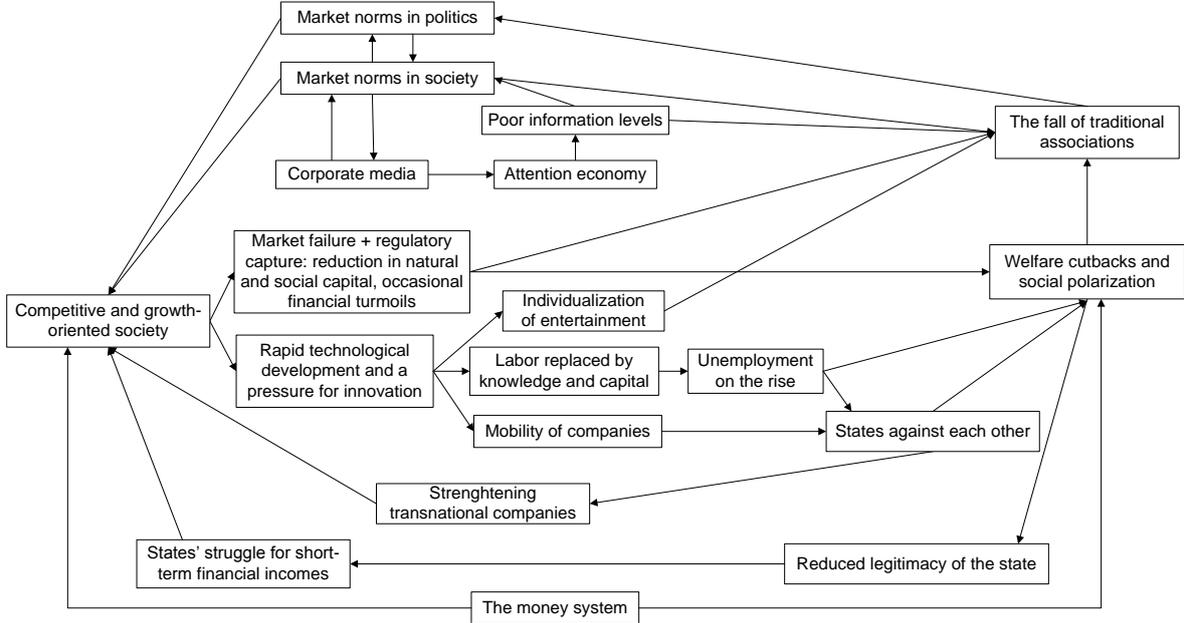


Fig. 5 Some positive feedbacks in consumer societies (arrows represent causal relations)

e. Problems selected for detailed analysis

Obviously, major changes are needed in a number of areas to fight short-term thinking, invigorate cooperation, and restructure global consumer societies. Some objectives in this agenda are already clear. Undoubtedly, on a finite planet, tenets of endless growth have to be rejected. For this, a completely new way of thinking is required. Kenneth Boulding made it very clear: “Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist”. To get closer to sustainability, the economic model must change. Most probably, the emergence of a new green collar economy is necessary to simultaneously alleviate problems arising from market failure and unemployment (Jones, 2008). Arguably, new complementary currencies with zero or negative interest rates are needed to reshape the global money system (Lietaer, 2001). Presumably, on the individual level, people should be encouraged to participate in voluntary associations and associations should be supported to restore their basic democratic functions. Most projects in this fundamental transformation are inconceivable if values and norms transmitted by the media do not change.

Apparently, tasks are abundant in many different fields and the implementation of solutions is often very challenging, so only a fraction of the problems can be discussed in my thesis. In my opinion, effective social participation and individual-level decision making in environmental dilemmas are two very substantial areas where research is desperately needed. The role of effective social participation is evident: the strength of civic life largely depends on it. If we want to intervene in the processes of Fig. 5 at the node of civic life (“the fall of traditional associations”), we have to think about new solutions and strategies to build up a

strong environmental advocacy movement. This is globally indispensable for a more sustainable future. As for individual-level decision making, the reasoning is similarly straightforward: individual environmental decisions are linked to norms. If we are to devise intervention at the node of norms (“competitive and growth-oriented society”), which is another great hub in Fig. 5, then we have to study psychological processes. In accordance, Section II is devoted to effective social participation and Section III to individual-level decision making.

The first problem of participatory solutions I deal with in Section II is the selection of meaningful public contributions. Especially in environmental problem solving, it is a daunting challenge to make scientifically grounded decisions and pay respect to public values at the same time. The institutional innovations I propose in this section aim to promote participation, support civil initiatives, and help decision makers to select valuable public inputs. The suggested practices are readily applicable in most democratic countries.

Besides institutions, actors themselves decide through actions how effective inclusive solutions will be. Strategies of environmentalists not only influence their own efficiency, but also affect the performance of institutions. Consequently, it is crucial to understand strategic considerations of stakeholders in policy situations when we try to work out effective solutions. Managers of policy networks need to know how stakeholders choose their strategies in policy games, or else they won’t have fair chances to facilitate cooperation in the network. In the strategic part of Section II, I add an insight to the theoretical literature of strategic planning and make an in-depth study of a concrete environmental problem. As shown in Fig. 5, I hope that my work on effective participation will eventually affect not only concrete decisions, but will also have an impact on politics and social norms (Paluck, 2009).

The second major issue selected for detailed analysis in my thesis is directly linked to norms. Perhaps the most important, but probably also the hardest task in the reform agenda is to develop and communicate effective norms in our rapidly changing environment. In a complex, dynamic, highly differentiated and highly competitive society, not only market competition is going on: we feel insecure due to dependence on other members of the society. The means by which most people try to achieve the comfortable psychological state of safety is gaining profit and power. Today, when unnatural flows of norms make consumer societies similar to dictatorships and distance them from the idealistic democratic conception, setting new priorities is a major challenge in environmental policy, regulation, and communication. Arguably, it will be difficult to bring changes to global systems where market norms are already entrenched and many opponents of global consumerism turn to extremism. However, the norms we follow will largely determine our answers to collective threats. How people’s beliefs and environmental attitudes change is thus a principal question regarding environmental and social sustainability. In Section III, I focus on individuals and their cognitive strategies. I outline a new model of belief systems and apply it to decision situations where injunctions from the individual and collective levels conflict with each other. The analysis of ancient and contemporary environmental dilemmas enables me to pinpoint basic cognitive differences and to draw conclusions concerning future opportunities. Finally, communication strategies are analyzed in detail. Again, I hope that changes in the system of norms will not only affect individual decisions, but the economic and political structures will also change as a consequence (Baritz, 2008).

Starting from different elements of complex psycho-social systems, all my theoretical conclusions and practical advices attempt to improve the strategic management of environmental decisions. As it may have become obvious from the introduction, such improvements are absolutely necessary.

II. Effective participation in collective decisions

The political system, its institutions, and the ways how citizens and groups make use of their opportunities in a given policy environment strongly influence the effectiveness of social participation in communal problem solving. How western-type democracies work is particularly important in environmental regards, because great economic and political powers are centered in these countries: they are home to the largest businesses and many of the most important collective decisions are made in their institutions. Hence, the state of the natural environment is globally dependent on decisions made in democracies. In most of these countries, a culture of participation has developed in environmental policy in the past few decades. Therefore, properly functioning institutions and effective strategies are essential to make participatory democratic solutions a cornerstone of successful environmental problem solving.

However, systems of decision making are restructuring and this transition poses challenges to effective participation. Today, the importance of corporations, lobby organizations, think tanks and other elusive players in the political battlefield is growing. The rise of transnational companies, the increasing interconnectedness of financial systems and in broader terms the partial loss of governments' economic and political sovereignty as a consequence transform the role of decision making bodies. Hierarchical (command and control) methods are inefficient in the emerging complex and dynamic environments. At the same time, potentials for deregulation (market-based solutions) are also limited due to market failure. Governance, especially in environmental policy, is more and more only possible within policy networks, where mutual interdependencies shift the administrators' emphasis towards coordination between actors (Börzel, 1998). Accordingly, questions about policy networks' evolution and functioning are receiving increasing attention.

Policy networks, by definition, are regularized patterns of social interaction whose constituent actors and modes of exchange are stable over time (Skogstad, 2005). Actors in networked settings typically rely on each other and cannot compel compliance on the part of the rest. Mutual resource dependencies between public, business, and civil organizations make cooperation imperative. Unlike in traditional institutions, control and monitoring are problematic, effects are indirect and cross-cutting, and, as a consequence, uncertainties are unavoidable (O'Toole, 1997). How to act efficiently in such situations is a pivotal question for stakeholders and network managers. New strategic considerations and new management methods are inevitable in the emerging policy networks. In this terminology, basic policy questions can be rephrased: What are the main drivers of the policy process in the network? What structural, dynamical, and contextual factors determine efficiency and legitimacy? What triggers policy change in the network?

Two essential statements are now widely accepted in the growing policy network literature. First, structure matters. The composition of the policy network and the web of relations between stakeholders affect policy outcomes. A number of case studies suggest such causal relationships between network parameters and policy results (e.g. Nunan, 1999; Kim, 2001; Bueren, Klijn, and Koppenjan, 2003; Daugbjerg and Pedersen, 2004); while some authors demonstrate direct evidence that network structure and policy outcomes are, indeed, linked (Daugbjerg, 1998; Howlett, 2002). For example, the existence of tight and closed policy communities in sectors subject to environmental regulation is associated with the introduction of low cost environmental policies. In contrast, open and loose issue networks are associated with high cost environmental policies (Daugbjerg, 1998). Policy change is also proved to be significantly facilitated or inhibited by structural characteristics of policy subsystems (Howlett, 2002). However, structure in itself is not enough to understand the policy process (Dowding, 1995). This second crucial observation is also corroborated by numerous articles

(e.g. Toke, 2000; Smith, 2000; Greer, 2002). Different attributes and resources of actors influence the dynamics of policy making (Jost and Jacob, 2004; Kriesi, Adam, and Jochum, 2006) and various contextual factors can affect outcomes, too (Toke and Marsh, 2003). Structural, dynamical, and contextual parameters jointly steer the policy system.

Although the range of possible outcomes of networked decision making is wide, neither efficiency, nor legitimacy is guaranteed by the system itself. Whether or not network governance is compatible with democracy is thus a pressing question (Klijn and Skelcher, 2007). For instance, in contrast to traditional representative democracy, there are no clear sources of accountability or transparency in policy networks. Further basic democratic expectations concerning inclusion and deliberation are not always met in networked settings. Amid massive socio-economic changes, alienation from politics grows. Nevertheless, there is no way back: traditional institutions of collective decision making cannot properly fulfill their roles any more (Beck, 2000); symptoms of a significant democratic deficit can be observed at different levels of the emerging multi-level decision making systems (DeBardeleben and Hurrelmann, 2007).

What is the way out of the current crisis of collective decision making? Foremost scholars of social science think that the revival of regional politics, non-politicized participation in decision making, and an increased reliance on electronic communication systems in political activities are crucial to move toward a more responsive and deliberative democracy enjoying enhanced legitimacy. New ways of communication, innovative solutions for participation, and a better understanding of the 'network society' are deemed necessary (Castells, 2004). In the following, I show how the various topics discussed in this section in detail relate to these expectations. As it will be clear, all four subsections are, in the first place, studies of policy systems, but due to different objectives and methodologies, different disciplinary branches will be touched upon.

Section II.1 is a contribution to the alleviation of a persistent problem of participation in regional politics. In broad terms, the problem is how public deliberation can be facilitated to move towards an optimal trade-off between representation and consensus decision making (Habermas, 1996). Although some sort of representation is a necessity (Sartori, 1987), the loss of reliable first-hand information is increasingly inadmissible in the age of indirect information flows. It is argued by many that the process of deliberation and reliance on diverse sources of information can boost governmental performance (Bessette, 1994; Pataki, 2007). Today, when knowledge and information are absolutely critical resources, people should be given the opportunity to contribute to decisions where they can make direct use of their knowledge or personal experiences.

However, it is difficult to organize, evaluate, and use results from public discussions. Perhaps the most cumbersome and controversial task is to select the relevant information during and after the deliberation process. Policy makers cannot simply involve public values for their own sake. E.g. as regulatory officials in environmental policy often see it, the public's values are uninformed by the relevant science and their preferences are perceived to be susceptible to biases. Since policy makers and agency personnel distrust citizen input, decisions are often limited to councils of experts insulated from public opinion. Similarly, it is usually impossible for individuals to affect public decisions through direct communication with their representatives, since personal views are typically ignored. Yet in an environment in which public trust of government officials and scientific experts at times appears to have broken down, the public is unlikely to accept scientific justifications for a decision (Shulman et al., 2003). Consequently, new participatory solutions are required to select valuable citizen inputs to reclaim public support.

What I suggest in Section II.1 is a means to support more involvement in communal problem solving by tightening the links between decision makers and citizens and, simultaneously, a method to select the most valuable public inputs received by policy makers. Specifically, the problem I want to mitigate is that decision makers usually do not pay attention to public comments and questions. I point out a new opportunity to use the general publicity of the internet as a vehicle to motivate decision makers to consider insightful citizen inputs. In essence, I propose a regulation about the obligatory publication of certain letters received by decision makers. The practice would be additional to existing democratic institutions.

Obviously, the effects on the quality of decision making we may expect are limited: contacting decision makers is just one form of political engagement and ineffective communication is just one of its problems. Moreover, the solution I give to this particular problem of this particular form of political engagement is far from being perfect: even if my practice was in place, we could still lose valuable comments or have problems when sorting out important and less important matters. Nevertheless, I believe that the value of the suggested practice can be demonstrated as part of the electronic democracy literature.

A potential line of attack against this part of my dissertation is to contend that the proposed method is not new. Every time when an idea of a new solution to a problem is born in a practical situation and a researcher argues for its implementation on a scientific basis, it is possible that something similar already exists. As I do not know all e-democratic practices around the world, I can not be sure that the regulation I suggest has not already been applied somewhere. However, I do know that neither my literature search gave similar results, nor did some of the world's leading experts in e-governance (including John Gastil, Stuart Shulman, Mack Shelley, Perry Walker, and reviewers at the *International Journal of Electronic Democracy*) know about similar practices. I think this is enough justification for including this subsection in my dissertation.

The way I present my second institutional suggestion in Section II.2 is similar to the first one. Again, I outline a practical problem, suggest a solution to alleviate it, and argue that its implementation is possible and beneficial. Broadly, the problem is that grassroots actors often lack the necessary powers to gain support for their beneficial initiatives. Considering the great need for effective non-politicized participation, all such deficiencies of civil advocacy are to be taken seriously.

Given the opportunity, individuals and civil organizations can assist their communities among others by valuable ideas, local knowledge, uncompromised advocacy, and the provision of different services (Smith, 1997). NGOs, for example, have indispensable roles in policy networks as advocates of sustainable development and the inclusion of the attentive public and grassroots groups is also crucial at forums where local environmental decisions are made. When setting directions for development, the proactive inclusion of grassroots actors is a challenging but important task: the selection of the best initiatives determines how well a community will use ideas generated at the street level. In most democratic countries, there are institutionalized programs to select and support projects started by citizens or groups of citizens. However, initiators rarely get comprehensive support and the available forms of assistance are not always enough to successfully implement projects. The particular issue covered in Section II.2 is how existing support opportunities of low-level initiatives could be extended to help initiators when they need hierarchical support to convince local decision makers about the advantages of their project. Looking at the problem from a new institutionalist perspective, I list the most likely institutional and cognitive reasons why this help may be needed and suggest a new system of applications to provide it. I compare my idea with other support methods and identify the special conditions under which my argumentation is valid and my idea helps.

Apparently, the scope of usage is restricted: the main field of application is the assistance of financially profitable grassroots proposals whose benefits are not recognized due to time constraints or personal distrust. It is also clear that success cannot always be guaranteed by the practice I suggest. Nevertheless, I argue that the possible twist on the agenda-setting and decision phases of the public policy making process I put forth can be conducive to meaningful participation.

At first sight, the proposed system of applications for official support looks very straightforward and simple. However, I have not found anything quite like this solution in the policy-making literature or on websites dedicated to NGO incubation. Not only my colleagues, but also the reviewers and the editor of *The Public Sector Innovation Journal* found the idea interesting and innovative. Due to its acknowledged practical potential, this subsection is a tiny contribution to the assistance of effective non-politicized participation.

The effectiveness of NGOs is also at the heart of the issue covered in Section II.3. The situation analyzed is common in policy networks: an NGO tries to influence the behavior of another actor (most probably a company), e.g. to make its operations greener. In this case, there are several strategic options: if initiators put up with a moderate speed of change, they can try to incite step by step progress; or, alternatively, they can set more ambitious goals and demand faster and deeper changes. Which option NGOs choose depends on several factors, but the aim of this subsection is to point out only one of these: the structure of the policy network. Specifically, I try to prove that the number of relationships in which a given environmental organization works for change (e.g. the number of companies it tries to persuade to adopt greener practices) affects its strategy in individual relationships.

I highlight an analogy between stock markets and policy systems to reveal the common roots of behavior in the two seemingly distant fields. Supposedly, in both cases the diversity of means through which an actor can achieve success (the diversity of stocks and relationships, respectively) and the strategies they apply (how cautious or bold they are) are linked. I claim that the reason for this connection is the tendency that actors in both fields try to simultaneously maximize success and minimize risks associated with their strategies. Although this line of reasoning opens an interesting perspective by drawing attention to diversification as a risk management strategy in the field of policy, the scientific result reported in this subsection is just the verification that a sample of environmental organizations set the boldness of their strategies to the number of partners they are connected to. This is a little piece of information in strategic planning that can be evaluated together with a number of other factors before a decision. In addition, the outlined analogy is a tool to better understand how policy systems work. Whether or not further applications can be based on the observation of this similarity is yet unknown.

The methodology used in this policy study is chosen to provide empirical support to the hypothesis set up after initial observations of concrete policy networks. I conducted a survey among Hungarian environmental NGOs to elicit their strategic response to a change in the number of their partners. The collected data was statistically analyzed to prove the hypothesis and draw practical conclusions.

Apart from the majority of positive opinions, two kinds of criticism were launched against this part of my dissertation in its preparation phase. Some argued that the effect I describe is trivial. In my view, these people (mostly with a background in economics) overlook the differences between economic and social systems. While priorities are often quite well-defined in an economic setting, people can behave differently in their social relations. It seems stunning for lay persons that an advocacy group uses different strategies in a given relationship only because of the number of its other relations. Other critics argued that what I claim is not true. My answer to this opinion (voiced primarily by a member of an advocacy

group) is that different actors have different risk preferences leading to different behaviors. It is very possible that certain groups do not consider the number of their partners in strategic planning, but, according to my study, this is rather the exception, not the rule. Just like in stock markets, risk preferences and actions are diverse, but it is still possible to recognize the characteristic patterns of behavior – and that is exactly what I do in Section II.3.

Finally, the last subsection of Section II is a policy-oriented environmental case study; a practical situation where solutions to the problem of effective participation can significantly influence the fate of species, if not ecosystems. The topic, wildlife interactions with power lines, is chosen for analysis due to my personal involvement.

Methodologically, this part is a comparative case study: institutional, strategic, and cognitive aspects of policy network management are reviewed in four different contexts to demonstrate the interplay of structural and dynamical properties of the problem-solving networks in Hungary, Slovakia, South Africa, and the USA. There were two main reasons for conducting this study with the applied methodology. Theoretically, comparative research is indispensable to distinguish effects of different origins, e.g. to link the structure of the policy network to outcomes, to elucidate the role of a given actor's attitude, or to ascertain the technological or competence needs that influence the effectiveness of a solution (Howlett, 2002). Practically, only case studies are specific enough to give guidance to stakeholders in other countries with similar problems. Since earlier studies focused on the technological and biological aspects of the problems of birds on power lines, it was logical to proceed with a policy study to point out strategic difficulties that may impede solutions even if biological and technological expertise is available. My aim is to outline the consecutive steps in the policy process to be followed in the conservation of species affected by electrocution and collision problems. What factors should be attended to and what actions are to be done to be effective under different circumstances are the specific questions analyzed.

Conclusions of this subsection are mainly of practical use: my strategic advices can help conservationists to avoid the mistakes most people are likely to make when they set out to start the solution process of the problem under study. At the same time, I also demonstrate how special country-specific contexts make different strategies optimal in different countries, so I call for greater subsidiarity than what is currently advocated in the prevalent international recommendations. In addition, this part is also instructive for people who want to effectively participate in policy networks to make a difference in other fields. E.g. in line with the previous subsection, it is crucial in most policy networks to find the balance between cooperation and conflict. The case described here is a prime example of this dilemma. Moreover, the role of the network structure or assets like knowledge, expertise, and trust can also be studied through this case. Future theoretical meta-analyses of policy network studies may build on experiences like the ones summarized in Section II.4.

Again, I have to note that far-reaching generalizations cannot be made from the investigation of a single issue. In my dissertation, the role of this part is simply to show a concrete case in which a committed group tries to manage a policy network. This type of political engagement is a form of participation where questions of effectiveness are especially complex. Due to the growing importance of networked problem solving, however, the significance of such studies also grows.

In sum, Section II is a policy-focused part of my thesis (disciplinarily, it can be classified as policy science), in which effective participation is the core issue analyzed. Due to the restructuring of environmental decision making, institutional innovations and strategic studies like the ones included in this section are necessary to achieve effectiveness. According to the different areas, elements of political, behavioral, and conservation science are used. The

specific fields of the subsections are electronic democracy, grassroots policy making, strategic risk management, and conservation policy. Methodologically, first-hand experiences and observations are relied upon throughout the section, but the exact methods vary. In the first two subsections, no empirical research is done; my contributions are restricted to the scientific description of the innovative ideas. More detailed descriptions of methodologies are given in the strategic subsections where I report empirical research.

1. The selection of opinions: answer or publish¹

a. The idea in brief

The selection of valuable public inputs is a major challenge in the communication of decision makers and engaged citizens. Decision makers usually receive scores of emails every day, many of which – with or without a reason – are not considered important enough to be answered. Consequently, a number of potentially beneficial civil initiatives and insightful questions are dismissed. At the same time, representatives receive numerous emails that are not to be answered according to the general public opinion. Due to a shortage of time, we can not expect decision makers to consider all public inputs. *Thus, the question arises, whether it is possible to separate important and less important letters.* The present subsection strives to answer this question by utilizing the freely available general publicity of the internet, opening the door for an efficient mechanism offering better chances for public deliberations.

The essence of the idea is very simple: *decision makers should be obliged either to answer citizens' questions or initiatives, or they should publish the letter received on a publicly accessible web page.*

Advantages of this solution are clear. Important questions would not likely be forgotten, because anyone could browse the list of unanswered letters and see which problems a given decision maker did not address. Political opponents would be inspired to search for socially important topics in the list of unaddressed issues. At a minimum, we can expect better outcomes than today when there are essentially no incentives to reply to citizens. On the other hand, the workload of decision makers would not unnecessarily grow – actually, it would converge to the societal optimum.

Fortunately, this solution does not include hidden problems: in the case of inadequate answers it is possible to ask again, while senseless, pugnacious questions can be sent to the web page instead of bothering with answers. Pre-edited letters sent by members of pressure groups can be answered by a single relevant answer; though, one answer would presumably be needed.

Moreover, there are no technical problems of the implementation: storage capacities are virtually infinite in terms of such documents. Obviously, perfect functioning of this system is hindered by uneven access to computer technology. Though, uneven distribution of resources and powers means no motivation to limit potentially beneficial behaviour of masses of people. Nevertheless, access to modern communication technology should be improved to promote equal chances.

A further advantage of the idea is that it can be extended to numerous other fields where sorting important and unimportant information causes troubles. Certain authorities struggle, because they are obliged to investigate each and every reported case. For them, it is a great opportunity to alleviate bureaucratic burdens and create time for important cases. Presumably,

¹ Based on Antal, M, Mikecz, D. (in press) Answer or publish – An online tool to bring down the barriers to participation in modern democracies, *International Journal of Electronic Democracy*. See also: Antal, M, Mikecz, D. (2009) Answer or publish – Energizing online democracy, *Communications in Computer and Information Science*, 49, 411-419.

instead of political opponents, professionals and civil actors would check unaddressed cases of different authorities. Traditional methods can also be combined with the present idea (stipulating conditions when traditional solutions should be used), giving flexibility to formerly rigid social structures.

All in all, when serving the public, whom else should we rely on, if not the public?

b. Implementation and practice

The implementation of internet-based methods should always be suited to local circumstances (Bozinis, 2007). In some countries, information communication technology (ICT) is already successfully applied in environmental policy making (Shulman, 2003): in the USA, online solutions facilitate interactions between individuals, social groups, and government officials from the early stages of policy making (Snellen, 2002). On the other end of the spectrum, many countries have not yet launched ICT-based services. Since the ways how political institutions employ ICT in their daily operations are dependent on the unique institutional and organizational contexts (Gibson, Römmele, and Ward, 2004), it is impossible to give general recommendations regarding implementation. Instead, I focus on Hungary and point out how the proposed idea could complement and bolster up existing online and offline institutions.

To understand the role of ICT tools in the contemporary Hungarian social-political situation, we first need to throw a glance at the historical context. The absence of a vital democratic political culture – even 20 years after the collapse of the communist regimes in Central and Eastern Europe – is still perceptible. During the communist era no real civil organizations, movements, or open communities could exist. The main task of the official organizations (unions, youth and women’s organizations, etc.) was to supervise their members and control the society. As a consequence, participation in communal decision making decreased.

Not surprisingly, the society remained extremely individualized and fragmented after the changes in the early 1990s. As Ralf Dahrendorf supposedly explained, it takes six months to create new political institutions, to write a constitution and electoral laws; it may take six years to create a half-way viable economy; but it will probably take 60 years to create a civil society. As a matter of fact, Hungary still suffers from the dysfunctions of its civil society (Hankiss, 2009).

If voluntarism, civic virtue and community based political activism has no real tradition in a country, easily accessible participatory solutions may serve as appropriate tools to break through the wall of political enervation. Although these practices do not necessarily result in long-lasting civic engagement, they can loosen up the rigid political attitudes. ICT solutions can help to speed up the process of building a new, active civil society by putting locally important, understandable issues into the focus where citizen participation can have a real influence.

To distinguish efficiency gains and improvements of the democratic system, I investigate two approaches in the use of online tools in the democratic process. E-government is a management-oriented approach with practical goals. Economic efficiency, cost reduction, simplification of bureaucratic processes, and a smooth functioning of the governance system are at the centre of e-governance. E-democracy is much more about basic democratic principles with a special emphasis on equal chances. The permanent and diverse interaction between citizens makes grassroots e-democratic applications the breeding ground for new ideas.

The majority of state-run practices in Hungary belong to the domain of e-governance, and only a few, mostly self-organizing solutions have tighter links to the ‘harder’ e-democratic

functions. European standards are of profound importance on Hungarian administrations giving the reason for this significant bias towards e-governance as opposed to e-democracy. As we shall see in the following, the proposed idea could help to mitigate this bias.

Apart from the strictly administrative electronic mechanisms (e.g. online taxation) three types of governmental or municipal e-government applications can be distinguished. The first type is purely about informing citizens. According to the Hungarian law (2005.XC), all public institutions including the parliament, government agencies, municipalities, courts etc. are required to publish information about their organization's structure, management, budget and activities. Furthermore, politicians, high-ranking officials and other politically exposed persons also have to publish data about their financial situation. These legislations have undoubtedly positive effects on transparency and accountability. However, if there are ambiguities about the published data or questions arise concerning the published information people do not really have the chance to contact the respective parties and to demand more information. The potential application of my proposal can assist involvement in such cases. Not only does it foster participation in the democratic process, but also facilitates a more effective fight against the abuse of power or authority, and thus steers processes closer to public interests. Arguably, electronic informative systems backed up by the suggested practice could partly restructure top-down communication. By supporting more effective dialogues, it would enhance transparency and accountability, contributing to legitimacy as well.

The second electronic governance tool already present in Hungary requires active participation from citizens and representatives: online consultations with elected officials are deemed increasingly important to establish direct contacts between voters and representatives with the primary aim to broaden the horizon of local decision making processes. To date, online consultations are far from general in Hungary, but some officials (especially mayors) discuss different topics with their voters online. Though, consultations are accidental and weakly formalized, there are no constraints, consequences are not traceable. In these regards I expect improvement from the envisioned practice. In the lack of obligations to respond, publicity could serve as the only legitimate tool to evoke answers from decision makers. Politicians' reputation – one of their main assets – could be threatened if they do not consider reasonable public inputs. Besides transparency, inclusion would also be assisted by the idea: aware of the growing importance of their opinions, more people would be inspired to participate in discussions. Moreover, if the list of unanswered questions is browsable by topics or geographical regions, comparison between cities or regions becomes easier, too. People struggling to get through with similar messages could find and help each other: this kind of horizontal knowledge transfer would contribute to the success of knowledge societies by dismantling the information barriers in problems of collective action.

Online public debate of legislative drafts is the third e-governance practice already applied in Hungary. Civil and professional organizations, recently even individuals can post electronic comments to express their opinions during the codification process. However, participation for non-professionals is difficult, and it is a rather reactive way of inclusion – legislative proposals are always made by governmental or municipal bodies, citizens can only comment on them. The practice I suggest could ease these problems from two aspects. First, the public concern formulated in laypeople's letters could motivate capable contributors to translate these inputs into professional language when making their contributions to public debates – these information flows could assist the effective use of knowledge in society. Second, the governmental commitment to better consider public inputs could enhance the significance of public proposals vis-à-vis governmental initiatives adding to the diversity of information sources.

As for practices from the field of e-democracy, online forums are the most notable means to foster discussions about collective problems in Hungary. The internet serves as the open

public space for free deliberation: presumably some of the unanswered letters would soon become forum topics, again contributing to horizontal knowledge transfer. These self-organized spontaneous discussions and citizen activities are deemed crucial by proponents of deliberative democracy. However, further prerequisites of a well-functioning deliberative system (Gabardi, 2001) are missing: people do not have equal access to the rational debate and there are no incentives to put consensus opinions – the outcomes of the deliberations – into practice. While the access to the debate can be assisted by further improvements in internet access and digital literacy, I argue that the envisioned method could help to select substantial contributions from the mixed quality debates. Similar endeavours to find effective filters that connect deliberations and decision (or policy) making have recently been in the forefront of research (Arguello, Callan, and Shulman, 2008). In our case, e-democratic practices offering inclusion for masses could be elevated to a higher level of governance without jeopardizing its efficiency goals by inadequate inputs.

As I describe an idea that has not been implemented yet, no practical experiences are available. However, to point out feasibility, it is important to delineate technical aspects and give practical application examples.

In Hungary, citizens can ask written questions from public administration offices that are required to answer (2004.CXL). Clients are allowed to publish answers; however, there are no forums where the publication of these questions and answers is regular. If a web portal was launched for this purpose, it could be complemented by the pages where unanswered letters addressed to politicians, mayors, or other representatives are published. Online consultations could also be organized here. Presumably, as electronic rulemaking gains momentum, a centralized portal will be rolled out like in the United States (www.regulations.gov) to facilitate interactions throughout the rulemaking process – these pages together could evoke vivid public discussions and increase the openness of knowledge societies.

The portal would be maintained officially and would be directly linked to the page of the decision making bodies under consideration. Probably it would not cause serious problems for municipalities, government agencies or other public bodies to provide storage capacities and maintenance to run such systems. (My optimism comes from already used applications. Technology is ready to handle hundreds of thousands of comments in the rulemaking process (Shulman, 2003).)

It is important to note that a self-amplifying process could lead to the widespread use of the system. As more and more people browse the pages of unanswered letters, the motivation to participate in decision making grows due to the increasing interest of decision makers to reply and the enhanced publicity in the case of ignorance. Although, it also means that in the beginning the opportunity has to be advertised to jumpstart usage.

To help orientation, letters should be labeled by topics, decision makers, and geographical locations. Having a clear overview of the topics, political rivals, lobbyists, and committed citizens will have better chances to push some letters or ideas to the top by giving further publicity to them.

Presumably, in most countries the primary focus of the application would be on local elected officials, because direct communication with citizens is particularly important for them. However, higher levels of decision making and non-elected officials could also be involved. In fact, organizations that are either not obliged to answer at all, or those that are obliged to answer to each and every input could potentially be considered; essentially there are no restrictions.

An example for the latter case, where appropriate knowledge management is hindered by unnecessary administrative burdens, is the case of environmental agencies in Hungary. These agencies are notoriously underfunded and understaffed, so they operate very slowly and

sometimes on a poor scientific level. They have to split their time between duties where their involvement is prescribed by the law and other tasks related to issues reported by citizens. While the former may include very complicated environmental impact assessments (e.g. licensing procedures of power plants); citizens sometimes report very petty issues (e.g. an aquarist once reported the successful reproduction of his very common grasshoppers in his home). No matter how important it would be to devote more time to conduct a sound environmental impact assessment and gain knowledge, for example, about the effects of a given power plant's emissions on a region's wildlife, the agency has to make a field investigation and document the breeding of grasshoppers, if such a case about a protected species is reported. Similar pointless tasks are abundant. Due to time constraints, this is a very serious limitation on the appropriate functioning of the agency. I claim that the envisioned practice could mitigate these burdens by lifting the obligation to respond to all citizen reports, questions, and complaints. If the responsibilities to regularly check the unaddressed problems are clear, it can be ensured that agencies properly fulfill their duties even if they have the right to make decisions on a case-by-case basis.

c. Summary

In summary, I argue that the obligation of decision makers to either answer or publish letters received from people could have very positive effects from several aspects.

Applied to politicians at any level of the decision making system, the regulation would amplify the increasingly necessary communication between representatives and the represented. People would be better motivated to participate in discussions, because they would know that their representatives are politically interested to answer rational questions: they would either receive an answer or draw potential attention to the topic raised in the letter. Representatives would be better informed without entering into lengthy and irrational debates. These deliberations would further inclusion up to the point where the public opinion sees the ideal trade-off between consensus decision making and effective representation, between meaningful rational deliberation and senseless dispute.

Potentially combined with other online practices, the envisioned solution could be conducive to enhance transparency and accountability, contributing to the re-emergence of trust, too. The implemented solution could link deliberations to political actions; or, in the case when consensual outcomes are ignored, at least this ignorance would be publicly known. Positive sides of the traditional representative and the increasingly demanded deliberative solutions are combined in the idea. The appropriate levels of inclusion, deliberation, and transparency are tuned by the public.

The same holds, if we apply the method in the opposite direction: instead of imposing new regulations on decision makers, general obligations to respond could be lifted in the case of some civil servants to make time free for the most important tasks.

The conception fits into the optimistic discourse about the social impact of information communication technologies. Individual actions in the extended political action space would probably lead to stronger ties between decision making bodies and civilians. The much needed integration of factual knowledge and public values would be facilitated (Shulman et al., 2003). This kind of inclusion in decision making would not risk but strengthen deliberation and so it would add to the deliberative character of democracy but preserve the basic representative function. The bias towards e-governance as opposed to e-democracy could be alleviated without risking the efficiency and functionality goals of governance.

The proposal is in line with the recommendations of the European Council's Ad hoc Committee on E-Democracy (CAHDE, 2008). As required by the document, it is "additional to traditional democratic processes", "widens the choices available to the public", "supports

the democratic roles of intermediaries between citizens and the state”, and “promotes opportunities for meaningful and effective public deliberation and participation in all stages of the democratic process, responsive to people’s needs and priorities”. New communication tools are thus applied to back up basic functions of the envisioned knowledge-based democracy.

Obviously, the presented idea is not a cure-all, only a slight step towards a more effective and legitimate democratic system supported by modern technology. However, as it seems to be easily doable, I deem its implementation worthwhile.

2. The selection of initiatives: applications for official support²

a. The idea in brief

The Student Environmental Organization at the Budapest University of Technology and Economics is a real grassroots group. They try to pursue sustainability goals at the university level by identifying environmental problems related to the university’s practices and come up with economically viable solutions. However, even if their proposals are most carefully worked out and perfectly reasonable offering both environmental and financial benefits, they are often ignored. The operative managers of the university may be too busy to read through all grassroots proposals, their lack of personal interest in running sustainability projects may sideline such initiatives, or their personal distrust in green activists may lead to refusal. Nevertheless, without the involvement of these managers (and their signatures, for example, on the contracts between the university and the waste management company providing environmentally sound services) the initiatives with their multiple potential benefits are doomed to sink into oblivion.

Grassroots actors frequently face similar problems in several different fields. Proposals of individuals and local NGOs can fail to make a difference in the village or city councils; employees can be unsuccessful in changing their organizations even if they have brilliant ideas. They simply lack the authority to make decisions: the systems they want to change are governed by higher level decision makers whose consent is needed for certain changes. Consequently, the success of grassroots projects is often dependent on the support of certain individuals or decision making bodies.

Decision makers, on the other hand, are often not very receptive to low level initiatives. There are several possible theoretical explanations for this ignorance. Taking a new institutionalist approach, I try to understand whether the observed behavior can be attributed to expedience, the sheer fact that the members of given institutions cannot conceive of alternative ways of acting, or moral causes (Powell, 2007).

First, looking at an institution in isolation, it can be rational to ignore low level initiatives. Busy decision makers who receive numerous requests from different people to use their powers and authority in different ways may not have enough time to thoroughly consider and evaluate each and every request. Although there are positive examples that modern information-communication tools can facilitate interactions between citizens and decision makers, participatory policy making (Joldersma, 1997) still faces the challenge of selecting valuable comments and initiatives. Hopefully, the selection process will become easier as digital technologies reshape the interface between citizens and public sector decision makers

² Based on Antal, M. (2010a) Applications for official support – an innovative way to promote grassroots initiatives, *The Innovation Journal: The Public Sector Innovation Journal*, 15(2), article 6.

(West, 2007). Nevertheless, time shortage remains an issue of importance, one that needs to be addressed.

A second potential reason for uncooperative behavior is that administration members cannot conceive of alternative ways of acting. Middle managers (councilors, committee members, etc.) may stick to hierarchical approaches either because their institution operates in a rigid, exclusively regulative way, or due to contextual reasons. Like rational ignorance, the former option can still be understood in the frameworks of rational choice theory. However, decision makers are rarely forced in an institutional way to ignore beneficial initiatives. More often, sociological and cognitive factors are at play. Here we cross the boundaries of rational choice institutionalism to obtain a more complete explanation of how preferences are formed (Koelble, 1995). Arguably, the institutional and cultural context is decisive. Apart from financial and functional uncertainties, behavioral change holds important social and psychological risks (APA, 2009): What will others think if I cooperate with grassroots activists? Won't they laugh at me? Our self-appreciation and perceptions about the time used in the cooperation also largely depend on contextual factors. Today, officials usually think they know what to do and what not to do. They often regard external inputs as intrusions into their duties, especially if these inputs are aimed at changes that could already have been made by the decision makers themselves. They may have negative feelings about such project proposals, because they perceive them as implicit critiques of their work. The fact that the critiques are brought up by powerless actors makes it easy to play them down. Negative attitudes thus easily translate into reluctance causing further delays in project implementation. Third, personal stances or feelings about the contents or the initiators of a project can also make officials balk at certain plans. If, for example, a given decision maker considers green activists aggressive nuisances, then not much room is left for a rational debate about a potential sustainability project. If there are no institutionalized forums where ideas or initiatives can be shared, decision makers do not necessarily feel moral obligation to consider unsolicited inputs.

Accordingly, the question arises whether it would be possible to reduce the power deficit of grassroots actors and alleviate the problems hampering the realization of their useful projects without giving too much power to the initiators themselves? We are looking for new solutions to fight problems associated with rational ignorance, to give legitimate support to beneficial proposals, and to change the normative environment in which individual decisions are made.

When searching for appropriate solutions to boost grassroots initiatives, existing methods can serve as examples. The suggested method to alleviate the problems outlined above is based on an analogy between financial and power-related hindrances of grassroots' success. As it will be obvious in the next paragraphs, the proposed support method would resemble existing techniques in many ways.

Application opportunities announced to help project financing are designed to financially support the most beneficial initiatives. Similarly, it would be possible to support selected projects from a hierarchical point of view and ease the lack of powers and authority by a similar procedure. A well respected body (a ministry, a council, a scientific panel, etc.) would invite the applications for official support. Applicants would be required to submit detailed project descriptions, demonstrate feasibility, and point out problems rooted in the hierarchical structure hampering the implementation. The organizing bodies would choose the best candidates: similarly to the case of traditional applications, the expertise of the judging panel and the rigorous selection process could help valuable projects gain support. The chosen projects would receive official support from the organizing committee, e.g. in the form of a public letter of recommendation. *If recommendation letters from prestigious actors were available through applications for grassroots actors, then their valuable initiatives would*

have better chances to get through. As these recommendations would only pertain to projects, initiators themselves would not gain undue powers. Apart from publicly announcing their support for certain projects, organizing bodies would later help successful applicants to publish a follow-up report about their project demonstrating the achieved results, or showing how the official support failed to make a difference.

Presumably, university leaders would not ignore a student proposal about more sustainable waste management practices, if it was supplemented with a recommendation letter from the Ministry of Environment. Similarly, local governmental bodies would more likely consider NGO proposals recommended by a creditable public sector or business organization. On the one hand, such recommendations could be appropriate to draw the attention of decision makers to the selected projects, viz. to alleviate the problem of rational ignorance. The judging panel would partly take over the task of project evaluation from the local officials. In addition, the application process could discourage the submission of less elaborate proposals and thus spare time for decision makers. On the other hand, the reputation of the recommending committee and the further publicity (be it either positive or negative) would mitigate the socio-cognitive causes of ignorance. If decision makers realized the significance of a proposal and the possibility of its implementation, they would be motivated to act in favor of the project even if they perceived the implicit critique of their work or if they personally did not really like the initiators. Many of the sociological and psychological risks associated to the unconventional partnership would be eliminated. An institutionalized solution would make alternative ways of acting conceivable. Still, without the follow-up report, negative feelings could often overcome objective considerations. Therefore, the publicity of the issue would be used as a further motivation for compliance: no one likes to be negatively exposed in the media, especially if the follow-up project assessments are accessible to prestigious and influential members of the society or a wide audience.

Obviously, to gain support from powerful actors is not just a hypothetical solution but it is an already existing way of lobbying for different goals. The formal procedure and the standardization proposed here could reduce corruption and open up new support opportunities for weak actors who are currently unable to reach the appropriate hierarchical levels when lobbying for their initiatives. Supporting bodies could also benefit by receiving elaborated project ideas instead of informal requests they receive today.

Moreover, the greater grassroots efficiency and the enhanced transparency would come at a relatively low cost. Only the evaluation of the applications and the publication of the follow-up reports would require resources.

b. Implementation and practice

When contemplating the announcement of applications for official support, a couple of questions arise, most of them related to the differences between the existing support methods and the idea presented here.

Firstly, while in traditional applications applicants have to elucidate how the received money would advance their projects; here they would have to point out the significance of the recommendation letter. One potential deficiency of the proposed solution is if applicants submit their initiatives before they approach the local officials. This may result in unnecessary paperwork on the organizers' side. However, it is not very likely that applicants compile detailed project descriptions before trying to go the easier way and discuss their plans with the local decision makers. Still, as in the case of any other support methods, incomplete applications may be submitted and not fully worthwhile projects may get supported. Fortunately, due to the low costs of the process, these problems are much less severe than in the case of already existing solutions. Unlike money that may be spent on anything if

reporting obligations are somehow circumvented, a letter of recommendation does not have a market value unless it is used for the project purposes.

Secondly, when considering grassroots support programs, it is important to investigate whether or not they create opportunities for astroturfing (McNutt and Boland, 2007). In contrast to other forms of grassroots activism, this application system does not create opportunities for formal political, advertising, or public relations campaigns to pursue their own goals while making the impression of being spontaneous grassroots behavior. Here, decisions are not based on popular support; panelists evaluate the benefits and feasibility of initiatives, the only factors that count from a societal point of view.

Thirdly, it may be asked whether the suggested practice would constitute sufficient motivation for officials in charge to seriously consider the proposals. To achieve maximal impact, it is important to get letters of support from highly-placed individuals. As for the follow-up report, the place of publication has to be carefully chosen according to the target audience, which may vary with the issues. There are several stakeholders who may be interested in the assessment report. If expertise is necessary to understand the proposal or its significance, then the organizing body itself can be the primary audience. As local decision makers are often dependent, in one way or another, on the opinions of ministries or other recognized bodies, this may help supported projects get through. If the initiative is easy to understand and there is sufficient public interest in the field, then the local community; in case of yet broader relevance, a given sector or an even larger segment of the society can be targeted. As decision makers are usually more or less sensitive to the public opinion, their aspiration to maintain or shape a positive image can help valuable initiatives. Accordingly, applied to the example of sustainability initiatives at a university, follow-up reports may be published in newsletters of the ministry, university papers, tertiary education communications, local newspapers, or other printed or electronic media. In case of a local NGO's proposal to a village council, the village newspaper and the regional media could cover the story. Generally, applicants could make suggestions about potential places for publication. Organizing bodies would either accept these suggestions, or choose other means to publish the follow-up report.

Apart from concrete questions related to the realization of the envisioned application system, there are concerns about the expected perceptions regarding the establishment of the new support method. While potential grantees would most likely welcome the new mechanism, local decision makers and possible providers of support may have reservations about the idea. Those who could be expected to conduct such application processes and issue the letters of recommendation may say that they are already too busy and lack the necessary resources to take on this new task. However, the same could have been said about the announcement of traditional applications except for the fact that no money is handed out after this process. If we try to strengthen a more inclusive democracy, the method proposed here can be a cost-effective element in the portfolio of solutions. More fervent opposition may come from decision makers or institutions being worried about their sovereignty. These fears are partly justified: if street-level actors get assistance from their influential counterparts, powers of the local decision makers may be curbed. Albeit the ultimate decision making authority would not be taken away from them, existing hierarchies and the power of publicity could be used to break their reluctance. Though, this opportunity to spur the implementation of socially conducive projects is deemed to be a manifestation of public control, which is desirable in well-functioning democracies.

To find the appropriate field of application for the suggested practice, it is useful to compare it with alternative solution possibilities. Three comparison categories are considered: NGO incubation programs, fellowships, and reliance on the support of social movements. These options resemble the proposed solution in that they can also serve as a means to legitimize grassroots projects, which is the primary motivation behind the idea presented here.

The few existing NGO incubators (like the Federation of Non-Governmental Organisations Centrum Szpitalna in Poland, the Sakhikamva NGO Incubator Trust in South Africa, or the Amity NGO Incubator in China) enhance the legitimacy of grassroots activism by connecting community based organizations to stakeholders of their projects. While networking can be very useful, it is usually not a targeted approach to promote concrete initiatives. More generally, incubators provide a wide range of important services to strengthen nascent community based NGOs, but their goals are much more comprehensive than the ones discussed in this essay. It is important to note that in-between solutions can also be feasible: one possibility, for example, is to offer financial support to recommended projects. Such combinations can improve the chances of financially more demanding initiatives. However, the trade-off between the scope of assistance and the costs of the support program is obvious. In a similar vein, most fellowships that facilitate social entrepreneurship (like the Ashoka Fellowship) offer combined assistance (stipends, trainings, networking): they can be deemed as incubators for personal projects. From a legitimacy point of view, it is noteworthy that in some cases the renowned name of the supporting organization can help to gain legitimacy. However, the effectiveness of these ‘brands’ strongly depends on the local context. Arguably, many officials are more susceptible to messages from the hierarchy they personally know. Clearly, in many ways official support for a project is much less than a fellowship, but it may give more legitimacy to a concrete proposal than any of the available fellowships.

Perhaps the only existing grassroots method whose primary aim is to create legitimacy for a project is positioning the initiative as a part of a social movement and/or relying on celebrities. These techniques can make a difference when an organization tries to garner public support for an initiative (like Bono’s charity campaigns). However, it can be difficult and expensive to accurately measure and demonstrate public support in order to convince officials. Neither is it easy to use celebrities in a campaign. Moreover, these techniques do not necessarily work with decision makers. Grassroots attempts to reshape existing decision making structures can backfire if decision makers perceive an intrusion into their responsibilities.

In summary, the method proposed in this paper has its niche of application. If individuals or grassroots organizations have beneficial initiatives that are economically advantageous and they have to convince middle managers in a hierarchical system, then official recommendation letters can work. Social and cognitive factors discussed earlier in a new institutionalist framework help us to understand how co-management is facilitated by such an institutional innovation (Sandström, 2009).

c. Summary

In the present part of my dissertation I briefly outlined an innovative way to promote grassroots initiatives. Today, when basic power structures undergo massive changes that further alienate citizens from public affairs, it is increasingly important to let people have their say. Participatory democracy and the revival of regional politics, two cornerstones of the way out from the currently unfolding crisis of representative democracy (Castells, 2004) are inconceivable without the inclusion of grassroots actors. To achieve collective success in communities, the ambitions of engaged community members committed to constructive objectives have to be recognized and patronized.

However, bottom-up efforts are often impeded by insufficient resources. Since money, powers, human resources, and information are all crucial for a successful project, it is simply stunning that no institutionalized methods are applied to reduce the dearth of powers while we go so far to reduce other shortages. The proposed way of filling this gap is not a panacea. Nothing guarantees that initiatives with official support will eventually be successful.

However, the odds will be better. The sheer fact of higher level acknowledgement can pave the way for local support and the publicity given by the follow-up report a few months after the decisions can also boost chances.

Clearly, there are substantial details to determine the success of the suggested method. The application procedure has to be sufficiently simple so that people without professional skills can participate, but submitted application materials need to aptly summarize the envisioned projects. The whole process has to be transparent to promote equality and reduce corruption. More generally, most questions related to traditional application systems can be asked. Fortunately, there are very simple answers to some of the most serious concerns, because no money or costly resources would be given to winners. We wouldn't have to worry, for example, about the severe bias in panel decisions based on mutual financial interests or the fraudulent use of the assets received in the application.

Supposedly, the suggested method would help grassroots projects gain legitimacy and galvanize support of powerful actors in the right positions to assist the most beneficial initiatives without high costs for anybody. All in all, only one question remains: how come that this straightforward idea has not been implemented yet?

3. Diversification of strategic uncertainties in the business of environmental policy³

a. Uncertainty in environmental problem solving

Environmental policy problems are usually of high complexity (Funtowicz et al., 1999). To begin with, large amounts of scientific knowledge are needed to understand the nature of a feature environmental problem. The required data are not always easily accessible and proper modeling of phenomena can also be complicated. Second, a number of different actors with different information, knowledge, objectives, strategies and influence can be involved, interlinked by different relationships (Klijn, Koppenjan, and Termeer, 1995). Governmental and non-governmental, for-profit and not-for-profit organizations compete or collaborate to reach their respective goals. Third, institutional settings affect the chances of different actors and outcomes of the policy process (Briassoulis, 2004).

All these factors of complexity bear different sources of uncertainties. The lack of scientific knowledge is called cognitive uncertainty. Strategic uncertainty refers to the role of unpredictable behavior of a certain actor directly or indirectly affecting other actors' success. Institutional uncertainty arises, because decisions are made in different places under different circumstances at different levels of the decision making system (Bueren, Klijn, and Koppenjan, 2003).

While the role of cognitive uncertainties in decision making is an integral part of the scientific literature (e.g. Holdgate, 1997), now the focus is on strategic uncertainties. The presented idea about the reduction of strategic hazards may also be generalized and applied to institutional uncertainties.

Strategic considerations of a given actor involved in the policy process imply risks for those partners whose success depends on the given decision. Their optimal strategy may depend on the decision of the partner – outcomes are often determined by sets of strategies. If the strategy of a partner is unknown, then it can be represented by a stochastic variable. Actors may estimate probabilities of different behaviors based on their experiences. However, the

³ Based on Antal, M. (2008) Diversification of strategic uncertainties in the business of environmental policy, *Periodica Polytechnica: Social and Management Sciences*, 16(2), 81-88.

measurement of such probabilities is virtually impossible in real policy situations. The actions of given actors can not be repeated many times under the same conditions to build statistics. Moreover, complex policy situations can not be interpreted without the context in which the processes are embedded, so it is not easy to draw conclusions from comparative studies. The bottom-up approach to explain actors' behavior fails due to similar reasons: game theoretic models otherwise amenable to measure and predict strategic behavior in risky situations (Heinemann, Nagel, and Ockenfels, 2004) are way too abstract to be applicable to real life phenomena.

Consequently, albeit the momentous role of strategic uncertainty is often highlighted in policy literature (see e.g. Allaire, Firsirotu, 1989), its relation with a number of different factors describing the policy process (e.g. structural characteristics of the actor network) is unclear. *The aim of the present part of my thesis is to shed light on the relation between strategic uncertainties and a basic structural attribute; the number of partners.* If we are able to reveal such a connection, this parameter can be included in strategic planning.

Throughout the subsection I investigate a suggestive case where an NGO tries to change the practice of companies to improve their environmental performance. There are many ways to do so: the strategy chosen by the NGO can be friendly and cooperative, or it can be very ambitious and vehement, sometimes even aggressive. In the case of a friendlier strategy targeting minor changes, step by step progress can almost surely be expected. More aggressive strategies offer the chance of rapid changes but also raise the possibility of complete denial of any improvements. Accordingly, strategic uncertainty grows as the strategy becomes increasingly aggressive. Environmental organizations have to balance their high-flying objectives with leniency to reduce the risk of denial.

This optimization resembles the behavior of risk-averse (or loss-averse) investors in stock markets. They also search for maximum returns and try to minimize uncertainties called volatility in their case. Similarities between stock markets and strategic decision making encouraged the elaboration of the outlined analogy between the two seemingly distant fields.

Before getting down to the analogy, I have to make a remark. Theoretically, it would be possible to distinguish two factors when we talk about the boldness of strategies: both targets and means can be bold or cautions (NGOs can have high or low expectations and they can put pressure on or form partnership with companies). However, the motivation behind high expectations and attempts to coerce companies is the same: to influence the eventual outcomes, e.g. to reduce the integral environmental impact of companies' activities. This is the reason why NGOs try to evoke big or fast changes with high expectations or more aggressive means, respectively. Higher expectations and more aggressive means both increase the probability of resistance, so they both make a strategy more risky. Hence, as it is explicitly stated in the survey text (Appendix 1), boldness simultaneously refers to targets and means.

b. The analogy and the ensuing hypothesis

The analogy

I compare stock markets and policy systems. In the stock market the subject of the investigation is a stockholder. In the policy system, I analyze an NGO that is in connection with some companies of a given branch of business. (I choose the simplest system that shows the studied behavior to avoid complex effects of unknown origins.) The aim of the stockholder is to maximize returns. The aim of the NGO is to maximize the environmental performance of the companies.

The means that allow the respective actors to reach their goals are buying stocks and establishing connections with companies, respectively. Thus, having stocks in the one field is matched to having connections with companies in the other.

Here I note that there is a difference between the two cases. Stockholders can change two parameters – the type of the stock that determines its riskiness and the amount they buy; while NGOs can only change the riskiness of their strategy, they either have one connection or not, there is no intermediate case. However, if we imagine a hypothetical stock market, where investors can either purchase a stock for a given sum or they can not buy any of it, their incentives to build portfolios – the central topic of the present subsection expanded later – are not eliminated. So, in such a “discretized” market, where stock amounts can not be freely changed, investors still build portfolios to reduce risks at a certain level of expected returns (Markowitz, 1952). They seek for the least imperfect combinations where expected returns are high and volatility is low. Fig. 6 shows a very simple example of diversification in a “discretized market” with a discretized efficient frontier (only the black dots are possible states). E.g. holding Stock 2 is suboptimal, so there are investors with given risk-aversion who diversify their portfolios. (The goal of diversification is to jump up and left from point to point in the expected return – volatility graph.)

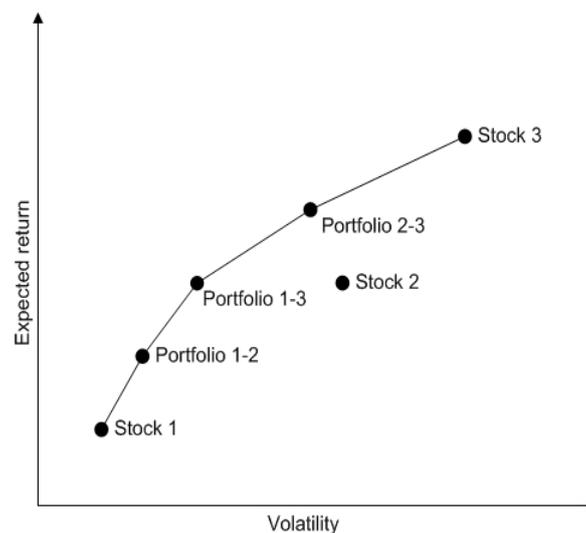


Fig. 6 Diversification in a “discretized market”

Success is determined by the returns of the stock and the behavior of the company, respectively. The analogy is sound, because the factor that measures success is a stochastic variable determined by the complex behavior of the whole system of the stock market or the policy arena. (Moreover, if an investor has several different stocks or an NGO has several different relations, returns are positively correlated. These changes in similar directions are caused by, inter alia, macro-economic effects and peer pressure, respectively.)

The assumed risks are given by the bought stock itself in stock markets and the boldness of the strategy in NGO-company relations. The analogy is clear: the bigger the assumed risk, the bigger the expected reward. In concrete: more volatile stocks have higher expected returns (Sharpe, 1964) and bolder (and thus riskier) strategies are used to achieve greater results. (Arguably, the boldness of the strategy is correlated with strategic risks: the bolder the strategy is, the bigger is the chance that the proposal will be denied. However, in case of success, bolder strategies deliver better results than less daring ones.) For a summary of the analogies see Table 1.

	<i>Stock market</i>	<i>Policy situation</i>
<i>Subject of the study</i>	a stockholder	an NGO
<i>Risky means of actions</i>	stocks	relationships
<i>Success factor</i>	stock returns	company behavior
<i>Assumed risk (single actions)</i>	stock volatility	boldness of the strategy
<i>A factor in portfolio building</i>	number of different stocks	number of relationships?
<i>Ensuing strategy</i>	diversification	???

Table 1 Analogies between stock markets and policy situations

However, the fact that there is no unequivocal value of the assumed risk in the policy case leaves two opportunities open. Either the curve of expected returns against boldness has a maximum and NGOs try to find this point, viz. they maximize expected returns; or expected returns and strategic risks are evaluated together by risk-averse (or loss-averse) NGOs. Notwithstanding that the expected returns fall if NGOs become too aggressive (i.e. expected returns, indeed, have a maximum as a function of boldness); it is still possible that strategic uncertainties are also considered viz. indifference curves are not horizontal in Fig. 7.

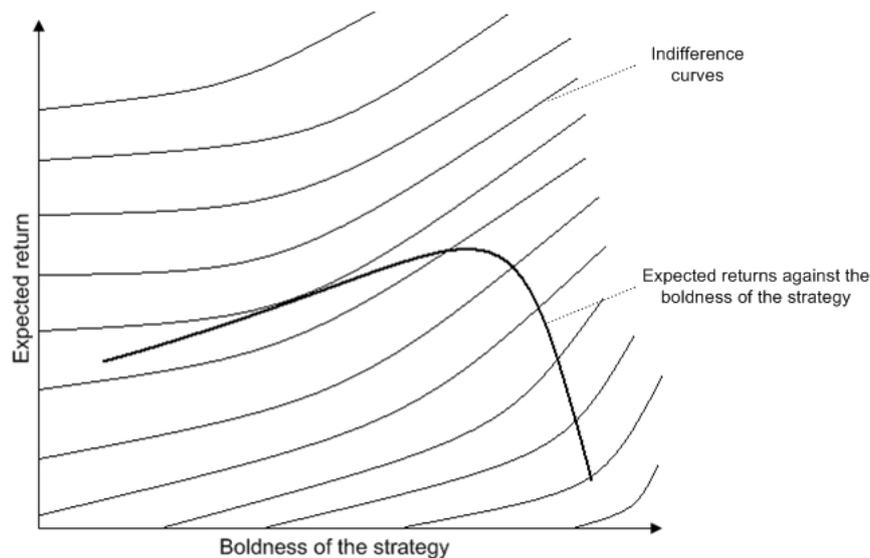


Fig. 7 Expected returns against the boldness of the strategy (thick line) and the indifference curves of a given policy decision maker

Thus, we need to distinguish risk-averse behavior from the sheer maximization of expected returns. To tell apart risk-neutral and risk-averse behavior we look at portfolios. Similarly to stock markets, where portfolios are built to diversify risks, it is possible that NGOs evaluate expected results and strategic uncertainties together. In stock markets, investors build diverse portfolios and strive to reduce volatility at a given level of expected returns by holding different stocks so that oppositely directed fluctuations in returns compensate each other. Alternatively, this is the way how at a given level of volatility expected returns can be maximized.

If the case is similar in the policy arena, the boldness of NGO's chosen strategy can be affected by the constitution of their 'portfolio of relations'. If the number of the companies they try to affect grows, variations in their behavior (defining the given NGO's success) will compensate each other – exactly as the volatility of portfolios decreases as the number of stocks in the portfolio (whose returns are not fully correlated) grows. Hence, a similar

reduction in strategic uncertainties is possible. However, if NGOs were risk-neutral, they would not care about strategic uncertainties and they would use the same strategy regardless of the number of the partners to maximize expected returns in individual relations.

My conjecture is the following: *if the number of the companies with which a given NGO is connected grows, its strategy to influence their behavior will become bolder.* More generally, I presume that actors in the business of policy are risk-averse and they can be characterized by a certain level of risk tolerance. Consequently, if strategic uncertainty falls (as the number of partners grows) their response will be to assume greater risks in their individual relations. The adjustment of the assumed risks, the treatment of uncertainties is similar to stockholders' behavior in stock markets: policy actors diversify strategic risks.

Preliminary remarks

Before going into details about the proof of the conjecture, I list some notable remarks. First, unlike investors who can freely choose their portfolio elements, the required connections in policy situations are sometimes given. Resource dependencies may necessitate the inclusion of given actors. In the exemplary case of the environmental performance of businesses, NGOs may try to influence all companies in a given area, so their opportunities to choose partners can be strongly restricted. However, that means no restrictions in terms of the assumed risk, because riskiness can be tuned by the chosen strategies. So, the outlined analogy is not distorted.

Second, if we are talking about an NGO and its several relationships, the boldness of strategies can be different in different relations. From a theoretical point of view, the clearest form of the conjecture can be formulated for those partners whose approach is unknown, because then there is no reason to pursue different strategies in different relations. Though, strategies of the NGO can be significantly different if partners are known to be cooperative, indifferent or hostile. Nevertheless, it is always possible (independently of the approach of the partners) to change the assumed strategic risk according to the number of partners. The only difference is that it is more difficult to discern the effect of changes in strategic uncertainties if there are other strategic concerns.

More generally, a third concern is that there are a number of other factors that influence the boldness of the strategy. Obviously, the public acceptance of the goals of the NGO, the complexity of the issue strongly linked to its marketability, the available time, power relations and several other factors affect strategic decisions. However, the fact that the number of partners is not always decisive in strategic considerations does not mean that its role is negligible. My aim is to separate the effects of the number of connections and demonstrate that it is indeed a constituent in strategic decision making.

Risk theory – basic dilemmas and methods of measurement

Since I wish to perform measurements regarding behavior under uncertainties, exact measurement instructions are needed. To define the parameter under study, a short theoretical review of the basics of risk theory is necessary.

It is generally assumed in modern portfolio theory that investors try to avoid risk. The original theory interpreted risk aversion by assessing the expected utility of wealth before and after an investment. The concave utility function of wealth was deemed to be responsible for risk aversion (Arrow, 1971).

Recently it was unequivocally shown that Markowitz's original theory and its later versions give infinitely high risk aversion for high values and total risk neutrality at lower values of wealth (Rabin and Thaler, 2001). This contradicts real world observations: we buy lottery

tickets and cheap insurances. Accordingly, the emphasis was shifted to the theory that regards the expected utility of income (viz. potential changes in wealth) as the fundamental variable. Instead of the initial and final values, the potential positive and negative changes in wealth were compared to calculate the expected utility of income and make a decision in a risky situation (Cox and Sadiraj, 2006). At the same time, loss aversion (originally described by Kahneman and Tversky, 1979) was proposed instead of risk aversion as the organizing principle of actions in risky situations (Rabin, 2000).

However, problems of the new model and contradictions with portfolio theory (e.g. portfolio-independent investments) were realized soon (e.g. Heinemann, 2005). Hybrid models were elaborated to incorporate all observed features into a single model. However, up to now, there is no convenient, universally accepted model to describe risk or loss aversion.

On the other hand, what is common in all these models is that actors react to uncertainties with changes in their behavior. Fortunately, my aim here is to show *how* behavior changes in policy situations under uncertain conditions. *Why* these changes happen, is a question for the future. However, the similarities between financial and political decisions could allow for the cross-fertilization of ideas and results between the two fields. Nevertheless, as for now, we should turn our attention to the measurement techniques applied to investigate behavior under risk.

Hanna et al. observed that there are at least four methods of measuring risk tolerance (Hanna, Gutter, and Fan, 2001): asking about investment choices, asking a combination of investment and subjective questions, assessing actual behavior, and asking questions based on hypothetical scenarios.

As stated earlier, the assessment of actual behavior is not a very promising opportunity in the case of policy. Asking about real life choices can also result in distorted results, because it is probably impossible to study a sufficiently large sample to level out other effects stemming from different factors that influence behavior. Thus, I chose hypothetical scenarios as a measurement method. Here the role of the number of the actors can be investigated in a ‘pure’ form and the sample of the query is not restricted to organizations that have already encountered cases in which they changed their strategies due to changes in the number of their partners.

c. The survey

Surveyed organizations

My aim was to study the behavior of NGOs that pursue environmental activities and see how their strategies change if there are changes in the composition of their ‘portfolio of relations’. I looked for NGOs that may get in touch with companies and try to affect their behavior. I restricted the scope of investigations to Hungarian NGOs for two reasons. First, the fact that I studied organizations in a single country allowed me to further reduce the number of parameters (social settings, organizational culture etc.) that potentially affect strategic considerations. Second, it was easier to reach Hungarian organizations and I could endeavor to contact nearly all of the environmental NGOs in the country.

I used the comprehensive web page “nonprofit.hu” to find NGOs. I searched for NGOs that marked environmental protection as one of their activities. I listed 253 different organizations that had proper electronic contact information, actualized their data in the last two years, and could receive 1% tax donations (implying that they were more or less serious organizations). As there were some umbrella organizations among these, the original list represented approximately 300 organizations. I sent out a survey electronically (as an attached document) with 9 questions to all of these NGOs. Unfortunately, 47 email addresses turned out to be

incorrect or unavailable. Eventually, even after I repeated the query, I received a meager 30 completed surveys. Thus, I targeted the inactive NGOs with an email consisting of only the most crucial question and asked them to reply in one word. These renewed efforts paid off in the form of 28 more answers.

Hence, I could build statistics from 58 separate answers from 58 different NGOs. However, I had only one question to rely on; supplementary questions included in the original survey (i.e. Appendix 1) could only be used as weaker guidance based on the first 30 results.

Survey questions

In the original survey I asked 9 questions. My central question was Question 1:

Suppose that your NGO would like to affect some companies in a given branch of business so that they improve their environmental performance. Depending on the number of companies, how would you change your strategy? Would you shift to bolder or to more cautious strategy if you tried to influence more companies?

1. *We would not change our strategy.*
2. *We would use bolder strategy.*
3. *We would use more cautious strategy.*

Question 2 and 3 were similar to Question 1, the only difference was that instead of companies, decision makers and other organizations were the hypothetical partners. Then I asked about the validity of my theory (Q. 4-5) and tried to gain information about other factors (approach and status of the partner) influencing strategic considerations (Q. 6-8). Finally, I asked about real-life examples (Q. 9).

Results

In the case of the fundamental question 32 of 58 respondents chose bolder strategies, 17 organizations would not change their strategy, and only 9 organizations answered that they would apply more cautious strategies. Supplemented by the data collected from full surveys, results are given in Table 2.

	<i>no changes</i>	<i>bolder</i>	<i>more cautious</i>
<i>Complete results (Q1)</i>	17 (29,3%)	32 (55,2%)	9 (15,5%)
<i>Survey Question 1</i>	12 (40,0%)	15 (50,0%)	3 (10,0%)
<i>Survey Question 2</i>	8 (26,7%)	14 (46,7%)	8 (26,7%)
<i>Survey Question 3</i>	10 (33,3%)	14 (44,7%)	6 (20,0%)

Table 2 Results: strategic changes caused by changes in the number of partners

d. Statistical evaluation

First I focus on the central question posed above. As there were three choices, we can use a modified version of binomial analysis. In the case of a random distribution of the answers, the probability of each answer is $1/3$. The probability that there are x answers from one type out of the 58 answers is:

$$P(x) = \binom{58}{x} \cdot \left(\frac{1}{3}\right)^x \cdot \left(\frac{2}{3}\right)^{58-x} = \frac{58!}{x! \cdot (58-x)!} \cdot \frac{2^{58-x}}{3^{58}}.$$

My aim is to see that the number of positive answers (bolder strategies) is too high and the number of negative answers (more cautious strategies) is too low to be coincidental. We could arrive at such statements if we calculated the confidence intervals at the 99% confidence level. So, the task is to calculate N and M so that $\sum_{x=1}^N P(x) \geq 0,99$ and $\sum_{x=M}^{58} P(x) \geq 0,99$.

Numerical calculations give $N = 28$ and $M = 11$.

As my results (32 and 9) are not in the 99% confidence intervals (1...28 and 11...58, respectively), I have to reject the assumption that I sampled a random distribution at the 99% confidence level.

Consequently, the conjecture that policy actors typically shift to bolder strategies if the number of their partners grows, can be accepted at the 99% confidence level. Both the particularly high proportions of positive answers and the particularly low proportions of negative answers corroborate this statement.

(The statistical analysis was repeated with the statistical software SPSS 15. Results obtained with its Binomial Test were perfectly the same that I got manually from the above calculations.)

Similar but weaker statements hold for the 30 original survey results. The proportion of positive answers lies out of the 90% confidence interval for all of the first 3 questions. Except for Question 2, the low proportion of negative results can also be accepted to be non-accidental at the 90% confidence level.

e. Summary

In this subsection, an analogy between stock markets and policy situations was formulated. Actors in such different contexts react to uncertainties in similar fashions. Expected returns and risks are evaluated together to optimize behavior. If there are simultaneous efforts to achieve success (an investor holds more different stocks or a policy actor has more different relations), then fluctuations in outcomes can compensate each other. Thus, diversification offers the chance to minimize uncertainties at a given level of expected returns, or to maximize returns at a given level of uncertainties. Actors in both fields tend to make use of such opportunities. However, while the phenomenon has been well known in stock markets for more than five decades now, to my knowledge, diversification of strategic uncertainties has not been identified before.

Although I studied NGOs with environmental objectives, I am convinced that the demonstrated phenomenon is much more general. It seems plausible that the underlying mechanisms are the same in a wide range of policy situations. The demonstrated effect is deemed to be a manifestation of a general risk (or loss) avoiding behavior characterizing actors in the world of policy. Consequently, the presented theory has practical implications for a variety of actors in the political battlefield.

The observation can help to consciously include a new parameter, the number of partners, into strategic planning in risky situations. On the longer run, further steps can be made to clarify the role of policy network structures in strategic considerations. Like in economics, attempts can be made to quantify different actors' approach to risky situations. However, problems encountered in economics are likely to occur in the policy case as well and even more difficulties are expected due to worse measurability.

An additional possibility is that policy actors do not only diversify strategic risks, but also they use the same method to reduce institutional uncertainties. Moderate politicians, for example, may find it profitable to have strong ties to more radical NGOs whose methods and strategies are radically different from theirs.

For sure, strategic decision making will remain an intriguing theoretical research area for a long time. Nevertheless, I hope that both the theoretical construct which serves as the base of the analogy outlined and the conclusions drawn from the survey of environmental NGOs can be beneficial – not only in the business of environmental policy.

4. Policy measures to address bird interactions with power lines – a comparative case study of four countries⁴

a. An environmental policy network

As an amateur ornithologist and committed conservationist, I got involved in a concrete policy network where I could collect first-hand experiences about decision making under uncertainty. In 2006 I phoned Péter Olajos (then Member of the European Parliament) and asked about potential volunteer opportunities in the field of environmental policy. The problem he suggested was a wicked one: bird electrocutions and collisions with power lines. *How actors working for the protection of birds should act to be effective in the struggle to reduce the adverse effects of power lines on wildlife* has been an open question for the last 30-40 years in various countries around the globe. Soon, our team entered into negotiations with multiple stakeholders to facilitate the resolution of the decades-old problem in Hungary.

Two years of experiences later, my special interest in environmental policy networks led me to study different solutions to the same problem in other countries. I conducted an international survey to investigate national settings in terms of the context, the evolving policy networks, the actions and tools playing significant roles, and the results achieved (Appendix 2). I contacted experts in South Africa (Jon Smallie, Eskom – Endangered Wildlife Trust Strategic Partnership), Slovakia, (Jozef Chavko and Lucia Deutschová, Raptor Protection of Slovakia), and the USA (Rick Harness, EDM International Inc.). The ultimate aim of these efforts was to help strategic planning in the many countries where birds still suffer from the adverse effects of electric transmission facilities.

Wildlife interactions with power lines are increasingly well-documented (Bevanger, 1998; Ferrer and Janss, 1999; Haas et al., 2005; Lehman, Kennedy, and Savidge, 2007). Given their fundamental concern, ornithological associations have been collecting data about the negative effects of power distribution facilities on birds around the globe for the last few decades (e.g. Nelson and Nelson, 1976; Rose and Baillie, 1992; Kovács et al., 2008). We know which species are seriously affected and the significance of the problem can be estimated for different families of birds (Haas et al., 2005). The high complexity of biologically relevant factors and processes determining risks posed by power lines to birds are better understood today (Bevanger, 1998; Lehman, Kennedy, and Savidge, 2007). Technological solutions to mitigate electrocutions and collisions are developed for a large variety of distribution facilities (Harness, 2000; Stoychev and Karafeisov, 2004; Sundararajan et al., 2004; Haas et al., 2005). By now, there are international recommendations about favorable solutions published by BirdLife International (BirdLife International, 2007). However, with extensive literature on

⁴ Based on Antal, M. (2010b) Policy measures to address bird interactions with power lines – a comparative case study of four countries, *Ostrich: Journal of African Ornithology*, 81(3), 217-223.

biological and technological aspects in hand, solution efficiency still strongly varies between different countries.

I argue that policy-related factors substantially contribute to regional differences in the efficiency of problem solving. Different contexts enable the rise of different policy networks. On the one hand, outcomes are largely determined by the structure of these networks: the actors involved (conservationists, utility companies, authorities etc.), their resources, and their relations fix the frameworks in which respective aims can be pursued. On the other hand, strategies of actors, their willingness of cooperation, and the way they address cognitive uncertainties (incomplete information about biological, physical or technological data), strategic risks (how partners will behave or react), and institutional uncertainties (how decision making frameworks will change in the future) largely shape outcomes (Bueren, Klijn, and Koppenjan, 2003).

If we try to foster cooperation among conservationists, ornithologists, energy companies, and politicians as recommended by the BirdLife Position Statement on Birds and Power Lines (2007), then other recommendations of the same document may not be feasible. For example, in contrast to the Western-European practice, a ban on upright insulators or laying cables underground are way too expensive solutions in many countries⁵. Another example is the application of legislative tools, which may reduce trust among partners working on a jointly agreed solution and thus may threaten cooperation. Consequently, the way to achieve the generally accepted goals can be very different in different countries.

The present subsection gives an account of policy-related factors affecting the efficiency of mitigation efforts regarding electrocutions and collisions. Four different solutions in four different countries – Hungary, Slovakia, South Africa, and the USA – are compared. Despite conspicuous differences, all four systems are deemed to be successful by conservationists in the respective countries. These methods could serve as examples for other countries where the struggle to mitigate adverse effects of power distribution facilities on wildlife has not started in earnest yet.

b. Common features of the problem

Electrocution and collision problems show some basic similarities in all countries surveyed. First, historical contexts are quite similar. After some early reports, the problem received wider interest in the 1970s and '80s. Since then, there has been a growing concern about wildlife – power line interactions facilitating increasingly intensive actions. Second, field biological data (affectedness of different species, population sizes, effects of pole design etc.) are inevitably needed to start a mitigation process. Although the issue is complex, it is possible to collect the relevant data and elaborate protection plans if expertise, time, and money are given for field surveys. Third, technological competence is also required to implement avian protection plans. Thus utility companies are key players not only because their operations are affected, but also because their expertise is necessary. Apparently, nature conservancies and engineers need each other's help to develop solutions. Fourth, money constraints are significant in all countries surveyed. Fifth, according to the key role of expertise, close policy communities evolve: new actors or ideas can not easily penetrate the boundaries of these communities where specialized biological or technical knowledge, clear authority or strong fundraising abilities are preconditions of participation.

⁵ In Hungary, laying cables underground is estimated to be 20 times more expensive (approximately 54,000 \$ km⁻¹) than the use of bird flappers. Although bird flappers reduce mortality only by 60-80% (van Rooyen, Nelson, and Kambouris, 2000; Yee, 2007), their use is a rational choice, if problematic parts of the network are extensive and funding for ground cables will not be available in the foreseeable future.

Presumably, these considerations apply for most countries where avian problems occur on power lines, with a possible delay in the historical context. So, we should bear the common features in mind when looking for appropriate solutions. Nevertheless, my fundamental argument is that *country-specific factors describing the policy system also have large influence on proper solution strategies, therefore countries have to adjust their methods to the national or regional circumstances.*

c. Country-specific solutions

Hungary

The Hungarian solution is based on a voluntary agreement. After years of bilateral negotiations between stakeholders, all the three utility companies, the Ministry of Environment and Water (MEW), and MME/BirdLife Hungary signed the ‘Accessible Sky’ agreement in 2008. They pledged full cooperation in all aspects to efficiently reduce electrocution and collision problems. The Coordination Committee of the agreement became the most important forum of problem solving. It convenes at least twice a year to discuss plans, implementation, and monitoring. Both reactive and proactive actions are undertaken with the announced (but hardly achievable) goal to retrofit all dangerous lines before 2020.

There were several contextual requirements of the emergence of this cooperation. First, long time relations between parties and the global escalation of environmental concerns contributed to the awareness of all relevant actors. Second, European funding opportunities were favorable: significant proportions of costs (approximately 75% in the first 5 years) are to be covered by the Environment and Energy Operational Programme of the European Union. Third, due to the political negligibility of the issue and the commitment of some ministry officials, MEW gave support to the agreement proposal prepared by an opposition party. Later MEW became the main facilitator of discussions.

The publicity of the agreement helps accountability and the regular meetings are beneficial to promote equality between the actors. The ministry is a more or less neutral organizer that tries to lead actors towards the commonly acknowledged goals, while utility companies and conservationists try to coordinate their objectives and expectations. A growing number of companies providing technological solutions and planning consultancy also show interest and join the discussions.

Cognitive and institutional uncertainties are decreasing due to several reasons. First, conservationists prepared priority lists of middle voltage lines for mitigation with rigorous scientific methodology: they picked the most relevant species (separately in the case of electrocutions and collisions), defined core habitats, and estimated affectedness of different species. The priority lists based on these data were handed over to utility companies in the form of detailed ‘conflict maps’. Second, utility companies and other experts calculated average retrofitting costs to obtain financial data for annual budget plans. Third, institutional uncertainties are reduced by the regularity and transparency of the Coordination Committee meetings.

At the same time, the reliance on cooperation adds to the significance of strategic uncertainties. It is not easy to voice dissatisfaction in the case of non-compliance, and coercive legal solutions are also off the table to maintain cooperation. However, as long as all parties are more or less satisfied, volunteer solutions can be viable.

In Hungary, early results are promising. Companies self report all accidents or they pledged to broaden reporting in the near future. There are comprehensive technical manuals used by all utility companies. New poles are bird-friendly and the generally agreed legislation about new constructions awaits final parliamentary approval. Scheduled retrofitting programs are well-

planned and significant: the annual budget of utility companies is around \$ 600 000 each. Considering the 75% external support it means that at least \$ 7 million is devoted to the issue in the country annually. However, according to estimations, this will only be enough to retrofit one third of all potentially dangerous lines until 2020. Nonetheless, the retrofitting of the most dangerous third of power lines could drastically reduce the number of casualties. Until 2013 EU funding is guaranteed, the main question is whether parties can maintain the momentum beyond this critical date.

Slovakia

Legal mechanisms and cooperative solutions are applied simultaneously in Slovakia. Conservationists from Raptor Protection of Slovakia (RPS), regional and national authorities (including the State Nature Conservancy and the Ministry of Environment), and all three utility companies are involved in the solution process.

The cooperation has significantly strengthened in the past 10 years. Companies increasingly understood their potential role in wildlife protection. Changes in the ideological context were assisted by conservationists' awareness-raising efforts (media appearances, leaflets, exhibitions etc.). Today, the approach of utilities is definitely positive, not least because they try to maintain a green image. An informal partnership has evolved between companies and ornithologists: there are regular discussions about strategic mitigation plans, utility companies are involved in conservation projects (e.g. Western Slovakia's utility, ZSE, in Imperial Eagle *Aquila heliaca*, Saker Falcon *Falco cherrug*, and Great Bustard *Otis tarda* LIFE projects), and companies often turn to wildlife experts to discuss technological solutions.

Cooperation between government agencies and RPS was also efficient in the first half of the past decade. They jointly prepared a legislation that allows nature protection bodies to coerce companies to adopt mitigation measures if bird killings are verified. State and regional authorities implement the law on a case-by-case basis. However, the inclusion of higher level political bodies enhanced the importance of the political context: there were serious setbacks in the cooperation after 2006 when a new government came into power. Nevertheless, government agencies and utility companies still regularly discuss retrofitting programs for middle voltage power lines, with special emphasis on Natura 2000 sites.

The future evolution of the cooperation with administrative bodies is crucial, because they are powerful actors being responsible for the implementation of the law. The present slight leaning towards industrial interests can be compensated by improving and intensifying connections between utilities and conservationists. These changes in relations underline the role of strategic and institutional uncertainties perceived to be notable in the policy network.

Reactive actions are not problematic in Slovakia: conservationists either inform the local authorities or the utility about accidental electrocutions. In both cases, the insulation of the particular lines can be expected soon. Since utilities cover all costs, results regarding proactive measures are mixed. While new constructions are bird-friendly, the pace of retrofitting depends on single projects. Fortunately, scientifically grounded priority lists of power lines prepared by RPS and the State Nature Conservancy are used in most of these projects. There is a strong need to carry on technological discussions, because specifications regarding bird-friendly solutions are not comprehensive yet. There is also some space to improve monitoring and reporting accidents in order to get a more realistic picture of the situation.

Given the well-functioning reactive legal mechanism, it could be advantageous to broaden the strategic partnership and set common targets to speed up proactive steps. Though, it is questionable whether the political conditions of such coordinated actions are given. Declining support of state and civil environmental organizations and the dominance of industrial

interests in higher politics are not reassuring. Still, there is hope that a greener government will be able to build on improving relations between companies and RPS, and will effectively fight the problems under consideration.

South Africa

The purest form of bilateral cooperation can be observed in South Africa. The single highly cooperative parastatal utility company (Eskom) and the Endangered Wildlife Trust (EWT) cooperate to resolve problems. Government agencies and public administrators are not involved. Early efforts and joint work gradually evolved into the formal partnership (Eskom-EWT Strategic Partnership) in 1996. Owing to the Partnership and the coordination of its full time staff, mitigation efforts are concerted in the country.

The most important contextual factor influencing outcomes is public awareness. The role of landowners – who usually know only the basics about the issue – is important, because they are relied on for data about incidents. There is an ongoing awareness program to inform people about the details of the problem and possible solutions. The positive approach of most landowners is an important asset of EWT. The growing awareness is well known to company representatives because of the close cooperation. At the same time, enhanced consciousness also causes some legitimacy problems – concerned citizens sometimes criticize the ways how problems are handled.

There are various regular forums with the different utility divisions to address all aspects of the cooperation. Most commonly technical details are discussed by engineers and environmental experts. Long term plans are specified by senior utility staff and conservationists. The issue is a top priority on the agenda of both parties.

Legal instruments were never important in addressing collision and electrocution problems in the country. As long as the present very high level of cooperation can be maintained, it is worth depressing some potential sources of conflict. More recently, the importance of strategic planning has been recognized and is currently being implemented through a series of workshops.

Results of the cooperation are mostly positive. The company reports accidents, standardized technical solutions are published in Eskom bulletins. New poles are usually bird-friendly, environmental impact assessments are performed before the construction of new lines or upgrading. Successful reactive measures are supplemented by proactive steps in key conservation areas where risk assessment is conducted to determine retrofitting priorities. Apparently, there is always some room for improvement since the task to retrofit existing lines is huge. As the company pays all retrofitting costs, it is not surprising that the focus is on particularly dangerous and reportedly problematic lines. Nevertheless, EWT attempts to significantly extend monitoring activities and obtain more data about electrocutions to get a clearer picture of the progress.

The USA

The largest influence of government agencies can be observed in the United States. The US Fish and Wildlife Service (USFWS) is a main driving force behind mitigation efforts, in which numerous organizations including utility companies, state wildlife agencies, and consulting companies are involved. The role of conservationists is usually limited to the provision of expertise during the solution process. There are thousands of utilities in the country; thus in the lack of high-level coordination, actions are extremely fragmented.

It is difficult to evaluate the role of contextual factors due to the complexity of the policy network. Nevertheless, none of the contextual factors seem to be as decisive as in the previous cases. Presumably, more diverse systems are less sensitive to changes in the circumstances.

In contrast to conservationists for whom the issue is not a top priority, government agencies are very active in some parts of the United States. As there are no regular discussions between stakeholders, relations are defined by the legal frameworks. Electrocutions and collisions are a violation of law. Wildlife – power line interactions have been receiving increased scrutiny from the USFWS in accordance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act and the Endangered Species Act.

After serious losses were recorded in 1972, the US Rural Electrification Administration published a guide to reduce raptor electrocutions, and several electric companies began testing new, safer power line designs (Olendorff, Miller, and Lehman, 1981). Nine of the most proactive major utilities joined in 1989 to form the Avian Power Line Interaction Committee (APLIC) to study electrocutions and bird collisions (Lewis, 1997). They regularly publish on avian protection practices; the most recent set of recommendations appeared in 2006 (APLIC, 2006). APLIC and the USFWS also set up guidelines for Avian Protection Plans (APPs) to help utilities outline their corporate approach to bird protection issues (APLIC and USFWS, 2005). Still, on the country level, the approach of utility companies is quite variable ranging from very positive to totally passive.

If significant losses are detected, the USFWS may prosecute the given utility. According to precedents, fines up to \$ 200 000 can be imposed for eagle electrocutions, supplemented by obligations to retrofit dangerous lines and to develop an APP. Even without obligations, APPs are prepared by a growing number of utilities to ease or forego potential conflicts, because the USFWS uses prosecutorial discretion with utilities acting in good faith. In the lack of official coercion all measures are up to the companies who pay for the projects.

Apart from court fines and restitution, there are further motivations for utilities to consider wildlife interaction problems: the US Department of Agriculture provides loans to some companies with the prerequisite that avian issues are addressed. Moreover, newly constructed lines have to be bird-friendly if they are built on federal land.

Given the transparency of the system, the most significant uncertainty is the lack of biological data. In some states extensive field surveys are needed before an APP with a risk assessment can be prepared. In other states, where good biological data are available, future problems are easily predictable. The Electric Power Research Institute, the California Energy Commission and APLIC accumulated valuable data to assist mitigation efforts, while EDM International has already done approximately 60 APPs.

Utilities with APPs address problems in multiple ways: they host long term strategic discussions, run reconstruction projects, and usually set up systems to record and report accidents. Due to the significant regional differences, outcomes are variable in the country; however, the growing number of utilities entering agreements to address avian issues indicates good progress.

	USA	SLOVAKIA	HUNGARY	SOUTH AFRICA
COUNTRY-SPECIFIC FACTORS				
Policy network	USFWS + utilities + numerous organizations and agencies, consulting companies	conservationists + utilities + local authorities + government	conservationists + utilities + Ministry of Environment and Water	conservationists + utility
Number of utilities	more than 1000	3	3	1
Coordination	very fragmented	somewhat fragmented	concerted	concerted
Main contextual factor	–	political context	economic context	ideological context: awareness
Solution method	USFWS prosecution + Avian Protection Plans + APLIC	Cooperation + legal tools to organize reactive measures	Comprehensive multilateral partnership + agreed legal steps	Eskom-EWT partnership
Most influential actor	USFWS/APLIC	authorities	–	–
Utilities' approach	variable	positive	positive	very positive
Governmental approach	variable, usually positive	negative (used to be positive)	positive	–
Cooperation	to elaborate avian protection plans	regular bilateral discussions	regular comprehensive discussions	regular comprehensive discussions
Legal steps	yes	yes (reactive measures)	only upon agreement	no
Main success criteria	expertise, legislations	expertise, image, legislations	expertise, volunteer agreement	expertise
Main uncertainties	biological	strategic, institutional	biological, strategic	biological, strategic, institutional
OUTCOMES				
Companies' self-reporting of accidents	in some cases (usually companies with APPs)	sometimes – generally unknown	most of the times	yes
Manuals	suggested practices	partly	yes	yes
Bird friendly new lines	variable (federal lands: yes)	yes	yes	mostly
Monitoring (done by)	in some cases (utilities)	some lines (conservationists)	some lines (conservationists)	some lines (conservationists)
Progress indicators	electrocutions reported (companies with APPs)	monitoring results	length of the retrofitted lines	collision & electrocution numbers
Who pays	utilities	utilities	state + EU + utilities	utility
Top priority	no	no	in-between	yes
Overall success	yes	yes	yes	yes

Table 3 Country-specific policy aspects and outcomes in the mitigation of avian power line interactions

d. The interplay of structure, dynamics, and context

Arriving at a solution

There are three main factors that determine the chances of different types of solutions.

Firstly, the composition of the potential policy network is decisive. The sheer number of actors already restricts opportunities. Most notably, the number of utilities is definitive: face-to-face communication and regular discussions are convenient if there are only a few companies, but such negotiations are inconceivable if there are thousands of them. Countries where electric distribution facilities are owned by many different corporations will always have some non-compliers if they rely on voluntarism. Thus, legal regulations gain significance as the number of utilities grows (Table 3). Together with the number of partners, the boldness of the strategy grows.

Secondly, the approach of the relevant actors is of utmost importance. Cooperative companies are likely to be involved in volunteer agreements, while long-term passivity and stubborn resistance call for coercive measures. However, strong plaintiffs, preferably government agencies are needed to sue companies, because a lawsuit against large companies is too difficult for individuals or smaller organizations. In the lack of governmental commitment, efforts to initiate legislation may prove futile. Statewide concerted efforts usually also require activity and commitment from higher-level authorities.

Thirdly, the economic, political, ideological, and knowledge based context in which the policy network unfolds is also relevant, because they affect organizational attributes of different actors. Macroeconomic trends have effects on the financial situation of utilities and the state funding of non-governmental organizations; regulation or deregulation initiated by politicians affect the level of competition between utilities; and the approach of companies and public support depends on the broader ideological context. The growing amount of technical and biological knowledge tangibly decreases cognitive uncertainties.

Consequences of the solution method

Once a solution method is fixed and the role of different actors is given in the emerging policy network, a number of consequences – the effects of the solution – are to be considered.

First, the importance of contextual factors has to be reevaluated. The quicker the solution is, the more important the economic context will be. Obviously, utilities try to keep costs down, so the availability of non-corporate funding that depends on the economic situation is essential if the retrofitting of the electric system is relatively rapid and expensive (e.g. Hungary). In contrast, if all costs are covered by the companies, their financial stability can guarantee a constant but moderate speed.

The significance of the political context depends on the composition of the policy network and the role of the political actors in the process. If legal mechanisms are applied and the administration also functions as the facilitator of the process, then the system will be vulnerable to political changes (see the case of Slovakia).

Public awareness is particularly important, if citizens are directly involved in the mitigation process (as in South Africa). The broader ideological context is relevant, as it shapes the views of stakeholders. Voluntary solutions augment the role of utilities' awareness; while in government-led legislative processes awareness-raising should be focused on administrators.

Second, while state-wide cooperations enable parties to act concertedly (e.g. in Hungary or South Africa), legal solutions usually do not provide coordination, thus the network of different stakeholders can remain very fragmented (like in the USA). The lack of information

flows between different organizations may result in knowledge deficits, diverging interpretations, or polarization. American vendors of avian safety products, for example, state that poor communication with utilities is one of the significant barriers to the otherwise growing market. Success in fragmented systems highly depends on the engagement of local actors. Concerted actions can help more reasoned planning, may speed up projects, and allow more precise success measurement. Although, these benefits must be balanced with coordination needs and costs.

Third, the chosen mitigation strategies partly redefine the main assets in the negotiations. In the case of a bilateral cooperation between conservationists and the utility, public support will be of enhanced significance (e.g. South Africa). If legal mechanisms are applied in a basically cooperative atmosphere, volunteer and non-volunteer agreements can both be valuable (e.g. in Slovakia). If either volunteer or legal solutions are firmly advocated (like in Hungary and South Africa, or the USA, respectively), tools of the non-chosen strategy will lose their significance.

Fourth, different solutions entail different uncertainties. If legal mechanisms are fixed, applied, and well known, then cognitive uncertainties are dominant (e.g. in the USA). In voluntary solutions strategic uncertainties are also very important. When conservationists are involved in the planning phase, transparent consultations and clear standpoints are inevitable. Once the contours of the partnership are laid down, no additional claims for expensive retrofitting are admissible, because predictability of costs is a major concern for utilities. More generally, the price of maintaining partnerships has to be paid. Therefore, it is practically impossible for conservationists in moderately developed countries to advocate laying cables underground or to set legally binding deadlines to retrofit all dangerous lines like in Germany (Lowen, 2007), if they try to cooperate with utility companies. Similarly, the ability to prosecute is lost, if all actors are working together (e.g. in South Africa or Hungary). Moreover, if decision making frameworks are vaguely defined (e.g. in the case of Slovakia's future proactive projects), institutional uncertainties add to the challenges of cooperation. Informal volunteer solutions pose risks for both parties: it is never known, for how long and to what extent companies will cooperate; or when conservationists will deem the volunteer solution unsustainable and resort to 'harder' measures. Wide publicity of the commitment of parties to uphold cooperation is a means to reduce these threats; however, financial problems can upset even outspoken plans.

e. Summary

The issue of wildlife – power line interactions is a rather complex one. None of the biological, technical, financial, or policy aspects can be neglected if solutions are sought to the decades-old problem. Although the basics of the matter are the same everywhere, prospects of a successful solution largely depend on the country-specific contexts, the composition of the potential policy network, and the approach of different stakeholders. These factors and the chosen solution methods mutually influence each other and jointly determine outcomes. Thus, in partial contrast with the current position of BirdLife International, solutions have to be adjusted to local circumstances.

Opinions of experts and the study of the policy systems of four countries from three continents revealed solution possibilities and we can draw some general conclusions.

As for countries where the process is in its early stage but the issue is on the agenda of conservationists, it is advisory to look at the approach of the utility companies first. If they are cooperative, volunteer solutions should be considered. If a given company is not cooperative or volunteer actions do not deliver the expected results, then it should be checked whether or not information shortage (the lack of biological data, low awareness due to bad

communication etc.) is in the background. If there are no doubts about the severity of the problem, but companies are reluctant to act, then the approach of the administration should be tested to see the chances of litigation.

Apart from dissatisfying behavior of companies and strong allies among the authorities, policy systems with many utilities also make the application of legal tools justifiable. However, even in that case, the first option is to form a partnership, but then the ability to prosecute is a critical factor to have a fallback position. On the other hand, in countries where there are few companies and they are cooperative, voluntarism can be more effective. Legal mechanisms should only be applied simultaneously with partnerships if all actors agree on them, unless they can exacerbate strategic risks and undermine trust for years. To create forums for effective communication, highly coordinated methods are preferable.

Whereas the targeted goals can be explicitly formulated in law, partnerships with the same goals have to be built up more cautiously. Low cost measures like self-reporting of mortalities or participation in externally funded nature conservation projects can be amenable to start collaboration. A second step is to discuss technical details of using bird-friendly constructions. Thirdly, these agreed safe techniques should be applied in critical areas; reactive programs can be launched. If the approach of the companies is not negative, the collection of biological data (e.g. the identification of the most important habitats) is beneficial. Once technical discussions deliver satisfying results, a set of utility standards can be developed to make newly constructed and reconstructed lines bird-friendly. A further step is to launch a cost-efficient proactive retrofitting program based on biological priorities. In all cases, a number of success indicators can be used (number of carcasses under monitored lines, the number of retrofitted poles, the length of retrofitted lines, etc.) to refine priorities and demonstrate results.

To sum up, goals, methods, and tools all have to be adjusted to the special circumstances of different countries to be effective in the complex problem of avian power line interactions. The ignorance of political realities can cost much for the bird fauna.

III. Individual decision making

1. Individual belief systems

a. The role of personal beliefs

No matter whether it is a political question, an environmental strategy, or a lifestyle choice, decisions, in the end, are made by individuals. It is our behavior that ultimately determines directions of social change. Besides social and economic settings, behavior in social dilemmas depends on individual-level parameters: information and identity besides institutions and incentives in van Vugt's (2009) terminology. Directly or indirectly, individual opinions can make environmental management practices successful or unsuccessful. E.g. levels of compliance in command and control regimes, responsibility taken in economic decisions, or chances of cooperation in social dilemmas all depend on personal beliefs. Consequently, behavioral studies are essential for strategic planning in socio-ecological systems. In fact, the need to shift the academic focus to the social sciences and the humanities in this field is recognized by leading scholars of natural sciences, too (Ehrlich, 2010).

The Theory of Planned Behavior is one of the most widely applied models to predict behavioral outcomes (Ajzen, 1991). As shown in Fig. 8, the theory suggests that our beliefs translate into personal attitudes and norms, plus we have beliefs about possible opportunities and limitations. If we think it is possible, we intend to act in concert with our attitudes and norms. Intentions become actions, if actual limitations do not prohibit it.

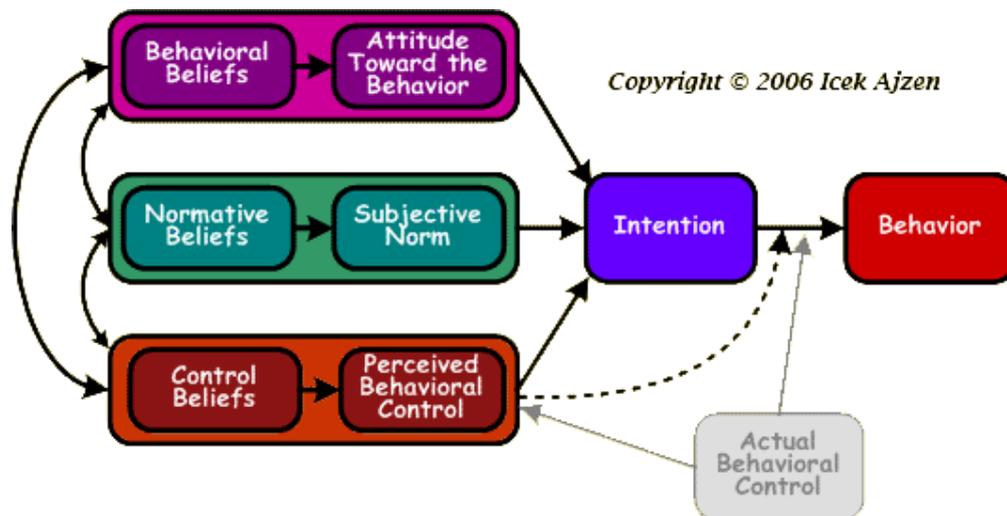


Fig. 8 The theory of planned behavior (Ajzen, 2006)

If we want to design an effective behavior change intervention, we have to understand motivations. What is obvious from Fig. 8 is that attitudes, norms, and perceptions of control are rooted in beliefs. The management of complex and interlinked belief systems is thus a crucial task to trigger behavior change. Therefore, if we opt out of direct institutional or economic coercion, an appropriate psychological description of belief systems is absolutely critical to devise new environmental strategies that may really work. However, whatever management techniques are adopted, cognitive grounds are important: even in the case of coercion, the level of compliance depends on individual beliefs.

Accordingly, I delineate a general model of belief systems first. The subsequent subsection applies this model as a demonstration tool to highlight the cognitive background of

environmental decisions. There were several reasons for choosing this particular belief representation model to illustrate cognitive changes of environmental relevance. First of all, it is appropriate to give a graphic expression of the structure of belief systems, hence it visually facilitates comparisons. Belief structures behind environmental decisions in different cultures will be compared in this way. Moreover, due to its potential to describe opinion changes, the model can later help the planning of strategies to change unsustainable cognitive patterns. Hopefully, the present application (Section III.2) will only be the first in a series of studies to exploit the full potential of this model.

b. Belief systems as statement networks⁶

The idea in brief

The evolution of belief systems has always been a focus of cognitive research. Classically, knowledge was conceived as a list of statements (Pylyshyn, 1973). Learning and opinion changes were represented by adding new statements to or deleting old ones from the list. In the 1980s, a new branch of cognitive science emerged: connectionists used networks to represent belief systems (Rumelhart and McClelland, 1986). In these networks, nodes were very basic units like words or parts of words. Knowledge was coded in the network structure: a piece of information was conceived as a simultaneously active set of nodes. Since nodes could only be activated through links, network structure determined meaningful patterns of activation. Consequently, learning was associated with changes in the network structure.

The hybrid model I will use considers a network of statements. Nodes in my belief networks are statements held true by the individual, while links are logical connections or associations between these statements. Nodes are characterized by their degree (the number of connections they have), a fitness factor (how much they take part in linking processes compared to other vertices of the same degree), and two parameters showing how much they fit into a given network (the proportion of potential positive and negative links). Links can be positive, negative, or neutral to denote mutually reinforcing, weakening, and neutral relationships between beliefs. The whole network is characterized by a negativity tolerance factor that shows the maximum proportion of negative links vertices may have. If this proportion is exceeded, the given statement is ejected (viz. not considered true: we do not believe statements that obviously contradict a very high proportion of other beliefs).

Time has an important role in the model: all processes are divided into time steps and changes in the network are sequential procedures. In each time step, one node is active: this is the statement we think about. Linking takes place in the vicinity of the active point. New statements are connected to the network with preferential attachment: the probability of the formulation of a new link to an existing vertex is directly proportional to its degree and its fitness factor. Centers of the network and points with high fitness factors attract more new connections than peripheral vertices with low fitness values. If there are no new statements to be processed, an existing network point is active. The model for thinking is simple: two-step random walks start from the active point and a link is built between the endpoint of the random walk and the active statement. Whether the link is positive, negative, or neutral depends on the compatibility and contradiction factors. Once a new link is established, a consistency test follows to check whether the negativity tolerance limit has been exceeded for any of the points. Statements are dropped if they have too many negative connections or if they lose all their links. Forgetting is modeled by randomly deleting links from the network.

⁶ Based on Antal, M, Balogh, L. (2009) Modeling belief systems with scale-free networks, *Neural Networks*, 22(10), 1359-1371.

Obviously, this model is a theoretical construct. There is at present no unequivocal proof for its relevance that will satisfy all skeptics. Nor is it clear what ‘conclusive’ evidence could be obtained. Although I accept that none of the following examples by itself proves that scale-free statement networks correctly model belief systems, I hope that when they are taken together – like weak fibers woven into a rope – the total structure will bear weight. Some of the examples may, at first sight, seem irrelevant; however, I think they are needed to justify the use of my belief network approach when I focus on environmental decision making.

Applications and examples

Interestingly, the statement network model captures several aspects of reality. First, it is easy to handle changes in the belief system: as points are statements, opinion changes can be modeled by adding new statements to or deleting old ones from the network. The outlined explicit rules tell us how this happens. Statements can gain significance if they get a large number of links or they can be dropped if they lose their links.

Second, there are structural characteristics of these networks that explain real-world observations. Under very general circumstances, scale-free networks are obtained. In these systems there are big centers and many peripheral points, the degree distribution obeys a power-law (the same structure is observed in protein interaction networks, the World Wide Web, or the global network of airports). The system is extremely resistant to a random removal of nodes but an attack against a few central points reveals its vulnerability (Albert, Jeong, and Barabási, 2000). Our belief systems work in a similar way: no single supreme thought is present in a healthy mind and the few very important core statements are closely followed by others. We can always find more and more statements of slightly smaller importance till we arrive to the most populous periphery. Accordingly, the majority of time is devoted to a minority of statements in our network. The loss of peripheral statements does not mean much for the network, but attacks against core opinions may ruin the system causing serious psychological problems (Padesky, 1994).

The fact that I imagine opinion systems as preferentially evolving scale-free networks (Barabási and Albert, 1999; Barabási, 2002) should not be stunning for several reasons. It is shown that words in human language linked by co-occurrence in sentences form a scale-free network with small world characteristic (i.e. the average distance between two randomly chosen points is short) (Cancho and Solé, 2001). Small world and scale-free properties also appear in conceptual networks where similarities of concepts connect words of a language (Motter et al., 2002). Moreover, the same features hold for cognitive maps (Özesmi and Tan, 2006). If we conceive texts as linearized versions of statement subnetworks, we may also refer to strong correlations between text quality and complex network features (Antiqueira et al., 2007). Finally, the principle of preferential attachment also seems to be reasonable: people associate to statements that are strongly represented in their networks, giving the reason for the feasibility of association based personality assessments introduced to psychology by Carl Gustav Jung.

Cognitive networks are densely linked small worlds: our associations can lead very far in just a few steps. Diameters (the average shortest distance between two arbitrary points) measured in computer-based model networks comply with this expectation.

Third, scores of everyday observations are inherently encompassed in the model. In opinion networks, for example, early points are crucial: the sooner we integrate a statement in our belief system, the more important it will be, on average. This model prediction is a practical experience in developmental psychology. Smaller-scale examples include the evolution of new subsystems: when we first meet someone, early impressions are decisive. In our model,

these are just manifestations of network evolution based on preferential attachment, where early vertices are of great importance, being located at the high degree end of degree distribution (Barabási, 2002).

Processing time is an important determinant of importance, which is consistent with marketing experiences. If a statement is repeated over and over again, it will have better chances to become a center. Besides, people who are rarely stimulated (and thus have much time for each input) are greatly affected by the few stimuli; these vertices can easily become the hubs of their smaller networks.

Network size matters much. There is an enormous difference between statement integration chances if developed and undeveloped belief networks are juxtaposed with one another. New ideas may swiftly achieve great significance in an immature network but are not likely to lead to drastic changes in massively diversified, highly developed structures. Young people, for example, are strongly exposed to fanatic ideas, while academic professors usually do not commit suicide attacks (Harrison, 2006). Children are gullible while old people are sometimes unable to integrate new information. These are natural consequences of network size in the model.

Teachers' experiences can also be reproduced by the model. It is well known from international surveys that Prussian school systems, where a comprehensive knowledge is offered and large amounts of facts are taught (i.e. there are lots of inputs) (Seton-Watson et al., 2004, p. 243) produce an excellent elite class and a poor average (OECD, 2004). That can be underpinned by the model behavior: the complexity of the evolving network depends heavily on the linking capability of the student. Without sufficient linking capabilities information is useless, they form rapidly vanishing islands. Further information has no vertices where they could link to, the network does not improve. That happens to most children in a Prussian-type school: they just do not have enough time for structuring. In contrast, sufficient linking capability plus a huge amount of vertices expedites structuring: the number of possible links rises very fast with a growing number of vertices allowing optimal development. Reflecting this case, differentiated education is introduced in several schools: learning (linking) methods are taught for those who require it and information for the others who are ready to integrate.

Similarly to the case of school systems, efficiency of individual lectures is also largely determined by its speed. Frequency of inputs (the amount of information given in a time period) determines performance. The model introduced here gives an account of this feature: starting from a given network, working with non-zero random link removal and fixing the number of time steps available there is an optimal number of points to be given in the time period to reach a maximum number of integrated vertices after the process.

Moreover, the constructed topology determines resistance against random link removal. If we build a linear network with statements linked only to the subsequent statement as often happens in history lessons, then large parts of the curriculum may be unreachable in the network due to the loss of certain connections. It is an everyday observation that we forget everything about some former studies and once being reminded of a certain statement we are able to bring up a few connected statements but then we are stuck again. Interestingly, time intervals of such retrieval bursts follow power-law distributions in semantic networks (Rhodes and Turvey, 2007). Arguably, the curriculum structure is very important to preserve the integrity of statement networks amid random link removal. It is shown that recall for information within a representation increases as the number of types of interconnections and the strength of the interconnections within a representation increases (Nakamura, Kleiber, and Kim, 1992). Perhaps the robustness of scale-free networks could be exploited so as not to lose access paths so fast. (As a matter of course, the problem and the need for appropriate structures are recognized without such theoretical foundations.) In addition, we may refer to

exams and particularly oral exams as examples of the usefulness of network-based thinking. Teachers usually try to roam through the network of the students so to check the existence of certain points and connections. This is a reason for stressing the importance of links and the structure as a whole in contrary to the barren subsistence of vertices. I contend that understanding is hidden in the statement integration process.

Another often encountered type of change where people try to shape the other's network is debating. In a dispute the goal is to build a strong system of own arguments and to destroy the network of our opponent. The latter is done by causing percolation of the opponent's structure by building in as many negative links as possible. There are different means how we can achieve this: we may point out contradictions of the structure, integrate new vertices for establishing negative links between existing vertices or integrate new vertices that are in contradiction with existing vertices themselves. It can be useful to draw a network of the opponent's arguments so to analyze it and find the ideal vertices to attack or vertices that are not worth considering (e.g. peripheries that percolate after an attack). The frequently applied technique to simply confute all the statements with one argument is far from optimal. The same means can be used when defending our own network under attack.

The model also holds potential to interpret communication problems like failed talks. If partners do not want to follow the routes dictated by the other's speech and only perceive single inputs or activations from it, then there will be no real conversation: both speakers roam their own networks.

A further interesting possibility is to look at psychological problems from a network perspective. If a network is exposed to abounding new information containing inputs with relatively high contradiction factors then checking procedures may be interrupted by new inputs leaving inadequate points in the network. This lack of enforcement of rules in the network can lead to a feeling firmly associated with cognitive dissonance (Festinger, 1957). More generally, psychological problems are often related to the fact that our own rules are not vindicated. If there are forbidden parts of the network containing unacceptable proportions of contradictions, then these locked up problems can cause psychological malfunctions. Psychologists often do not really intervene in the development of belief systems but they lead the patient to certain problematic areas of their own network (Hermans, 1987).

Summary

The sheer structure of opinion networks, changes determining evolution, and specific model behaviors have relevant implications regarding a number of cognitive psychological processes. Naturally, we are far from a proper description of opinion system formation and development, but the use of scale-free network theory for modeling statement networks is promising. Hopefully, the potential of this model will be harnessed in a wide range of research areas including environmental decision making.

2. Decisions in environmental dilemmas

a. The cognitive war to save the planet⁷

Prominent scientists and policy makers have recently called for a “wartime speed of response” (Brown, 2008, p. xi) to combat global environmental problems, including investment in energy technologies on the scale of the Manhattan Project to battle climate change (Rees, 2006). The argument has also been put as a critique of what is considered to be an irresponsibly slow and essentially failed science-focused, top-down policy process enshrined in the Kyoto Protocol (Prins and Rayner, 2007). What is needed instead, Prins and Rayner argue, is a bottom-up “social learning” approach, including experimentation with a portfolio of policy measures.

Although the pleas to counter climate change with massive technology investments and focused policy experiments can be justified with the need to do something quickly when all else has failed, this subsection argues that the reasoning is justified on more fundamental cognitive grounds that merit its emulation in science-based environmental policies across sectors and scales. These cognitive aspects are highlighted by focusing on the belief systems with which individuals make sense of their interactions with the social and biophysical environment (D’Andrade, 1995).

The analysis is driven by the following research questions: What insights do recent developments in cognitive science, particularly cognitive anthropology, provide for our understanding of urgent environmental problems, such as global climate change? How will a cognitively-grounded understanding of human-environment interaction modify mainstream environmental policies?

From the cognitive perspective, current projects and programs to tackle climate change obscure for large segments of the world’s population a deep contradiction between the independence from ecosystems that an individual perceives to possess as a result of technological and economic development, and the highly coupled dependence on ecosystem services that such development in fact creates for the individual. This cognitive contradiction is explained in terms of a belief network, with support from empirical studies of the history of human-environment interaction. Resolving the contradiction will require major changes in the way today’s climate change projects and programs are framed and formulated.

The technology-oriented policy recommendations aim to establish cognitive prerequisites for mobilizing the subjective individual potential for collective action. Building on universal human physiological characteristics, the vision of grand technology projects aims to evoke support for a global culture of environmental awareness. However, implementation has to take place at the human scale, as bottom-up social learning experiments, to succeed in cognitive mobilization.

b. The dilemma of human-environment interaction

John W. Bennett aptly summarized the dilemma of human interaction with the environment: “On the one hand, by making use of increasing quantities of natural substances and other living species and enhancing their productivity by transforming them into ‘natural resources,’ humans might be said to have freed themselves from the constraints of Nature; on the other hand, this increased freedom created exponential functions, especially population increase and an increasing dependence on Nature” (Bennett, 1996, p. 3).

⁷ Based on Antal, M, Hukkinen, J. (2010) The art of the cognitive war to save the planet, *Ecological Economics*, 69(5), 937-943.

Many other key syntheses of the history of human-environment interaction corroborate Bennett's conclusion. Charles Redman, for example, points out how, on the one hand, surplus food production and efficient human organization "have contributed to human success and have become a part of our character, our very existence" while on the other hand "human groups in all parts of the world have developed and made decisions in such a manner that they were not in concert with the requirements of their environment, and consequently, they have failed as social and sometimes as biological communities" (Redman, 1999, p. 217). Vaclav Smil expresses the tension between freedom and dependence in terms of control and uncertainty: "Uncertain future is a key reality of human condition. We strive for a greater control [...]. But retrospectives show little real success" (Smil, 1993, p. 202). J.R. McNeill, focusing on the 20th century history, puts the same idea in terms of an intensifying tension between human and planetary constraints: "With our new powers we banished some historical constraints on health and population, food production, energy use, and consumption generally [...] But in banishing them we invited other constraints in the form of the planet's capacity to absorb the wastes, by-products, and impacts of our actions" (McNeill, 2000, p. 362). Looking to the future, Jared Diamond calls the tension "the cruelest trade-off that we shall have to resolve: encouraging and helping all people to achieve a higher standard of living, without thereby undermining that standard through overstressing of global resources" (Diamond, 2005, p. 496).

The human dilemma in complex societies can in cognitive terms be nicely summarized with Gregory Bateson's concept of the double bind. In a double bind, a primary injunction is contradicted by a secondary injunction at a different logical level, which affects the interpretation of the primary injunction, while there is no possibility of resolution or withdrawal from the problem (G. Bateson, 1972; M.C. Bateson, 2005). A child, who wants to hug her mother but is sent away with "You are very tired, go to bed – mother loves you and wants you to have a rest!" is trapped in a double bind. Love is expressed toward him in words, but the real message at another logical level is "Go away; I don't want to hug you!" If he goes away, he admits that he is tired when in fact he is not and that he believes the lie of his mother. If he goes on to hug his mother, he will be rejected. Moreover, there is no escape from the dilemma: if he identifies the problem and speaks about it, his emotional security will be affected, but the mother will deny the truth and no solution will follow. So, it is better not to be aware of what's happening and permanently repress the tension into the subconscious, whereby a buildup of psychological pathology is rendered possible (G. Bateson, 1972). In the case of human-environment interaction, an individual's belief that her independence increases with expanding use of natural resources (primary injunction) is contradicted by feedback from the broader socio-ecological system indicating diminished options and increasing systemic dependence for the individual (secondary injunction). As in the earlier example, we may accept a lie or lose the false feeling of security. And once again, it is psychologically risky to identify the problem, because the truth may interfere with a host of different opinions and practices relating to short-term economic well-being. The current state of our natural environment gives sad evidence of the pathological relationship arising from the permanently unresolved problems.

The double bind is a cognitive conceptualization of human beliefs and behavior with respect to ecosystems. It holds promise as an analytical device to guide cognitively and behaviorally sound environmental policies. To draw on this promise in a systematic way, the double bind is presented in terms of a belief network.

Typical environmental double binds of different eras are illustrated with statement networks that depict rough averages instead of individual belief systems (Fig. 9, 10, 11). Obviously, each and every individual has many other statements in his/her network. However, the parts

presented are not chosen arbitrarily. These networks illustrate typical ways in which the double bind between humans and the environment is perceived by most members of the studied societies. Eventually, these belief patterns (or the lack of them) influence environmental behavior.

While belief networks have undergone significant changes in the past millennia, some features have remained unchanged. From ancient to modern times, safety has been one of the most essential human wants (Maslow, 1970) – a center in belief systems and a driver of human activities that laid the groundwork for human-environment interactions. Safety-related considerations governed pre-industrial human-nature relationships and lead to the minimization of survival risks instead of the maximization of gains. Human safety also tops the list of contemporary environmental concerns (Redman, 1999). In network terms, corroborative statements positively linked to the basic safety center refer to the need for personal economic safety and system level safety with a predictable future. In Fig. 9, 10, and 11, belief nodes relating to personal level safety can be found in the left-side branch of the network and those relating to the system level safety in the right-side branch.

Guided by the recognition that some ancient societies were able to live sustainably with their environments for hundreds or thousands of years (Diamond, 2005), I investigate belief structures that were compatible with environmental necessities and enabled long term survival. In a religious worldview that dominated the human past, future’s predictability depends on the satisfaction of spiritual beings, which, in turn, rests on the fulfillment of religious obligations. These obligations include environmental instructions that establish a very direct connection between safety and environmental behavior, as illustrated in Fig. 9.

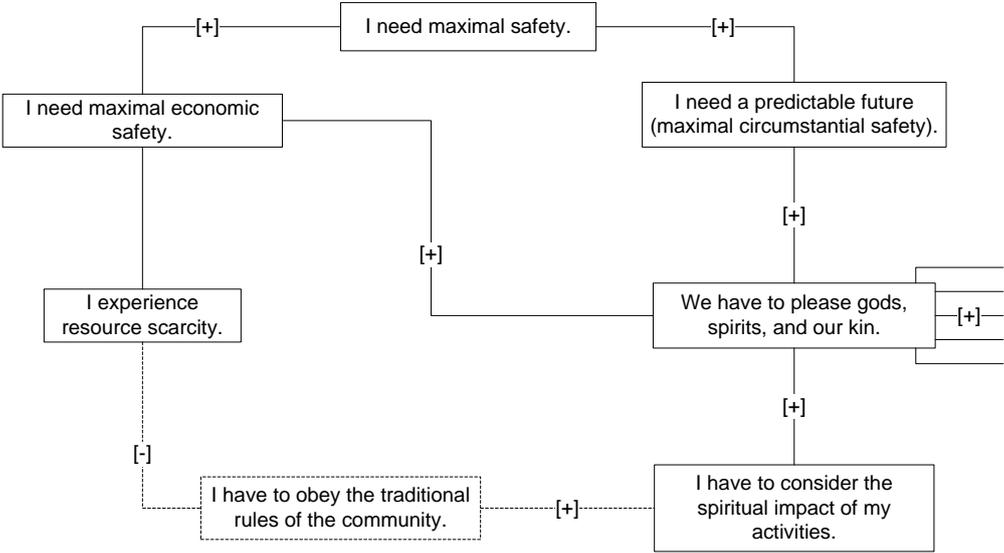


Fig. 9 Belief systems in hunter-gatherer societies. Ancient cultures used very similar primary metaphors. They believed that individual and community level success depends on the spiritual world. Thus there was a direct connection between individual and community level considerations (see the link between “I need maximal economic safety” and “We have to please gods, spirits and our kin”) and between safety needs and practical environmental decisions (the link between “I need maximal safety” and “I have to consider the spiritual impact of my activities”). A potential double bind represented by dashed lines in the figure could develop as a result of extreme scarcity.

Witness, for example, Tsembaga fears that red spirits will punish them if they fell certain trees (Young, 1990), Tikopian taboos that prevented overfishing (Diamond, 2005), or the Tukano

belief that one child will be killed for each fish caught in a reserved stretch of their river (Worldwatch Institute, 1992). Sometimes such mental images are cultural representations of past depletion crises (Berkes, 2004), other times they are based on the understanding of incremental environmental changes (Turner, 2004). In both cases, the mental images are encoded in simple practical instructions. Similar sustainability criteria may have lead different tribes to view their natural environments in similar ways, using the same primary metaphors (Gowdy, 1997; Lakoff and Johnson, 1999).

In societies where the accumulation of wealth was negligible, minor economic differences and less hierarchy rendered personal safety considerations weaker and contradictions between the personal and systemic levels of safety less severe (Gowdy, 1997; Polanyi, 2001). Nevertheless, when extreme scarcity threatened survival, contradictory injunctions could occur at different levels, for example between a taboo and the need to obtain food by any means. The identification of such contradictions bore substantial psychological risks, because double binds could develop in decision situations, as indicated by the dashed lines in Fig. 9. Contradictions were often eliminated by further strengthening of the spiritual side, e.g. by the introduction of temporary taboos that imposed new restrictions on individuals. In exceptional cases, continuing inconsistencies made ancient peoples abandon their religions (Diamond, 2005; Young, 1990).

c. Today’s dilemma

Changes in societies and their safety threats also transform individual belief systems and survival strategies. Contemporary belief networks are radically different from those of hunter-gatherer societies in at least two respects (Fig. 10).

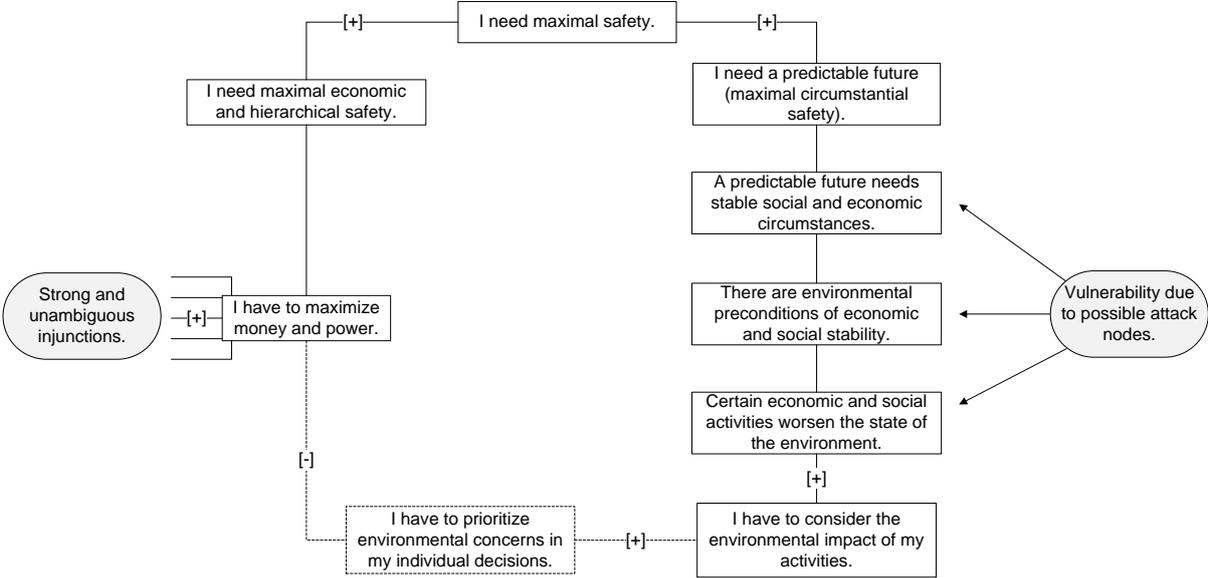


Fig. 10 Present belief systems. On the one hand, few individuals believe that the sound environmental decisions they make have anything to do with their individual economic and hierarchical safety, as illustrated by the lack of links between the left and the right side of the belief network. On the other hand, to justify sound environmental decisions, complicated belief structures are built, as represented by the long chain of beliefs on the right hand side of the figure. Yet the sheer number of belief nodes in the chain makes the entire chain vulnerable to outside criticism, thus abolishing all corroboration to the node “I have to prioritize environmental concerns in my individual decisions.”

First, individual safety in present societies is strongly linked to individual performance. Money and hierarchical positions, two assets missing in egalitarian immediate return societies, are used to measure individual success (Gowdy, 1997). Striving for profit and power aimed at the reduction of dependence on other members of the society has become one of the most important structuring forces in contemporary societies, dwarfing collective-level safety considerations (e.g. those regarding safety benefits in an egalitarian society). Constant change makes life less predictable, forcing people to gain resources and drive changes themselves instead of being mere subjects of altered circumstances. The resulting strategies include the adoption of very high discount rates and declining cooperation (Ostrom, 1990), both entailing dire environmental consequences. Complex societies sometimes succeed but more often fail to solve their environmental problems as a result of the unfolding maladaptation processes (Redman, 1999; Dietz, Ostrom, and Stern, 2003), in which elites develop “institutions and supporting ideologies that act to keep the society integrated and operating in a reasonable manner” (Redman, 1999, p. 164). The sustainability of the socio-ecological system is often not guaranteed (Diamond, 2005).

Second, the deepening nature-culture division has an important effect on mental representations. Although practices based on traditional ecological knowledge are still found in many locations around the globe (Berkes, Colding, and Folke, 2000) and lately new adaptive management techniques have restructured local patterns of knowledge (Berkes, 2009; Armitage et al., 2009), the proportion of people alienated from ecosystems is substantial enough to cause significant harm to the global environment. As the technological worldview largely replaced the former spiritual one in countries that dominate world production (Young, 1990), connections between core safety beliefs and environmental management rules became indirect. As people are increasingly alienated from ecosystem functions, the main prerequisite of a predictable future is generally perceived to consist of economic and social stability alone. To arrive at nodes of environmental management from the socio-economic safety centers in present belief networks, a complex chain of interrelated statements is needed: environmental preconditions have to be acknowledged, detrimental effects of certain activities have to be recognized, and conclusions have to be drawn (Fig. 10). However, each step in the complex thinking process is vulnerable to external attacks: contradicting statements may be linked to the nodes to eliminate them from the network and thus people may not reach environmentally appropriate conclusions (Fig. 10). The hubris of new technologies can veil the environmental preconditions of our existence, industrial groups with vested interests may misinform the public about the impacts of harmful activities, and spatial or temporal remoteness of environmental impacts can insert a node of uncertainty (“nobody knows what will happen before repercussions reach us”) in the network to hinder unambiguous concern for the human predicament with the environment (Winner, 1977; Hård and Jamison, 2005).

Preventing the development of belief structures that stem from system level safety considerations and enhance environmentally sound behavior is not only in the interest of powerful groups in complex societies. It can also be psychologically preferable for individuals who can avoid a stressful double bind when there are no contradicting injunctions from different subnetworks like the one in Fig. 10. It is comforting to maintain consistent beliefs and belong to an imperturbable group of people (Crompton and Kasser, 2009). All we have to do is ignore part of reality – we will be assisted by numerous other actors trapped in problems of collective action on common pool environmental resources (Ostrom, 1990). Psychologically comforting denial can lead to extremely persistent environmental dilemmas, such as global climate change or the decades-old and still unresolved issue of agricultural drainage containing salts and potentially toxic trace elements in Western U.S. (Hukkinen, Roe, and Rochlin, 1990).

Consistency in beliefs can be disrupted – as it was in earlier societies – by final collapses and conspicuous facts not fitting in the belief system. Just as epidemics lead indigenous peoples of Oceania to abandon their views (Young, 1990) and declining Easter Islanders to turn away from their religion (Diamond, 2005), a sea level rise of 3-6 meters combined with persistent droughts and floods would have a sobering effect on our society. Environmental and cultural disasters with their political consequences may jointly make our civilization unravel (Brown, 2008; Lovelock, 2009). At the same time, people who already perceive grave problems may turn away from the current society to develop their own consistent belief structures. They may, for example, give up aspirations to achieve safety in the ordinary way and form a “back to nature” movement (Jacob, 1997), which creates a strong, system-independent feeling of security. The feeling of restored consistency found in unspoiled nature may also provide the reason to embark on increasingly popular wilderness experiences.

Nevertheless, if the injunction to strive for individual gain and the one to respect the socio-ecological system both are strong and persistent, which is increasingly the case today due to the escalation of system level problems and the perseverance of individual level arguments, one may permanently live with the double bind. As Bateson (1972) has pointed out, the perpetual contradictions can have negative psychological effects but also provoke resolution and stimulate creativity. To get at least partly rid of the contradictions in different fields, to obtain food without damaging ecosystems, to make a living without exhausting natural resources, or to have mobility without producing devastating pollution, new, smart solutions are needed. Just as the financial turmoil gives us a chance to recognize the vulnerabilities of the current economic system and to restructure it by prioritizing system level stability over individual level gain, recognition of the specific environmental double binds (summarized in general in Fig. 10) make it possible to find creative solutions to pressing environmental problems.

It is interesting to note that the struggle for consistency I described above is in good accordance with a successful psychological model of environmental behavior. The Value-Belief-Norm (VBN) Theory describes pro-environmental behavior as an endeavor to restore a value held dear and perceived to be threatened by the individual (Stern et al., 1999). In a little narrower sense, the focus here is on one key value (safety). Just as in the VBN Theory, in Fig. 10 there are belief nodes concerning the awareness of and responsibility for the consequences of our actions, and, in line with the theory, personal norms are linked directly to the statement representing the decision situation (dashed lines in Fig. 10).

d. Dealing with the dilemma

The first step toward creative solutions is to construct a viable mental representation of the contradiction in people’s minds. In evolutionary terms, the surviving ancient communities were culturally capable to encrypt their ecological understanding and to create cognitive shortcuts between core safety centers and codified adaptive answers to pressing challenges in human-environment interactions (Fig. 11).

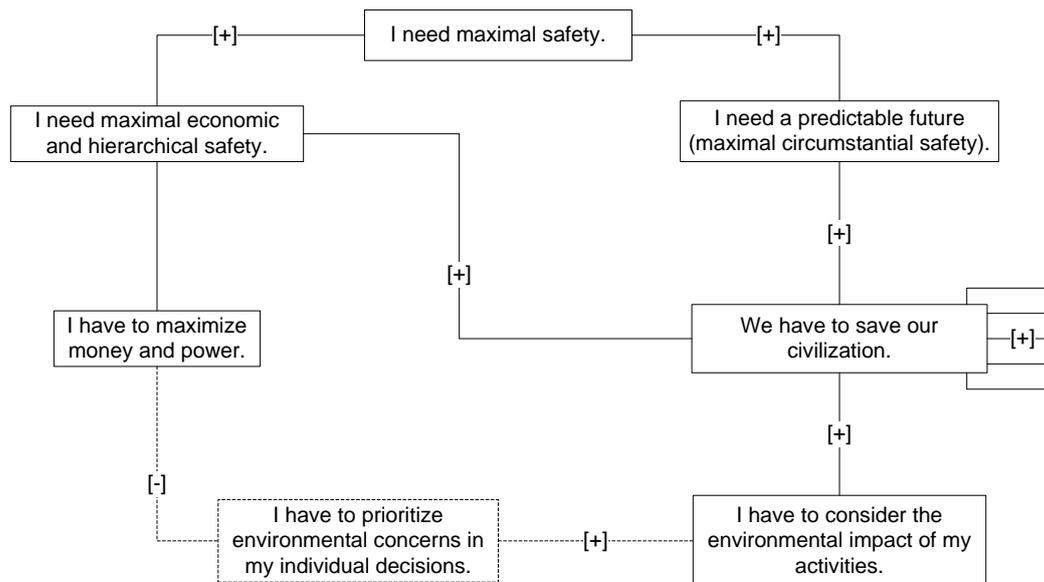


Fig. 11 Belief systems to be built. To move toward sustainability, connections need to be built between the individual and community level considerations (as illustrated by the positive link between “I need maximal economic and hierarchical security” and “We have to save our civilization”) and the path from safety to practical environmental decisions needs to be shortened (the path from “I need maximal safety” to “I have to consider the environmental impact of my activities”).

We, too, should build direct links from system-level safety to appropriate individual belief nodes of environmental management (note the structural similarity between Fig. 9 and Fig. 11). In contrast to the myths and stories of ancient peoples, the underlying knowledge and reasoning of contemporary societies is grounded in science. Of course, not everybody can be expected to mobilize complex, science-based belief patterns prior to every environmental management decision. Instead, we deal with our cognitive limitations by condensing real world complexities into simple conceptual blends that capture their pragmatic relevance (Simon, 1996; Fauconnier and Turner, 2002). In practice, the blends are simple messages with the potential to shape individual belief systems. To avoid abusive use of information, it is important to ensure that everyone has access to the building blocks of conceptual blends.

The belief node – the conceptual blend – establishing the direct connection between individual safety and system survival has to be simple, unambiguous, and credible. Obviously, there is little room for absolute injunctions in our scientifically enlightened culture. However, I argue that the ever more frightening environmental outcomes of the globalized consumer society could make the statement “We have to save our civilization” acceptable for many. As shown in Fig. 11, this statement can function as a shortcut between socio-ecological safety and environmental behavior in belief systems.

What communication and policy strategies are needed to build up such belief systems? From a psychological aspect, at least three crucial questions arise. (1) Is it possible to reveal the crises without making people numb? (2) What roles should emotions play in environmental communication? (3) How much risk should we assume to achieve a maximum impact? Answers to these questions⁸ are necessary to translate theoretical recommendations to concrete communication strategies and policy practices.

⁸ Based on Antal, M. (2010c) Crisis communication: thoughts on environmental communication strategies (Válságkommunikáció – gondolatok a környezeti válság kommunikációs stratégiáiról), *Magyar Tudomány* 2010/6, 674-684 (in Hungarian).

1. It is critical that people see the consequences of our present environmental practices. Although uncertainties are huge and it is not easy to discern creeping trends from ‘background noise’, there is ample evidence that major and urgent changes are necessary. We have to fight generational amnesia and clearly show if baselines shift and we falsely think that everything is all right (Papworth et al., 2009) to avoid a collective socio-ecological failure. To make it credible that “we have to save our civilization”, one of the most important supporting statements on the right hand side of Fig. 11 is the acknowledgement of the crisis. So, is it possible to direct people’s attention to global problems in a way that contributes to long-term pro-environmental behavior?

Different groups try to use different strategies to achieve this goal. First let me have a look at the science-driven approach. Obviously, scientific knowledge can be very conducive to create long-term commitment; champions of the environmental movement can effectively build on a deep understanding of the issues they fight for. However, in today’s attention economies it is impossible to reach the majority of the population with scientific messages. For example, IPCC’s mode of operation that reveals and focuses on ever more uncertainties about climate change, its drivers and consequences, is paradoxically counter-productive from the cognitive point of view. In fact, IPCC communications keep opening up new potential points of attack for the climate skeptics and give new grounds for psychological defense strategies. From the cognitive point of view, the science-focused way of communicating the climate change message only fuels the distancing in an individual’s mind between beliefs concerning safety and socio-ecological survival. Although an educated minority benefits much from periodic summaries of existing scientific knowledge on climate change, IPCC reports are inappropriate to give guidance for the majority. Equating the policy mode of operation with the science mode of operation has resulted in utter inability globally to set the stopping rules for research, i.e. to fix a point where science must end and policy must begin.

An alternative option is emotion-based communication. Emotions have always served humans in complex situations to make quick decisions. It is not surprising that a growing cluster of environmental groups turn to such communication methods as they perceive increasingly urgent problems. However, these strategies are also very risky. If we successfully put a statement in a belief network about the severity of the environmental crisis to emphasize the need to save our civilization, this belief node will potentially be linked to other statements, too. The more overwhelming crises we depict, the bigger is the probability that the new statements link to the belief nodes of perceived behavioral control. People may feel that the struggle to stop negative trends is hopeless. If the future is dire anyway, motivation to change behavior is lost. Nevertheless, there are positive examples of successful environmental strategies around the world that gear their messages (intensity and the balance between science-based and emotion-based communication) to their target audiences (CRED, 2009). To find the right tone and devise cognitively-grounded policy measures and incentives, it is necessary to elicit the role of emotions in environmental communication.

Before addressing this question, I note that when people accept we are in a crisis, the importance of communication grows further. In a state of disequilibrium (like in a crisis), perceptions of reality and fundamental conditions or outcomes have a strong mutual influence on each other (Soros, 1998). This reflexivity underlines the role of communication strategies in solving global environmental problems.

2. Most environmental organizations use emotion-based methods to raise attention and spur rapid action. We often see shocking pictures and videos and hear dramatic forecasts.

However, in the lack of concrete and available opportunities to do something about negative trends, psychological defense mechanisms are activated. Apathy is a common and natural response to overwhelming problems. A perfect reason for sticking to old opinions or practices (which is an effective strategy to minimize risks associated to changes (Bateson, 1972)) is to claim that problems are insurmountable. The objective advantage of shunning responsibility is restored consistency between bad practices and the apparent crisis.

The logical reaction from environmentalists is another high-risk strategy: they try to make people feel responsible. Again, they use emotions to reveal inconsistencies. Reflections on one's behavior or personal characteristics evoke shame or guilt. For those who are criticized, there are several ways out of the stressful situation.

On the one hand, behavioral change is possible. If, for example, a technology-oriented policy program with a clearly focused message on saving the civilization is available, the tension created by the recognition of the double bind can be eased by getting involved. A grand vision of saving the planet and its economy from further irreversible destruction opens up an inspiring perspective. Inclusion in collective efforts for the planet has the potential of enriching personal and collective social identities (Brewer, 2001). Such a program would also provide the shortcut in individual belief systems between individual and system-wide safety.

This approach would in no way diminish the significance of today's mainstream policies, but would rather boost their effectiveness. In the field of energy provision, for example, future IPCC assessments could be solidified by integrating the excellent scientific summaries closely with a visionary energy mission, such as *Solar Europe 2020*. A focused vision of common objectives would facilitate the emergence of a shared cognitive base that is required for tackling the dilemmas of collective action (Ostrom, 1990; Diamond, 2005; Crompton and Kasser, 2009). Creating a direct connection between individual safety and the system level effects of resource depletion would spur rapid action, as has happened in other crises, be they economic collapses or wars.

On the other hand, emotion-based appeals to responsibility can easily be forgotten or they can even backfire. Often we engage in token actions that restore psychological consistency but do not really help much. We also seem to have a 'finite pool of worry' (i.e. cannot be worried about too many different things at the same time), so new emotion-based messages easily overwrite old ones. Consequently, the proposal to save the civilization needs to be reinforced by repeating the statement and its underlying values across a wide range of issue areas. Since mental representations like the one I propose here are physically present in our brains and need time to evolve (Lakoff and Johnson, 1999), media campaigns can not be spared. For long-term benefits, rational understanding of local issues is important: besides the simplified global messages we have to strive for a deeper understanding on the local scale.

Unfortunately, long-term effects can also be negative. Attempts to shame individuals into adopting pro-environmental behaviors can lead to rationalizations of environmentally disruptive behavior, rejection, resentment, and annoyance. Instead of futile efforts to argue, it is often better to demonstrate the successful environmental practices of friends, neighbors, or fellow citizens. People may then believe that change is possible and risks of changing behavior are not so high. Concrete local experiences are invaluable to link visions to actual behavior.

Thus, science-based and emotion-based communication strategies have to complement each other. Emotions are necessary to create the cognitive shortcut between individual and system level safety, science is needed to devise reasoned actions on the local level. The tension created by the recognition of the double bind should be eased by the opportunity

to take part in the solution. By simplifying messages about complex global phenomena and opening up local opportunities for action, active citizens can be recruited to translate the global vision into local adaptive co-management practices (Berkes, 2009).

Moreover, since there is an inherent tension between individual and socio-ecological safety, it is more fruitful to emphasize not the war between conflicting notions of safety but rather the art of dealing with its cognitive underpinnings. Instead of creating further psychological stresses and activating defense mechanisms by such divisions, the psychological benefits associated with responding to a collective threat should be reaped (APA, 2009). From the cognitive point of view, the constructive approach is to begin imagining long term sustainability: How to transform saving into maintaining our civilization.

Nevertheless, an important question still remains: what behavioral outcomes do we deem acceptable as a response to the crisis?

3. The range of potential outcomes and the associated risks are largely determined by the intensity of environmental messages and the communication strategies applied. The bolder strategies we use the greater risks we have to assume. Those who perceive lesser risks from environmental hazards usually favor low-risk policy and communication strategies. Their aspiration to uphold cooperation is understandable; they want to avoid conflicts and prevent harmful self-defense mechanisms. Others see grave problems and take on greater risks. Advocates of radical changes believe that minor steps in the right direction are not enough to avoid catastrophic consequences of human behavior. For them, behavioral studies are extremely important in strategic planning (Ehrlich, 2010). Due to substantial uncertainties concerning environmental and social processes, it is not always known whether reformists or revolutionaries are more effective in the struggle for sustainability.

As shown earlier, different contexts favor different cognitive strategies. However, it is always practical to harmonize policy and communication strategies. To reinforce the cognitive structure promoted here and highlight the link between values and behavior, both command and control instruments and economic instruments should be made analogous to the “Save our civilization” node in Fig. 11. Very often regulatory sanctions should be stricter. E.g. in cases of persistent regulatory violation or impending resource shortage, consideration should be given to controlled downscaling of technical services – such as the staggered “brownout” already used as a contingency measure in electricity provision – because it sends a direct, embodied signal to the individual of ecosystem service scarcity. At the same time, regulatory rules should be justified with clearly expressed visions of the ecosystem services to be secured. From the cognitive point of view, regulatory restrictions, taxes and permit prices without clear visions only inform individuals about what not to do but fail to inform them what good their behavioral changes and resource allocations will bring about.

Obviously, the cognitive shortcut between individual and system level safety does not wipe away the tension between individual gain and its environmental impacts. That tension, after all, is inherent to human existence on Earth (Bennett, 1996). What the shortcut does do, however, is facilitate double loop learning, i.e., individual capability to learn how to constantly devise innovative ways to minimize the unwanted consequences of the tension (Bateson, 1972). Food and housing security are linked to climatic stability and ecosystem services, job and income security require a stable economy, social status presumes social stability – all these point to a troubled civilization in which higher level systemic considerations have to be prioritized in individual decision making. The pertinence and urgency of the higher level systemic goals can be highlighted for an individual by creating a

single mental connection that summarizes the specific crosscutting links in the different safety-related subfields in Fig. 11.

This cognitive environmental strategy is likely to attract criticism on several grounds. First, is not what is proposed here just rhetoric – a clever marketing trick aimed at mobilizing large segments of humanity? I respond that using the word rhetoric in a belittling sense reflects a cognitively unfounded notion of how the human mind works. It assumes a Cartesian division between objective factual and subjective value arguments, where rhetoric supposedly falls under the latter category. In reality, the human mind is incapable of performing any of its scientific work without simultaneous normative orientation (Taylor, 1989; Dennett, 1991; Fauconnier and Turner, 2002; Hukkinen, 2008; Slingerland, 2008). Consider two examples from the 1960s: it was the political rhetoric of President John F. Kennedy that mobilized the military-industrial complex to take the first American to the Moon (Compton, 1989), and it was a visionary book by a well-known intellectual on social policy that inspired the systematic development of the Finnish welfare state (Tuomioja, 2002). We should accept this cognitive reality in our science-based efforts to tackle climate change and related global environmental challenges. For our science to have policy impact, we really do need to explicate – with rhetoric – what goods are to be strived for and what bads to be avoided in the scientific endeavor.

Others may criticize our proposal for totalitarian undertones. Do not all dictators successfully mobilize the masses by shunning complex arguments about reality and emphasizing a few simple alleged truths? Here I think it is important not to assume that proven cognitive dynamics necessarily be affiliated with particular social goods or bads. While it is true that totalitarian leaders have resorted to punch lines, so have many highly regarded democratic leaders. Punch lines belong to culture: cultural evolution is based on the famous ratchet effect, whereby influential conceptual innovations, or conceptual blends, are anchored in technology, language or social institutions (Tomasello, 1999; Slingerland, 2008). Our proposal is to have the technological and institutional anchoring take place before ecological catastrophes, when precautionary measures can be taken in democratic settings – rather than after the catastrophes, when emergency measures in undemocratic settings are the most likely outcome.

e. Summary

So, what insights on environmental problems does the cognitive approach give us, and how do the insights modify environmental policies? First, cognitive anthropology enables us to reframe the human dilemma with respect to the environment. Human-environment interaction is characterized by a double bind between the subjective will of an individual for greater independence and the objective biophysical dependence imposed by the wider socio-ecological system – a dependence that only increases as the individual struggles for greater independence. By presenting the human-environment relationship as an individual belief network, it is possible to draw conclusions by pinpointing cognitively pertinent remedies to the dilemma.

Technological and institutional measures are proposed that would bring the double bind to the fore of human cognition. The measures aim to create effective cognitive shortcuts between individual action and perceived safety by highlighting the biophysical boundaries of individual action. Similar conceptual anchoring of individual safety to system survival has been made before. We are reminded of Winston Churchill's famous speech to the House of Commons in the first year of World War II. Although he had "nothing to offer but blood, toil, tears and sweat," he also envisioned "victory [...], for without victory there is no survival".

IV. Conclusions

In my interpretation, the strategic management of environmental decisions is a very broad, multidisciplinary area. To support environmentally sound and socially acceptable decisions, both natural and social sciences are necessary. In my thesis I tried to approach problems with an analytical attitude borrowed from natural science, but as a student of ecological economics I did not hide my normative orientation. The overarching aim of my work was to study some of the most common action opportunities of a concerned person who wants to make a difference by getting involved in pro-environmental activities. According to the different roles of the person, several situations were analyzed: citizens contacting decision makers, environmental groups initiating projects or pursuing goals in complex and uncertain settings, and individuals making personal decisions or communicating about environmental issues. In all these cases, I proposed strategies to improve the efficiency of our collective efforts to create a more sustainable world. Obviously, I could only consider a fraction of the problems and my answers to the specific questions posed in the thesis were also incomplete, sometimes inescapably controversial. However, I believe that the solutions suggested to the various challenges will raise efficiency and eventually contribute to the success of environmental problem solving.

The opening section of my thesis argued that it is impossible to overestimate the importance of the socio-ecological problems we are facing today. Consequently, understanding patterns of decision making is also crucial. After sketching the motivation of my work, the structure of my dissertation was outlined with references to problems and the elements of solutions I offered in my research papers. Still as a part of the introductory section, I gave a manifesto of my worldview in a macro-sociological essay that linked all the different topics of my dissertation through collective action theory to each other and to the social and ecological crises.

In Section II, I studied the conditions of effective participation in environmental policy from institutional and strategic perspectives. First I argued that substantial institutional innovations are needed in environmental policy making. As natural system services become increasingly scarce, the number and diversity of potential stakeholders in environmental decision making grows. Institutional innovations are necessary, because at the moment we do not have reliable methods to incorporate the opinions and values of these stakeholders in the policy process. The difficulty to select the most relevant public contributions (often from a very large number of inputs) is at the heart of the problem. This is not only a dilemma in the communication between citizens and decision makers, but also one of the greatest barriers to the proactive inclusion of grassroots actors in policy making.

Today, pervasive socio-economic changes render many of the traditional forms of participation ineffective. Thus, the challenge is to develop new inclusive methods that also help decision makers to select the most valuable public inputs. Local environmental decision making is a field where such new solutions are urgently needed, since people increasingly want to have their say. So, what options do I consider feasible in this agenda?

Thesis statement #1 and #2 are answers to this question in two specific fields. In Section II.1, I began the analysis with the problem of communication between citizens and decision makers. What I put forward is an idea to motivate decision makers (especially local representatives) to answer relevant emails received from citizens (Antal and Mikecz, 2009; Antal and Mikecz, in press). Why would they care about letters from ordinary people? How could they sort out what is important? How would I facilitate this selection and people's participation at the same time?

Thesis statement #1 To facilitate the selection of valuable public inputs from a large number of comments, decision makers should be obliged either to answer citizens' questions or initiatives, or to publish the letter received on a publicly accessible web page.

By utilizing the almost freely available general publicity of the internet, this proposal opens the door for more efficient public deliberations. Important questions would not likely be forgotten, because anyone could browse the list of unanswered letters and see which problems a given decision maker did not consider. Political opponents would be inspired to search for socially important topics in the list of unaddressed issues. At a minimum, we could expect better outcomes than today when there are essentially no incentives to reply to citizens. On the other hand, the workload of decision makers would not unnecessarily grow – actually, it would converge to the societal optimum. Furthermore, the same mechanism could be applied to alleviate bureaucratic obstacles of overburdened authorities by lifting the obligation to respond to each and every case reported by citizens. If the responsibilities to regularly check the unaddressed problems are clear, it can be ensured that agencies properly fulfill their duties even if they have the right to make decisions on a case-by-case basis. Traditional methods can also be combined with this idea (stipulating conditions when traditional solutions should be used), giving flexibility to formerly rigid social structures.

The other institutional innovation I proposed in Section II.2 aims to strengthen grassroots groups by supporting their valuable projects (Antal, 2010a). Again, this is an effort to select the most beneficial initiatives emerging in society. Questions are similar to the previous ones: How could decision makers recognize the most advantageous projects without thoroughly reviewing many other worthless proposals? Why would they be motivated to consider any of the grassroots suggestions? What mechanism could serve street-level actors and busy decision makers at the same time?

Thesis statement #2 If recommendation letters from prestigious actors (ministries, scientific panels, etc.) were available through applications for individuals and grassroots organizations, then their valuable initiatives would have better chances to be implemented, especially if a follow-up report was later published by the organizing body about the success or failure of the supported project.

The suggested application system would resemble existing support programs in many ways. Just as applications for financial support help to solve financial problems, applications for recommendation letters would help to solve problems where implementation is hampered by the low status of initiators. Today, grassroots initiatives are very often ignored by local decision makers: the dearth of hierarchical and relational powers is a major cause behind the failure of socially, environmentally, and economically beneficial projects. The recognition from a respected body and the publicity of a follow-up report would motivate decision makers to consider the implementation of the initiatives selected for support. The system would also improve the quality of project proposals received by decision makers and facilitate the otherwise cumbersome selection process. Moreover, greater grassroots efficiency and the enhanced transparency of support measures would come at a relatively low cost without any serious practical problems of implementation.

After these specific institutional aspects of participation in collective decisions, I went on to discuss questions related to strategies in networks of environmental problem solving. Obviously, strategy is a key factor that determines effectiveness. Is it also apparent that systems of environmental decision making are restructuring: both hierarchical and market based solutions have lost some of their relevance, while policy networks (relatively stable

systems of mutually interdependent actors) came to the fore. Amid the new and uncertain circumstances, green activists often need help to devise strategies for effective advocacy. Both theoretical and empirical research is needed to better understand how networked systems of decision making work.

On the theoretical front, I proved the existence of a special kind of risk minimizing behavior (Antal, 2008). The statement concerning strategic risks was drawn up on the basis of a survey conducted among Hungarian environmental NGOs, but other actors in other policy arenas probably show similar behavior, too.

Thesis statement #3 Like stockholders who diversify their portfolios to maximize expected returns at a given level of riskiness, policy actors also evaluate the diversity of their 'portfolio of relations' and tune risks in individual relationships accordingly: if the number of relationships grows, unpredictable variations in partners' behavior increasingly compensate each other, so they assume greater risks in individual relations.

Apart from the inherent value of the scientific description of a behavioral pattern, this is a tiny piece of information for strategists who try to consciously account for most aspects of a complex policy decision. If strategic risks are the dominant sources of uncertainty in a policy system, risk diversification can gain further significance. Although this statement – the message of Section II.3 – may not always seem very important from a strategic point of view, the outlined analogy between decisions in stock markets and policy situations can enable further knowledge integration.

For example, one of the hottest environmental issues today concerns reducing emissions from deforestation and degradation (REDD), where the monetary valuation of ecosystems also calls for risk minimization. If we simply put the price tag on a forest, we ignore the riskiness of conservation efforts. Considering the potential irreversibility of destruction, this is unwise. A risk-oriented approach to financial and policy problems in REDD schemes is an intriguing and serious research opportunity. Risk diversification may be one of the most powerful tools to integrate different conservation approaches.

Notwithstanding the value of theoretical work, sound environmental decisions can not be made without substantial empirical support. According to my experiences in policy network management, I devoted Section II.4 to the detailed analysis of policy aspects of wildlife – power line interactions (Antal, 2010b). The subsection is thus a concrete example of policy network management; a comparative study that aims to identify and analyze the most important strategic choices in the mitigation process of this particular environmental problem. Since I worked as a volunteer assistant of a Member of the European Parliament to organize a nationwide cooperation to mitigate bird electrocution and collision problems in Hungary and conducted an international survey to see how different countries (Slovakia, South Africa, and the United States) deal with the same problem, the following thesis statement is grounded in concrete, factual information.

Thesis statement #4 Strategies to minimize adverse effects of electric transmission facilities on wildlife can not be uniform due to different national contexts and policy networks; so in most cases, BirdLife International's recommendations can not be implemented simultaneously: instead, the balance between cooperative and legislative efforts has to be found on the basis of the composition of the network, the approach of different stakeholders, and the context in which the process unfolds.

Way too often we try to use general solutions to solve locally dissimilar environmental problems, while subsidiarity remains an empty principle. I studied how the structure of the policy network, stances of actors, relations between them, and tools applied in the solution

process affect the efficiency of different types of solutions. In particular, I discussed how different factors assist or inhibit cooperation. Based on comparative policy network analysis, I gave strategic advice to environmentalists so that they can effectively manage the policy system needed to resolve avian power line problems. As it became obvious in the last four decades, biological and technological knowledge alone do not suffice to solve this wicked problem. Hopefully, my policy recommendations can help future conservation efforts.

After the policy-oriented investigations, I studied individual decision making in Section III. The motivation for this research was the observation that regardless of the political and economic circumstances, individual behavior is always a key driver of socio-environmental change. Behavior, in turn, is strongly dependent on belief systems. Unsurprisingly, two of four conditions identified as critical for the successful management of shared environmental resources are directly linked to individual cognitive patterns (information and identity); while personal priorities and norms, themselves grounded in beliefs, largely determine how the other two (institutions and incentives) work in a society. Our collective inability to handle global environmental problems underlines the role of behavioral, cognitive, and psychological approaches often neglected by economists and policy planners.

The first step in this agenda was the brief description of a new model of belief systems (Antal and Balogh, 2009). I argued that it is beneficial to represent an individual's beliefs with a network of statements he or she considers true. Links between statements were logical connections or associations, new statements were connected to the network with preferential attachment. Structural properties (distance between two belief nodes, centrality of a statement, etc.) and dynamic features (opinion changes, structuring processes) were investigated to reveal the model's relevance in belief representation. I suggested that the favorable set of definitions makes this approach a promising candidate to study behavior in a range of fields including environmental decision making.

In Section III.2, the network method was applied as a demonstration tool to highlight contradictions between injunctions from the natural and socio-economic systems (Antal, 2010c; Antal and Hukkinen, 2010). On the basis of cognitive anthropological studies it was shown how people in ancient and contemporary societies received contradicting messages from their social or economic surroundings on the one hand and the natural world on the other. Throughout history, individuals who strived to free themselves from the biophysical constraints of life with material gain and believed that their independence increased with expanding use of natural resources systematically strengthened their collective dependence on natural life support systems: feedback from ecological systems indicated diminished options and increasing systemic dependence. In different ages, different belief systems evolved to reflect such contradictions. The last thesis statement summarizes the cognitive strategy advocated to bring this contradiction to the fore of human cognition and to bring about major changes quickly.

Thesis statement #5 The cognitive lesson of the past is that sound environmental practices of the majority of people have never been grounded in scientific understanding; instead, beliefs regarding environmental behavior were directly linked to core safety considerations. To build similar belief systems today, link individual and system level safety, and reap psychological benefits, simple emotional messages about global processes have to be accompanied by scientifically reasonable local opportunities to join grand collective efforts whose clear aim is to save our civilization.

The task for environmental communication is to create a shared cognitive base for collective action and to promote a global culture of sustainability while also enabling people to tailor

projects to local conditions. Political, economic, and communication strategies must all take psychology into account in order to translate the most dramatic socio-environmental problems of human history and our unprecedented opportunities to handle these problems into the most exciting collective challenge ever seen.

The question is not whether we can believe in this vision where efforts enrich us or not. I know that we can, since this challenge is very much a part of my life. The real question is how much we can do to spread this attitude and drive our societies toward a more sustainable path. Due to the immense complexity of the world, science can not fully answer this question. I have faith that the work to rescue the planet under stress and the civilization in trouble will be effective.

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⁹ All URLs checked and functional as of 26 October, 2010.

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Appendix 1

Behavior under risk – a study of environmental NGOs

I. Introduction

In the followings we ask questions about strategic decisions of NGOs pursuing environmental activities. The aim of the study is to analyze opinions of the surveyed organizations about risky situations. We examine cases in which environmentalists try to change the behavior of certain economic, social or political actors (e.g. companies, schools, local governments, decision makers etc.).

The more or less unpredictable behavior of the actors they try to affect means risk for the NGOs. Depending on how ambitious their goals are and how vehement they are in persuasion, they can expect different results. While small step strategies offer minor changes with very good chances; bolder plans and stronger actions may result in significant changes for the better, but at the same time chances of a complete denial of suggestions grow. In the followings we would like to study how the boldness/cautiousness of the strategy is related to the number of partners.

The survey is sent to a broad range of Hungarian NGOs pursuing environmental activities. Results obtained in the study may help to make strategic decisions and could contribute to the vitalization of our civil society. Outcomes of the statistical evaluation will be sent to all respondents without specifying concrete organizations.

If you have any questions or comments, please indicate them in the Comments section.

Thank you for your kind assistance!

II. Survey

Throughout the survey, we use the term cautious strategy, if the NGO is in partnership with the organization or person it tries to affect. Continuous efforts are made to reach agreement, the good relationship is very important for the NGO. Steps of actions are usually planned jointly, small step targets are set, and slow, gradual improvement is envisaged.

We use the term bold strategy, if the NGO shifts to stronger initiatives, exerts pressure, or tries to coerce its partners to improve their environmental performance. High-flying aims of bolder strategies may deliver step-like changes and significant improvements, but chances of conflicts also grow that can hamper development.

Basic data

Name of the NGO:

Number of employees:
Approximate number of volunteers:

Questions

Please underline the answer that is characteristic for your organization!

Question 1

Suppose that your NGO would like to affect some companies in a given branch of business so that they improve their environmental performance. Depending on the number of companies, how would you change your strategy? Would you shift to bolder or to more cautious strategy if you tried to influence more companies?

We would not change our strategy.
We would use bolder strategy.
We would use more cautious strategy.

Question 2

Suppose that your NGO would like to shape the opinion of some decision makers in a given decision making panel. Depending on the number of the decision makers, how would you change your strategy? Would you shift to bolder or to more cautious strategy if you tried to influence more decision makers?

We would not change our strategy.
We would use bolder strategy.
We would use more cautious strategy.

Question 3

Suppose that your NGO would like to affect the behavior of some organizations. Depending on the number of organizations, how would you change your strategy? Would you shift to bolder or to more cautious strategy if you tried to influence more organizations?

We would not change our strategy.
We would use bolder strategy.
We would use more cautious strategy.

Question 4

Until now we conjectured that (leaving all other parameters unchanged) unidirectional changes in the number of partners (increase or decrease) shifts the strategy into the same direction (so that it becomes bolder or more cautious). Is this conjecture right?

Yes.
No. (Please briefly specify causes!)

Question 5

Until now we conjectured that your NGO uses the same strategy in its relations with different partners whose status and role in the given case is identical. Is this conjecture right?

Yes.
No. (Please briefly specify causes!)

Question 6

In which case would you choose bolder strategy: if the partner's approach was positive / negative / neutral / unknown? Please write the words "positive", "negative", "neutral", and "unknown" next to the numbers. Number 1 means the most cautious, number 4 the boldest strategy.

- 1.
- 2.
- 3.
- 4.

Question 7

If the approach of the partner was unknown, in which case would you choose bolder strategies: if you tried to influence companies / decision makers / organizations? If the order is unequivocal, please put the words "company", "decision maker", and "organization" next to the numbers. (Number 1 should be the most cautious, number 3 the boldest.) If other parameters determine the boldness of the strategy, please specify it briefly!

Order:

- 1.
- 2.
- 3.

No unequivocal order, it depends on:

Question 8

Depending on the perceived importance of an actor in a given case, how would you use your strategies?

We would use bolder strategies in more important relations.

We would use more cautious strategies in more important relations.

We would use the same strategy in all our relations.

Question 9

Have you ever encountered a case in the life of your NGO that changes in the number of partners lead to changes in your strategies? If yes, please briefly elicit the case!

II. Comments

Thank you very much for your assistance!

Appendix 2

Adverse effects of power lines on bird populations and mitigation efforts

- an international policy-oriented survey -

This survey is aimed to constitute an integral part of international efforts to mitigate negative interactions between birds and power lines. The focus is on policy-related factors: we strive to understand how stances, strategies and actions of different actors in the policy process affect the efficacy of the solution. In accordance with recommendations of BirdLife international, results are supposed to be published in an international scientific journal.

Your contribution to the study is essential, so please try to answer all the questions. If you don't know the exact answer, please give approximations, indicate them, and note if there are other competent actors who may know more. Whenever you have relevant additional ideas or information that are not explicitly mentioned in the question, please do not hesitate to put it down! Feel free to edit the document so that no information is lost due to formal matters. If there are relevant country specific articles or documents about the topic, please attach them to the survey. If you have contacts to people who could also take part in the survey, please send me contact details or forward the survey with my address.

Thank you very much for your contribution!

I. Basic data

1. Name:
2. Organization or institution, status:
3. Country or region¹⁰:

II. Context

1. Please list public, business, and non-profit organizations that are involved in the process of mitigating the problem (if there were changes over time, please note):
2. Have you observed effects of changes in the economic context? (E.g. influence of economic trends on company budgets or the availability of state and federal funding.)
3. Are there considerable effects of changes in the government? Are certain administrations more cooperative than others?
4. Would you call the issue of wildlife – power line interactions a salient one? (Do most people know that the problem is existing or not?)

¹⁰ If you are familiar with more separate countries or regions where steps are already taken, please fill in more separate forms. Thank you!

5. How would you describe the interest and environmental consciousness of the residents of the given area? (Those who have learnt about the problem – are they well-informed and willing to act or just a minority cares about conservation issues?)

6. Are utility companies heavily fined in case of outages?

7. Do organizations (conservationists, utilities, public administrators) act concertedly or actions are rather fragmented (meaning that behavior of different regional groups is different)?

III. Stances and relations

1. When were problems identified?

2. When did conservationists establish connections with utility companies? How did these interactions evolve (did they become more frequent over time, did they become less localized, were new topics introduced etc.)?

3. When did conservationists establish connections with public administrators? How did these interactions evolve?

4. Are there regular discussions between conservationists and utility companies? If yes, please specify major topics (e.g. accidental electrocutions, strategic planning etc.)!

5. Are there regular discussions between conservationists and public administrators? If yes, please specify major topics!

6. Are there regular discussions between utility companies and public administrators? If yes, please specify major topics!

7. Are there institutionalized ties between state, business, and non-profit actors?

8. How would you describe the approach of utility companies?

9. How would you describe the effect of the accumulating data and knowledge about the process? (Are there tangible effects on stances of company representatives or public administrators? Do they realize the problem or the need for cooperation?)

10. If there are more utility companies:

a.) are there significant differences between their approaches (are there champions and opponents of conservation efforts)?

b.) are there competitive relations between the companies or do they cooperate *with each other* and act concertedly in negotiations about conservation issues?

11. Please rank relationships between conservationists and utility companies on a scale where 1 means unfriendly and conflictual and 5 means friendly and cooperative! Please specify major sources of conflict!

12. Are there potential sources of conflict that are depressed to maintain cooperation or trust?

13. Which of the following factors do you think promotes equality in conservationist – utility company relations in your case? Please rank factors from 1 to 5 where 1 means insignificant, 5 means most important!

Public support for conservationists:

Legislations, legally binding agreements:

Volunteer agreements (not legally binding):

Political leverage of conservationist organizations:

Expertise of conservationists:

Other (please specify):

14. Which of the following factors hamper equality in conservationist – utility company relations? Please rank factors from 1 to 5 where 1 means insignificant, 5 means most important!

Budget size:

Political leverage of utility companies:

Expertise of the company:

Other (please specify):

15. Would you say that the problem is a top priority in the agenda of conservationists / public administrators / utility companies?

16. How would you describe the approach of public agencies?

17. Please elicit the role public agencies play in the process! (Are they neutral organizers providing instrumental help or rather active players on either side?)

18. Are the aims of public agencies closer to industrial interests (in the traditional sense), to the values of conservationists, or do they try to represent perceived voter attitudes?

19. Would you describe the decision making system as a close policy community, where basic views and mechanisms are given and do not change, or rather as a vivid, conflict-ridden, open network, where new ideas can easily gain popularity?

20. Which actors do you consider to be most influential in the process?

21. What sources of uncertainties do you consider to be most detrimental to the process in your case? Please rank them as before!

The lack of information about ecological parameters of the problem (number of affected birds, casualties' role in population dynamics, most vulnerable areas etc.):

The lack of information about the electric system (number of killer poles, costs of retrofitting etc.):

Strategic uncertainty (how partners will behave or react):

Institutional uncertainty (how decision making frameworks will change in the future):

22. Please elicit, how different actors try (and tried) to reduce these uncertainties (if they do)!

IV. Actions and tools

1. Are there joint discussions to elaborate long term plans?
2. If there are strategic plans to mitigate adverse effects of the electric system, how are these plans elaborated? (Who are involved, how do they decide on schedules?)
3. Are there joint discussions to elaborate proper technical solutions?
4. Have conservationists tried to form the public opinion to achieve results through public support? If yes, please specify details!
5. Are there legally binding regulations compelling companies to act in case of accidents?
6. Are there legally binding regulations about retrofitting potentially dangerous lines?
7. Are there legally binding regulations about newly constructed or renewed lines?
8. Are legal opportunities exploited? (Are companies fined for breaking the law? Does the legal procedure really help to resolve the problem?)
9. If there are specific legislations for the problem under study: who were the most important actors to elaborate it?
10. What is your opinion about the role of deliberation and trust, legislations, and contextual factors from an efficacy point of view?
11. Are there monitoring programs to study effects of power lines on wildlife? If yes, please elicit in a few words (scale, frequency, monitoring bodies)!
12. What progress indicators are used?

V. Results

1. Do companies self report accidents?
2. Are there comprehensive manuals of bird-friendly solutions generally used by companies? Since when? If there are technical solutions of fundamental importance (e.g. all new poles are constructed with suspended insulators), please explain them!
3. Are new poles constructed in a bird-friendly way?
4. Are there scheduled retrofitting programs? If yes, please explain!
5. Are there detailed priority lists of power lines to define the right order of retrofitting?

6. What proportions of the problematic part of the system are already bird-friendly (length data or pole numbers are also useful), and what progress can be expected?
7. Is there a generally acknowledged deadline until which all power lines have to be retrofitted? If yes, what happens if the target is not achieved?
8. How are costs defrayed among the actors? (Who pays the price of retrofitting? Who does invest in innovative solutions?)
9. Did you notice any legitimacy problems about the process? (Concerned citizens criticizing the way things are handled etc.)
10. Do you think your country (region) is dealing with the problem successfully?

VI. Comments

If you have any comments about the topic or the survey, please let me know.

Thank you again.

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