

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

by

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PhD thesis summary

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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.

1. Motivation (grounds for research)

There is ample evidence to state that the present world order is neither environmentally sustainable, nor socially acceptable. In 2010, 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. In several fundamental fields, 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. A handful of studies about newly emerging questions are comprised in my dissertation.

2. Aims and methods

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 are touched upon in my thesis, but none of them is 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 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 methods I apply are very different. First, in institutional studies, my own frustrating experiences I have had as an activist in the current institutional environment were the 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. In these cases, I did no empirical research; my articles were restricted to the scientific description of the innovative ideas.

Other times, I observed how certain environmental policy systems worked, made surveys, and gave scientific descriptions that reflected my observations and the survey results. In these cases, I drew conclusions regarding actors' strategies. In a theoretical study, I relied on the results of my survey conducted among Hungarian environmental NGOs. The main conclusion was about the existence of a specific risk management method applied by these organizations in their policy games. My most empirical piece of work was a comparative case study: I compared the solution methods of a given conservation problem in four different countries based on my own Hungarian experiences and the results of an international survey I did with experts around the globe.

Lastly, in the cognitive analysis of individual decisions I did theoretical research again. My investigation focused on environmental decisions of different societies in different ages. I reviewed the psychological effects of cultural and sociological factors to compare ecologically advantageous and disadvantageous belief structures. My own belief network model was used to create graphic illustrations of belief structures. By studying the belief systems of societies that lived in dynamic equilibrium with nature and others that failed, I intended to formulate psychologically sound policy recommendations.

Due to the methodological and disciplinary diversity, the types of conclusions I reach and the policy recommendations I make are also diverse. Obviously, only tiny parts of the problems are addressed in my thesis and solutions are neither complete, nor without controversy. 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 is 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.

3. Summary and thesis statements

In my interpretation, the strategic management of environmental decisions is a very broad, multidisciplinary area. The problems selected for detailed analysis in my dissertation are related to two very substantial fields: effective social participation and individual-level decision making in environmental dilemmas. The global restructuring of the institutional order, social change, and the spread of western culture make research necessary in both fields. I set out to study certain aspects of institutional, strategic, and psychological questions of sustainability decisions to enhance the effectiveness of participation in environmental problem solving and to facilitate ecologically sound decisions at the individual level.

The opening section of my thesis argues 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 the dissertation is 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 give a manifesto of my worldview in a macro-sociological essay that links 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 study the conditions of effective participation in environmental policy from institutional and strategic perspectives. First I argue 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 begin 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 [1,2]. 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 propose in Section II.2 aims to strengthen grassroots groups by supporting their valuable projects [3]. 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 go 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 prove the existence of a special kind of risk minimizing behavior [4]. The statement concerning strategic risks is 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 devote Section II.4 to the detailed analysis of policy aspects of wildlife – power line interactions [5]. 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 study 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 discuss 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 study individual decision making in Section III. The motivation for this research is 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 is the brief description of a new model of belief systems [6]. I argue that it is beneficial to represent an individual's beliefs with a network of statements he or she considers true. Links between statements are logical connections or associations, new statements are connected to the network with preferential attachment (i.e. the more links a given statement has, the bigger is the probability that new statements are connected to it). Structural properties (distance between two belief nodes, centrality of a statement, etc.) and

dynamic features (opinion changes, structuring processes) are investigated to reveal the model's relevance in belief representation. I suggest 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 is applied as a demonstration tool to highlight contradictions between injunctions from the natural and socio-economic systems [7,8]. On the basis of cognitive anthropological studies it is 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 I advocate 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.

4. Supporting publications

1. Antal, M, Mikecz, D. (2009) Answer or publish – Energizing online democracy, *Communications in Computer and Information Science*, 49, 411-419. (Proceedings of the Second World Summit on the Knowledge Society, 16-18 September, 2009, Crete, Greece.)
2. 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*.
3. Antal, M. (2010) Applications for official support – an innovative way to promote grassroots initiatives, *The Innovation Journal: The Public Sector Innovation Journal*, 15(2), article 6.
4. Antal, M. (2008) Diversification of strategic uncertainties in the business of environmental policy, *Periodica Polytechnica: Social and Management Sciences*, 16(2), 81-88.
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