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Perceived Power Resources in Situations of Collective Action

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ABSTRACT: This paper discusses various concepts of power. Its goal is to shed light on a better method for implementing the power concept. The case of Bulgaria's water user associations' failure shows the abuse of power by local actors who fear they will lose their influence and the private benefits that they have enjoyed under the former system. The paper provides an empirical study of power resources verified by actors' perceptions rather than having resource endowments quantified. It also illustrates the contrast between empirically revealed perceived power resources in a local context and their theoretical examination in the distributional theory of institutional change. Studies that set power resources in relation to one another are scarce. Therefore, in this study an innovative, interactive method is used that leads to a ranking of perceived power resources, which is robust against the impact of belonging to different territorial, social, and agricultural producer groups: 1) unrestricted access to information, 2) personal relationships, 3) trustworthiness, 4) cash resources for bribing, 5) menace, and 6) physical power and violence. The implication of this gradation of power resources on collective action solutions addresses complementary measures to disseminate information and compensation measures for those who fear losing their benefits and may therefore oppose the new institutions.

KEYWORDS: Collective action, power concepts, nonparametric testing, irrigation, Bulgaria

INTRODUCTION

As in many post-socialist countries, Bulgaria's irrigation sector was managed in a centralised way, namely by the Irrigation System Company (ISC) state firm who held the monopoly on irrigation water supply during socialism and in the first decade of transition. Irrigation systems based on market coordination, such as trading water rights or quotas did not exist. Decisions were implemented top-down, and there were no opportunities for the agricultural water users to participate. The ISC was responsible for the management, operation and maintenance of all state-owned irrigation and drainage systems in Bulgaria. Water guards were the village representatives of the ISC. From the viewpoint of the water users, especially the small ones, the water guards are often the only visible ISC personnel, still today after the devolution attempts which will be outlined later in this paper. In order to find solutions for Bulgaria's deteriorated irrigation infrastructure and the rising demand of farmers for better, i.e. more reliable, water provision an irrigation sector reform was initiated in the late 1990s. Collective action management solutions for more sustainable resource use have been propagated by the Bulgarian government and the World Bank. The Bulgarian government enacted two laws: the *Bulgarian Water Law*, implemented in January 2000, and the *Water User Association Act*, enacted in March 2001. The aim was to reform the former centrally organised water sector and increase the involvement of local actors. Bulgaria's irrigation sector mostly relies on gravity irrigation in open concrete-lined canals. Canal systems are filled by either micro-dams, or by diversions from rivers. Problems of top-end and tail-end distribution of water are symptomatic of such a system.

The Bulgarian agricultural production structure in the South-East can be characterised as a combination of manifold small subsistence producers who mainly have pooled in their fragmented land plots into cooperative farms or into large tenant operations in exchange for small connected plots which can be irrigated (transaction six in table 1). There are a few medium-sized agricultural producers

cultivating their own land and trying to stay in the agriculture business competing with the large tenant operations.

Even after reforming the centralised-organised water sector, most of the established water user associations (WUAs) are neither functioning nor familiar with the farmers in the respective villages (Theesfeld, 2004).¹ Regardless of these formal efforts, little collective action in the irrigation sector has been observed in Bulgarian villages. The present formal attempts seem to find no common ground where collective action can grow. Instead, the facilities continue to deteriorate, and only a small percentage of the fields equipped with irrigation devices is actually irrigated. Chaotic water appropriation rules and insecure and ineffective property rights prevail (Penov et al., 2003; Theesfeld, 2008).

Recently, common-pool resource scholars have suggested taking into account distributional aspects and asymmetries of power between actors when analysing institutional change in common-pool resource management, such as irrigation regimes (Agrawal, 2001; Meinzen-Dick et al., 2002; Mehta, 2003; Adhikari, 2005; Broderick, 2005; Molle et al., 2008; Armitage et al., 2009; Cascão, 2009; Sehring, 2009). The role of social power of actors is extremely relevant in determining the effective property rights (Toufique, 1997). Some actors gain more and others less from new rules, according to socio-economic attributes and private endowments of households (Adhikari, 2005). Zwarteveen (2008) specifies further that the dimensions of power are not gender-neutral, and yet current theories and concepts of irrigation power are mainly linked to masculinity. The way benefits are distributed among various actors is decisive and the respective political weight of the latter can influence the likelihood of institutional change (Baland and Platteau, 1998; Dinar et al., 2004; Sehring, 2009). Local actors use power asymmetries to create their disproportional benefits. The literature provides manifold studies on the political economy of the institutional reforms in the irrigation sector, such as by Dinar et al. (2004) who assess proposed reforms in the irrigation and drainage sector of Pakistan. They postulate that actors' costs of influencing a reform is a function of their political power and the magnitude of change they wish to incorporate in the reform. Yet, political economy studies of this kind do not focus on the empirical investigation of different resources of power as this study does.

In the next two sections, I first present the methodology used and discuss theoretical concepts of power thereafter. I then provide empirical evidence for the phenomenon of abuse of power in the irrigation sector by various transactions in that sector and introduce the distributional theory of institutional change (Knight, 1992). I subsequently investigate the power resources which allow actors to keep powerful positions and benefit from them. With this I contribute to the objective of the paper to shed light on a better method for implementing the power concept. I illustrate the contrast between actual perceived power resources in a local context and their theoretical examination in the distributional theory of institutional change. Together with a statistical model, an interactive ranking method weighs each power resource. This ranking particularly indicates the effects of power resources on other actors because it expresses the locally perceived importance of various power resources. Last, I conclude with a discussion on the implications of this gradation of power resources on collective action solutions in the irrigation sector.

METHODS

The study is based on empirical fieldwork subdivided into four phases spanning from 2000 to 2005. In addition to recurrent interviews with experts in Sofia and representatives of the regional administration during all phases, two kinds of case studies were conducted. In the first research phase, 17 village case studies provided an overview of the irrigation sector situation in Bulgaria. In the three following research phases, four in-depth village case studies were carried out. As described above, two irrigation command areas were selected. In each area, two villages were chosen with one village located directly

¹ The same situation has been reported for post-soviet Kyrgyzstan and Tajikistan by Sehring (2009).

behind the water dam (top ender) and the other further back – at the middle or tail end of the canal and river system.

Two irrigation command areas were selected in the Haskovo region in South-East Bulgaria for the empirical work. In each area, two villages were chosen. In order to guarantee the anonymity of the individuals involved, abstracted abbreviations of the villages are set up. Village A is a top-end village in the first irrigation command area. As in all other villages, subsistence producers cultivate vegetable and forage crops on their small plots of less than 0.5 ha, each. The majority of agricultural land is cultivated by two agricultural cooperatives, a socialist successor cooperative and a newly founded one. In Village A, the production specificity regarding irrigation water needs is defined by a large group of Turks, almost 40 families, producing tobacco on small plots. Tobacco is a crop which does not need many irrigation turns, but the crucial irrigation turns have to happen at a certain time. According to the official documents of the ISC head office in Sofia, one WUA has been established here. Village B is a middle-end village in the first irrigation command area. Its agricultural structure consists of a socialist successor cooperative, a big tenant and mid-sized family farms. The existence of one WUA has been reported. Village C is a top-end village in the second irrigation command area. A socialist successor cooperative and one newly established cooperative are farming the land. Its production specificity is that seasonal workers come into the village to produce pickles, which need a comparatively large amount of irrigation water. Village D is a tail-end village in the second irrigation command area. It has three big agricultural producers competing for lease contracts: one successor cooperative, one newly established cooperative and, additionally, one big tenant.

With the help of participant observations and about 200 semi-structured interviews in total, I analysed the institutional change in Bulgaria's irrigation sector. The second research phase incorporated iterative work on the power resources to 1) filter and explore relevant power resources and 2) reveal and validate them. I collected impressions, notions and expressions of power resources that water users spontaneously mentioned describing the relationships in the irrigation sector. After collecting these statements, I grouped, ordered and summarised them. I continued to ask if the expressions I had formed are the most important. This iterative process aimed to make my final list step-wise and more congruent with the local people's attitudes. For instance, the interviewees wanted the notion 'information' to be changed into 'access to information' to put more emphasis on the accessibility. At the end of research phase two, I had a list of six power resources which were determined most relevant in the irrigation sector by the local actors (table 2).

The third empirical phase used an interactive interview technique. A set of six cards representing the main power resources of local actors, which came out of the previous analysis, was distributed to 78 interviewees in the four case study villages. Village affiliation, leadership function and scope of agricultural production comprise the independent variables and subdivide the sample. These actors' groups have been defined according to the hypothesis that the perception of power resources differs according to territorial, social, and agricultural producer groups. The interviewees were asked to rank the features of actors in the irrigation process in descending order. Interviewees were allowed to take time and arrange and rearrange the cards until they were satisfied, and then they presented their rankings. This technique, compared to a questionnaire, requires that the interviewees spend a lot of time ranking the characteristics (for more details see section on the non-parametric testing). Thus, it ensures that interviewees choose more consciously and consider how they answer. The fourth research phase served to close gaps in the general investigation on institutional change, to check for recent changes in the local communities and to update on recent reforms in the irrigation sector.

CONCEPTS OF POWER

Following Zartman and Rubin (2003), power comes in so many forms, subsumed under so many definitions, that it must be separated into component parts before the whole can be properly understood. Its use in social science and political analysis poses methodological difficulties of definition

and operationalisation (Dahl, 1975; Zartman and Rubin, 2003). This paper contributes a particular element towards a better operationalisation of the power concept. Since the early 1930s power in social science has been defined as a relation among people, and as the ability of one party to move another in an intended direction. Thus, power is conceptualised by its result and identified with its effects.² I would like to follow Zartman and Rubin's (2003) reformulation here in stressing that the relationship of power can be studied with either its sources (ability) or its results. The causal question that should be approached is: what is it that enables one party to move another in an intended direction?

First, to place the power discussion in this paper in context, we will follow Robert Dahl (1957) who distinguishes among four elements of power relations. Second, the three-dimensional approach to power initially developed theoretically by Lukes (2005), provides an underlying specification of the kind of power relations explored in the case study of this paper. Dahl (1957) distinguishes, between a) the source, or base of power, b) the means or instruments of power, c) the amount of power, and d) the scope of power. The base, or sources of power indicate where the power of some party (A) comes from. A may have access to economic resources and may thus mobilise support or may hold a particular position. Both power resources may enable A to change the rules of participation for actor B, which refers to Luke's Power², as described in the following. The instruments of power indicate the manner through which some party A exercises power over some other party B, such as actual or implied sanctions, positive or negative. The amount of power is represented by the probability that B changes his action. The scope comprises the range of B's responses evoked. This paper concentrates on the power sources, and will therefore explore particularly the first element of power. Likewise Lukes (2005) reconsiders his 1974 definition of power "A exercises power over B when A affects B in a manner contrary to B's interests". Lately, Lukes gives a stronger focus on the power resources "Power is a capacity not the exercise of that capacity (it may never be, and never need to be, exercised): and you can be powerful by satisfying and advancing others' interests". The latter even stresses the positive outcome of power.

According to Lukes (2005) there are three domains of influence, that indicate the broad spheres of activity that power affects (Power_{1, 2, 3}).

1. Behaviour: A's power may alter B's behaviour. It can directly impact B's behaviour within a given context and understood rules.
2. Rules/Expectations: A's power may permit, deny, or alter B's access to or participation in various decision-making bodies. A could alter rules of access to or participation in relevant arenas, alter perceptions of other parties concerning the legitimacy of B's participation, or influence B's expectations concerning possible reactions of others.
3. Preferences/Beliefs: A's power can alter B's preferences concerning undertaking certain actions or related activities. A exerts power over B by shaping or determining his very wants in order to diminish or eliminate B's will to challenge A. This involves shaping perceptions, cognitions and preferences in a way that B accepts his role in the existing order of things, either because he can see no alternative to it, or because he sees it as unchangeable, or he values it as beneficial (Lukes, 2005).

An application of Lukes' dimension of power to water resource management can be found in Zeitoun (2008) who structures his analysis of the Palestinian-Israeli water conflict in line with Lukes' dimensions of power, which he names 'hard', 'soft' and 'ideational' power. Particular the third dimension of power, the ability to shape issues even beyond the consciousness of a group in conflict is one that is central to the analysis of Palestinian role in the Palestinian-Israeli water conflict (Zeitoun, 2008).

² Dahl's well-known definition of power (1957) states that "A has power over B to the extent that he can get B to do something that B would not otherwise do" and also includes non-strategic effects.

In the present irrigation management study the power relations observed relate mainly to power₂, where power affects rules and expectations. Incidents of non-participation of certain actors in water user associations reflect exercise of power₂ by others, rather than voluntary choice. Power₂ treats rules and corresponding positions and access as manipulable. It includes purposefully changing of rules. Yet, this paper does not examine, whether A is following a strategic manipulation of B's access, although this seems obviously. The empirical analysis presented here gives insights into the understanding B has about A's abilities. A makes a move that changes B's perception of what is going to happen or A changes the rules, and thus B's access to a desired transaction. Whereas in power₁ all is understood or observable by both parties A and B, with power₂ some information asymmetry is introduced, where B may not observe some of A's actions. B may not know how A biases access (Lukes, 2005).

To analyse power, the power of various actors must be compared, which as already stated by Dahl (1957), is very difficult, particularly from an operational point of view. In Dahl's view if we want to compare the power of actors, we need to compare them with respect to the responses – or the probability of an event – they are capable of evoking, not with the basis (resources) of power or their means of power, yet even this might be very arbitrary (Dahl, 1957). In this paper I do not aim to make observations on such a variable result. I rather concentrate on the first element of power, the resources, or bases of power. I compare the bases of power between actors. Even more specifically, it is not the actual resources of actors that I try to measure, but the perception of all actors (As and Bs) on the relative importance of different resources. This is an attempt hardly dealt with in research on power so far. The purpose of this paper is to rank a number of power resources with respect to their influence in local agricultural water management. The ranking of their importance is only based on empirical material, which provides the additional value of this paper.

Investigating the perceptions of power, rather than seeking an objective reality, a raw measure of resources, approaches power the same way as the involved parties do (Bacharach and Lawler, 1976; Zartman and Rubin, 2003). The empirical survey of this study follows this understanding. Selman (1981) in his conceptual work on interpersonal negotiations incorporates the same basic assumption that at a negotiation level where implicit power is used, not the actual resource (e.g. force itself) but the perception of it is relevant. Already in 1976, Bacharach and Lawler, who worked on the employee-employer relationship, found that stakes parties have in a conflicting situation depend on the perception of self- and other-power. Related to the water sector, perceived access to the local government decision-making process is found as a determinant of power within and between catchment communities (Broderick, 2005). Tying up to these studies, we cannot simply measure a resource, because the resource is determined by the effects it produces on other actors (Morriss, 1987). In sum, we can conceptualise power in line with Zartman and Rubin (2003) as "the perceived capacity of one side to produce an intended effect on another through a move that may involve the use of resources". Of course, the perception is still related to objective realities.

Besides this conceptual focus on power₂, particularly the perception of sources of power, there are a few interesting shortcomings of the contemporary power concept, which particularly hinder the operationalisation for empirical studies. The view that power relations are binary is reductive and simplistic (Lukes, 2005). This immediately makes the implementation of the power concept difficult, because one power resource might be offset by another resource of an opposing actor (Morriss, 1987). Moreover, power relations are dynamic and change over time (Cascão, 2009). Derkzen et al. (2008) have shown that resource endowment alone is not sufficient to analyse and explain power. In line with Allen's (2003) topology of power, the modes of power, whether reciprocal, authoritarian, or based on coercion, are decisive for social interaction. In addition, when conceptually rethinking the comparison of the theoretical examination of power with the empirical research on power, it should be mentioned that the discussion of power is an exercise in ex-post rationalisation: "[p]ower is ascribed to that party which, after the fact, appears to enjoy the advantage" (Williamson, 1996). Williamson's critique invokes the propensity to myopically examine power and the missing unit of power analysis. In sum, scholars agree that the problem of empirical studies on power has not yet been solved satisfactorily (Morriss,

1987). There are no data to directly measure power and therefore, power is extremely difficult to quantify (Toufique, 1997; Dinar et al., 2004). To cope with this challenge, Morriss (1987) and Lukes (2005) insist on a profound understanding of the culture and society and rejects studying power in isolation.

Actors exercise power in different ways, with positive and negative effects on society. In the remainder of this article, I concentrate on power abuse, i.e. intentionally exercising power to pursue private benefits. Abuse of power is understood here as the individual expression of opportunistic behaviour and thus it is almost synonymous with opportunistic behaviour, which is defined as different expressions of self-interest seeking with guile, including calculated efforts to mislead, deceive, obfuscate, and otherwise confuse (Williamson, 1996). Hence, abuse of power is the individual expression of the opportunistic behaviour of different actors.

ABUSE OF POWER IN THE IRRIGATION SECTOR

Empirical investigation in Bulgaria reveals that power asymmetry among the actors is one of the driving forces for various decisions and actions in the irrigation sector (Theesfeld, 2004). Table 1 summarises transactions in the irrigation sector, which are affected by abuse of power. For example, the actual water appropriation practice is the result of abuse of power and indicates the incongruity of the formal and effective rules (first example in table 1). The way a WUA has been established is likewise affected by abuse of power (last example in table 1) (Theesfeld, 2008). Similar evidence is reported for Kyrgyzstan, where the WUA's councils are filled with key actors of the village and reflect existing local power asymmetries (Sehring, 2009).

Based on evidence from the field, the following research question motivates the proceeding sections: What exactly is the local perception of power and how does this affect irrigation practices? The analysis is led by the following hypotheses: power abuse is one determinant of institutional change in Bulgaria's post-socialist irrigation sector. The incongruity of formal and effective rules facilitates the exercise of power by actors and, in turn, is a result of that process. There is a high heterogeneity of provision with power resources among different actors. In particular, the perception of power resources is assumed to differ between territorial, social, and agricultural producer groups. The last hypothesis is statistically tested in the section on non-parametric testing.

DISTRIBUTIONAL THEORY OF INSTITUTIONAL CHANGE

The formal establishment of pseudo-WUAs in post-socialist Bulgaria (Theesfeld, 2008) and the evolving discrepancy between formal political intentions and informal effective institutions at the local level represent institutional changes, no matter if with intended or unintended effects (Kingston and Caballero, 2009). Allio et al. (1997) consider three general theories of institutional change classified as economic theories of institutional change, public choice theory of institutional change, and distributional theory of institutional change. 1) From the viewpoint of the economic theories of institutional change, institutional change develops in the direction of Pareto improvements and considers the improvement of efficiency as the main driving force. Competition and institutional change occurs as a result of mutually acceptable contracting between relevant economic actors (Pareto-improving). North's (1990) early works also contributed to the economic theories of institutional change by arguing that the driving force of competition will lead to an efficient system of institutions. His later findings are a result of the theory's inability to explain a large number of observed cases of institutional change (North, 1990). He explains the observed inefficient solutions with the main determinants of transaction costs, ideology, and path dependencies. 2) The public choice theory of institutional change states that change results from actions taken by the government as a strategic actor interested in revenue and electoral prospects. 3) The distributional theory of institutional change represents characteristics of power between different actors. Change results as the by-product of

bargaining between actors with asymmetric resources seeking distributional gains (Knight, 1992, 1995; Allio et al., 1997). This comparison of theories shows that the explanatory power of each theory may be focused on certain aspects.

Table 1. Transactions in the irrigation sector affected by abuse of power.

Transactions in the irrigation sector ^a	Actors involved actor I ↔ actor II	Specific decisions affected by power abuse
Starting an irrigation turn	Water users ↔ Neighbouring water users at the canal	Who irrigates first, and who violates the water appropriation rules?
Paying for irrigation water	Minor water users ↔ Water guard Major water users ↔ ISC regional office	Who refrains from paying, or who pays less?
Releasing water into the canal	Water users ↔ Water guard Water users ↔ ISC regional office	Who is favoured when the water is released?
Closing the barrage of a micro-dam	Fish farmers ↔ Water users	How long is water withheld from the irrigation canal?
Providing uncleaned irrigation canals to the water users	ISC ↔ Water users WUA ↔ Water users	How can maintenance work be reduced to a minimum?
Renting plots from the cooperative	Water users ↔ Cooperative	Who rents plots at the top-end position along the canal?
Establishing a constituent committee to found a WUA	Initiators ↔ Water users	Who is involved in the initiative, and how are operational rules set?
Withholding necessary documents needed to transfer use rights of dam water to a WUA	ISC ↔ Constituent committee	When shall the necessary documents be provided, and how can the procedure be prolonged?
Founding a WUA	Management of WUA ↔ Water users	Who is in the management, and how can certain water users be excluded?

^a This refers to the definition of transactions by Furubotn and Richter (1999), who do not restrict the term to situations in which resources are actually transferred in the physical sense of delivery. Besides economic transactions, Furubotn and Richter (1999) also talk about social transactions, which are actions necessary to establish, maintain, or change social relationships. Social transactions are necessary for the formation and maintenance of the institutional framework in which economic activities occur. In the table above, transactions are also formulated with reference to Hagedorn et al. (2002), who give examples of transactions between the farmer and the public or community concerned.

Note: ISC – Irrigation System Company state firm.

Other classifications, such as those by Hall and Taylor (1996), differentiate between three schools of thought in new institutionalism, namely: a) the historical institutionalism, b) rational choice institutionalism, and c) sociological institutionalism. They all have analytical strength in explaining institutional change. a) In the historical institutionalism, and particularly in its calculus approach, strategic interaction plays a key role. Likewise, asymmetrical relations of power are prominent in such an analysis (Hall and Taylor, 1996). According to Hall and Taylor (1996), institutional studies in the line of thought of historical institutionalism are able to elucidate the second and third dimension of power

of Lukes (2005). Although closest to the distributional theory of institutional change, historical institutionalism rather gives groups (not individuals) disproportionate access. b) For the rational choice institutionalism, Hall and Taylor (1996) see a chance to build an appreciation for asymmetries of power and to deal with the fact that some actors are vested with more power in Knight's (1992, 1995) approach. c) In sociological institutionalism institutions and procedures used by modern organisations are not adapted simply because they are most efficient for the tasks but have to be explained in cultural terms. The impact of the latter on organisation theory is explored by DiMaggio and Powell (1991). They integrate organisational institutionalism with developments in contemporary sociological theory and state that in new institutionalism the aspects of interests and power are underrepresented (DiMaggio and Powell, 1991). Based on empirical observations, they provide some efforts to incorporate power and strategic use into institutional arguments and thus in the branch of the new institutionalism in organisational analysis.

At present the most satisfactory theory of institutional change that encompasses both common-pool resource management issues and the importance of a change in power relations for institutional change is the distributional theory of institutional change.³ Therefore, besides the well-known concepts of power described above, this paper links up with the distributional theory of institutional change (Knight, 1992), according to which the bargaining power of an actor is a function of his resource provision. As theoretically very promising, more scholars started to apply the latter to natural resource management analyses (Toufique, 1997; Acheson and Knight, 2000; Theesfeld, 2004; Thiel and Egerton, forthcoming [2011]). Acheson and Knight (2000) demonstrate this application with the Maine lobster fishery and the generation of three of the most important lobster conservation laws.⁴

The distributional theory of institutional change (Knight, 1992, 1995) is able to explain the phenomenon of institutional change in a post-socialist country and, moreover, the complexity of interactions in the irrigation sector. Recently, Kingston and Caballero (2009) used Knight's theory to explain how, from an evolutionary perspective, rules that are not the most optimal might nevertheless become effective. Knight's (1992) approach focuses on power asymmetries of actors as the main determinant of institutional change. Knight argues that institutions are better explained as a by-product of strategic conflicts over distributional gains than in terms of a Pareto-superior response to collective goals or benefits. According to Knight (1992), institutions reflect the distributional expectations of different actors in the short and medium term. The asymmetries of power in a community are those factors that influence the capacity of strategic actors to determine the content of institutional rules. Knight (1992) defines power as follows: "to exercise power over someone or some group is to affect by some means the alternatives available to that person or group". The institutional development is determined by the parties' relative abilities to force others to act in ways contrary to their unconstrained preferences. This explains why institutional development becomes an ongoing bargaining game between actors (Knight, 1992). When either the relative bargaining power or the distributional consequences change, institutional change will emerge once again and institutions will be adapted to the currently prevailing power distribution (Knight, 1992). According to Knight (1992), the bargaining power of the actors is a function of their resource provision. In the following section, I describe the various power resources building the core of the distributional theory of institutional change.

In game theory, the term 'power' represents the fact that one actor can survive several rounds of the game without a cooperative solution. This could be due to his stock of assets, or it might stem from the fact that he would bear relatively lower opportunity costs (Knight, 1992). This power resource can be named *exit costs* (Schlüter, 2001) and describes the breakdown values which measure the costs of

³ Building upon Allio's classification, Hanisch and Schlüter (2000) argue that for land reform and agricultural privatization in Bulgaria the best explanation can be drawn from the distributional theory of institutional change.

⁴ Likewise, Munro (2009) provides an approach of how to conceptualize asymmetries of actors with game theoretical models of internationally shared fishery resources.

non-coordination. *Risk behaviour* is the second power resource. It is closely linked to resource availability. A higher provision of resources leads to a higher level of risk acceptance (Knight, 1995). The determinants of power differ according to context. For instance, Wittman (2009) describes land possession in Brazil as the core element that determines political power and participation.

Knight (1992) introduces additional power determinants. He points out that uncertainty hampers the establishment of institutions that can produce distributional advantages. Uncertainty leads the actors to increasingly discount the future. The more we discount our future, the more we base our present institutional choices on short-term distributional gains (Knight, 1992; Knight and North, 1997). Accordingly, *time preference* represents another power resource. Bargaining is expensive and those actors with more patience, i.e. with a lower time preference, have advantages in the bargain (Knight, 1992). Another power resource is *credible commitment*. The key to this resource is convincing a social actor to accept the commitment of another actor (Knight, 1995). By using a binding commitment, an actor determines the choice of others (Knight, 1992).

Sanction power enables actors to push their alternative, but this is mostly unequally distributed. Sanctioning is a mechanism that ensures commitment. In general, sanctions reduce the expected benefits of non-compliance and make compliance a more beneficial long-term strategy (Knight, 1992). Toufique (1997) also draws on Knight's theory, stressing the fact that social power of different groups is extremely relevant in enforcing rights. Without enforcement, the formal granting of rights has no economic value because property rights cannot be enforced and protected.⁵ The *organisability of a group* is mentioned as a power resource by Knight (1992), particularly at the political level. The bargaining power of actors depends on their ability to organise and act collectively. It is crucial for group leaders to maintain discipline and unity and to resolve the free-rider problem,⁶ which reduces the group's bargaining power.

Information represents the key power resource (Knight, 1992). Information and information asymmetries influence actors' evaluations of individual alternatives, hiding institutional alternatives or adding new alternatives (Knight, 1992). In environments of imperfect information, advanced education and privileged access to specific media and sources of information or greater experience become increasingly important. Therefore, we should expand the variable information to the notion of *knowledge*, which comprises information and skills. There are additional determinants, which represent sources of power asymmetries. Thus, the relative *transaction costs* of an alternative are a power resource (Schlüter, 2001). Transaction costs represent an aggregated category including aspects of other power resources, such as access to information or sanction power. Transaction costs change the distributional consequences of the bargaining outcome for an actor, because they affect the pay-offs of cooperation. *Positional power* is an additional power resource. It could come from the strategic position; for example, it could give an actor access to important information, controlling power over assets, or the opportunity to carry out credible threats (Shleifer and Treisman, 1998). A special form of positional power refers to the positional power of existing networks. The bargaining power of existing *networks* is a significant source of power, which is extremely important in post-socialist countries. The *nomenklatura* effect is especially obvious here and refers to the fact that the former communist elite continue to hold positions of power (Balcerowicz, 1995; Sehring, 2009).

Still, the present study demonstrates how difficult it is to empirically verify Knight's resource provisions as power resources. First, the important factor is not a person's resource possession and potential use of power, but his actual exercise of it (Statement about A). This can be categorised as pressure, inducement, and resistance. Thus, an actor's willingness to put his power resource (and not

⁵ Although Toufique (1997) talks about physical threat, position, credible threat, network and leadership, he considers social power as a whole, not distinguishing between the single determinants.

⁶ In economics, the free-rider problem refers to a situation where some individuals in a population either consume more than their fair share of a common resource, or pay less than their fair share of the cost of a common resource.

the potential) into the bargain is decisive.⁷ Second, in this regard, Pettigrew (1972) stresses the skilful use of the resource to be a power determinant (Statement about A).⁸ Third, it is not the exercise of power that is decisive, but an actor's subjective perception of the power of the opposing actor (Statement about B: Perception of A and B about the importance of A's abilities).

EMPIRICALLY DERIVED POWER RESOURCES

The following empirical study contributes to the operationalisation of the power concept. In line with the argument in section 3, power is investigated in terms of perceived power resources of local actors in their social context and their daily work in the Bulgarian irrigation sector. The approach combines several stages: 1) filtering and exploring relevant power resources, 2) revealing and validating these power resources, and 3) having them valued and ranked recurrently by the respective actors. In the subsequent section, I present the results of stages 1 and 2. Some of these variables are correlated, such as 'menace' and 'physical power and violence'. However, they are not combined in one power resource, because this would lead to a loss of the precise gradation by the local actors. I illustrate the contrast between empirically revealed perceived power resources in a local context and their theoretical examination in the distributional theory of institutional change. The exploring and revealing of the power resources together with the local actors show some nuances that are not represented so carefully in the power resources mentioned in the theory.

Table 2. Empirically derived power resources.

Empirical power resources	Comparability with theory	Effects on the bargaining model
Access to information	Possessing information as a key power resource (Knight, 1992)	Distributional consequences of bargaining outcomes
Personal relationship		Relative bargaining power
Trustworthiness	Credible commitment as a key power resource (Knight, 1992)	Relative bargaining power
Cash resources for bribing		Distributional consequences of bargaining outcomes
Menace	Credible threats of retaliation as a minor power factor (Knight, 1992)	Relative bargaining power
Physical power and violence		Relative bargaining power

Possession of information and the possibility to govern and control information is widely recognised as one important power resource (Giessen et al., 2009). Likewise, studies on adaptive co-management, which emphasises social processes, highlight the use or misuse of information as a determinant to exert power (Armitage et al., 2009). In the present study, the local actors focus on a slightly different aspect, namely accessibility. It is understood as a pre-stage of using information, namely being able to see where the information is posted, being able to use media (such as the Ministry Internet website, newspapers), knowing people who possess the information and are willing to share it, or being close to networks that receive information about relevant issues and are sharing this among their members.

⁷ In contrast, Braham and Holler (2005) started a debate on the integration of preferences as a component of power. They opt for power understood as the general ability of an actor to effect an outcome, excluding the behavioural content. Napel and Widgrén (2005) argue in response that preferences are very well a valuable ingredient of power analysis.

⁸ Zartman and Rubin (2003) also stress the fact that pure possession of power resources fails to take into account control through will and skill.

Therefore, I named this variable as *unrestricted access to information*. This is in line with Pettigrew (1972), who also describes access to information as an important base of an actor's power. *Personal relationship* is here understood as a good personal relationship with the 'right' person. When we recall that we analyse rural communities, it is not surprising that social networks are highly appreciated. Actors who cultivate good personal relationships with decision-makers in the irrigation process are more powerful. *Trustworthiness* is closely linked to credible commitment and is one of the key power resources also highlighted by Knight (1992). Corruption is a strategy that occurs quite frequently in irrigation systems, because irrigation institutions create many such opportunities. *Cash resources for bribing* can change the distributional consequences of bargaining outcomes and are, consequently, a power resource. The power resource *menace* is the use of power to fill people with fears and misgivings. It ranges from threatening people with social sanctions, including social exclusion, libel, and slander, to fostering fears of harmed business relations, extortion, or violence. Knight (1992) does not consider threat to be a direct power resource. In the empirical context of this study, fears and misgivings are present and therefore the ability to credibly menace others is a power resource. *Physical power and violence* are still common in Bulgaria. Physical strength and use of violence are a power resource of local actors. The participative observation of brawls in the pubs or in the fields provided much evidence that this power resource is still important. However, as outlined in the following section, it is less important than it was in the beginning of the transition process of the post-socialist countries.

NON-PARAMETRIC TESTING FOR THE ASSESSMENT OF POWER RESOURCES

Stage 3 of the empirical approach is an interactive interview technique, in which 78 subjects ranked six empirically derived power resources of local actors (column one in table 2) by their perceived importance in descending order. The exercise evoked a response on how and, in particular, due to which factors actors manage to succeed in the actual irrigation system. The interviewees could relate this power resource ranking to their own behaviour or those of other actors depending on how they perceive their own role. In addition to the criterion of village affiliation, including top-end and tail-end villages, interviewees were further classified according to the criteria leadership functions and scope of agricultural production. Local community leaders included the mayor, the cooperative managers, certain tenants, the leader of the Turkish inhabitants of one case study village, and very active agricultural producers to whom other community members attributed leadership functions. The third criterion split the sample into subsistence farmers and agricultural producers. This latter differentiation was made according to the criterion "own area under cultivation, excluding the area rented out to other producers or abandoned". Subsistence farmers operate on less than half a hectare. On average, they cultivate only their household plots (0.1 ha) plus one or two others (0.1 to 0.3 ha) growing vegetables or forage. The agricultural producers include mid-sized farmers operating 3-40 ha, big tenants, or cooperative farmers. The criteria to build different sub-groups include the independent variables and allow testing of the hypothesis that the perception of power differs between village affiliation, possession of leadership functions, or scope of agricultural production.

- Villages (Village A, sample size (N) = 18; Village B, N = 22; Village C, N = 20; Village D, N = 18).
- Leaders (N = 17) and non-leaders (N = 61).
- Subsistence farmers (N = 44) and agricultural producers (N = 34).

The testing of this hypothesis represents stage 4 of the endeavour to make the power concept more operational. It was conducted after the third empirical phase. Non-parametric procedures are performed, because this is appropriate if rank data in an ordinal scale are available for analysis (Daniel, 1978; Bortz et al., 2000). For the purpose of this analysis, the Spearman correlation coefficient, the Kruskal-Wallis H Test, and the Mann-Whitney U Test have been computed.

Tendency to assess power resources in a similar way

The Spearman correlation is a commonly used non-parametric measure of correlation between two ordinal-scaled variables.⁹ For all the cases, the values of each of the variables are ranked from the smallest to the largest, and the Pearson correlation coefficient is computed on the ranks. Values of the coefficient range from -1 to $+1$. The sign of the coefficient indicates the direction of the relationship and its absolute value indicates the strength, with larger absolute values indicating stronger relationships. The significance levels depict the probability of obtaining results in the population as extreme, as shown by the one observed in sample. I used a two-tailed test which refers to a null hypothesis in which the direction of an effect is not specified in advance. The Spearman coefficient is computed to test the relationship of the assessment of LEADERS and NON-LEADERS in a first run and the relationship of the assessment of SUBSISTENCE FARMERS and AGRICULTURAL PRODUCERS in a second run. The correlation coefficient of 0.943 for the first run shows a relatively strong positive correlation of both groups. Thus, there is a tendency for LEADERS and NON-LEADERS to assess the variables in a similar way. For the second run, the Spearman coefficient also reveals a strong positive correlation between SUBSISTENCE FARMERS and AGRICULTURAL PRODUCERS. Accordingly, there is a high tendency for both groups to assess the variables similarly.

Testing the influence of village affiliation on the rankings

The Kruskal-Wallis one-way analysis of variance by rank is the most widely used non-parametric technique for testing that several independent samples – here four villages – have been drawn from the same sample. The Kruskal-Wallis Test assumes that the underlying variable has a continuous distribution and the sample tested is similar in shape.^{10,11} The Kruskal-Wallis Test is preferred when the available data are measured on at least the ordinal scale (Daniel, 1978). If the level of empirical statistical significance is less than 0.05, the null hypothesis for the Kruskal-Wallis test, specifying that *the four populations' distribution functions are identical or there is no difference in the assessment of one variable between the villages*, can be rejected. The Kruskal-Wallis Test is computed six times, with one run for each dependent variable, representing the assessment of one power resource. The independent variable VILLAGE denotes the four different case study villages. Table 3 provides the statistical results. It is only for the variable 'Cash resources for bribing' that the null hypothesis is rejected. Accordingly, a significant difference in the assessment of BRIBE between the VILLAGE samples exists.

Testing the influence of particular actors' groups affiliation on the ranking

The Mann-Whitney Test compares the number of times a score from one of the samples is ranked higher than a score from the other sample. The Mann-Whitney Test exemplifies whether two independent samples are from the same population.¹² Two-sided non-parametric analyses are

⁹ The raw data fulfil the assumptions required for this test: A) The data consist of a random sample of n pairs of numeric or non-numeric observations. Each pair of observations represents two measurements taken on the same object. B) If ties occur among the X s or among the Y s, each tied value is assigned the mean of the rank positions for which it is tied (Daniel, 1978).

¹⁰ The data were successfully tested for their continuous distribution with the Chi-Square test.

¹¹ Also, the data fulfil the other assumptions required by this test: A) The data for analysis consist of k random samples of sizes n_1, n_2, \dots, n_k . B) The observations are independent both within and between samples. C) The variable of interest is continuous. D) The measurement scale is a least ordinal. F) The populations are identical except for a possible difference in location for at least one population (Daniel, 1978).

¹² The assumptions required for the Mann-Whitney Test are fulfilled: A) The data consist of a random sample of observations in both populations 1 and 2. B) The two samples are independent. C) The variable observed is a continuous random variable. D) The measurement scale employed is a least ordinal. E) The distribution functions of the two populations differ only with respect to location, if they differ at all (Daniel, 1978).

performed to test the null hypotheses in which the direction of an effect is not specified in advance. This implies the general null hypothesis: *The populations have identical distributions.*

Table 3. Do subgroups assess different?

Independent variable H ₀ : No difference in the assessment of the variable...	Dependent variables					
	Unrestricted access to information (INFO)	Personal relationship (PERE)	Trust- worthiness (TRUST)	Cash resources for bribing (BRIBE)	Menace (MENACE)	Physical power and violence (VIOLENCE)
Between Village A, B, C and D (Kruskal-Wallis Test)	0.101	0.573	0.402	0.019 ***	0.606	0.231
Between LEADERS and NON-LEADERS (Mann-Whitney Test)	0.025***			0.931		
Between SUBSISTENCE FARMERS and AGRICULTURAL PRODUCERS (Mann-Whitney Test)				0.529		
Between Village D and joint Villages A+B+C (Mann-Whitney Test)					0.233	0.957

Note: *** H₀ rejected with a level of statistical significance < 0.05

The Mann-Whitney Test is used as a stepwise refinement of the testing results of the Kruskal-Wallis Test. Table 3 shows only those statistical runs which were conducted to test selected and well-founded particular assumptions about a different ranking of two subgroups. Thus, not all dependent variables have been tested with the Mann-Whitney Test. In the first and second runs of the test specify the results of the Spearman correlation. In the first run, the two sample data LEADER and NON-LEADER are compared. It is questioned whether there is a significant difference in the distribution in the assessment of 'unrestricted access to information' between both populations. With a significance level of 5% the null hypothesis has to be rejected. Accordingly, there is a significant difference between LEADER and NON-LEADER in the mean ranking of the ordinal-scaled variable INFO. This finding is supported by the argument that leaders often possess more information and therefore may place more value on its possession and accessibility. In the second run, the Mann-Whitney Test is used to test the null hypothesis that there is no difference in the assessment of 'cash resources for bribing' between LEADERS and NON-LEADERS. With a significance level of 0.931, H₀ cannot be rejected. A third run tested the null hypothesis that there is no difference in the assessment of 'cash resources for bribing' between the populations of SUBSISTENCE FARMERS and AGRICULTURAL PRODUCERS. A probability of 53% indicates that the null hypothesis cannot be rejected. There is no significant difference between these groups in the assessment of BRIBE.

In Village D, a tenant cultivates a large percentage of the village's agricultural land. His decisions regarding the village have an even greater impact than those of the mayor. Moreover, he enforces his production techniques, including his irrigation practices, upon the villagers with physical power. These findings lead to the hypothesis that villagers in Village D will add more weight to the power resources MENACE and VIOLENCE in the irrigation sector than villagers from the other case study villages. Therefore, the Mann-Whitney Test is computed for the null hypothesis that the population of Village D and the population in all three other villages have identical distributions in the assessment of MENACE. The outputs of the statistic procedure indicate that with a statistical significance level of 0.233 H₀

cannot be rejected. The statistical inference for the variable 'physical power and violence' is similar. The null hypothesis that the population of Village D and the population in all three other villages have identical distribution in the assessment of VIOLENCE cannot be rejected.

One result of the Kruskal-Wallis Test was the significantly different assessment of the variable BRIBE in the four villages, which can be further analysed in pairs with the Mann-Whitney Test. With a statistical significance level of 5% it can be shown that there are significant differences between the assessment of BRIBE in villages A and B as well as between villages A and C. Likewise, the differences between the assessment of BRIBE between villages D and B as well as between villages D and C are significant. In fact, bribing mostly refers to the behaviour of the water guards, which is village-specific and varies according to the individual person responsible in the respective villages.

According to the analysed sample, the statistical inferences of the non-parametric procedures are summarised as follows: the relationships between the assessment of LEADERS and NON-LEADERS as well as between the assessment of SUBSISTENCE FARMERS and AGRICULTURAL PRODUCERS are strong and similarly directed in both cases. A sample analysis shows that which village one lives in, whether or not one is a leader, and whether one is a subsistence farmer or agricultural producer has no significant influence on the ranking of power resources. This is strong evidence against the hypothesis that the local perception of power resources differs between the respective actors' groups.

In comparison to the unexpected but significant similar ranking of all actors' groups, the two exceptions can be explained, yet are of minor importance for the main research question to be answered here. In addition, there is no proof for the assumptions drawn from qualitative research that specific actors' groups, chosen due to a particular village affiliation, rank the variables differently, such as a higher ranking of MENACE and VIOLENCE in Village D. The latter is astonishing – that people in a village where the day-to-day irrigation practices are affected by menace and physical violence still place more value on the other power resources, particularly access to information, when considering their effect on local power abuse in the irrigation sector.

The power resources hold the following mean ranks: 1) unrestricted access to information is assessed as the most important followed by 2) personal relationship, 3) trustworthiness, 4) cash resources for bribing, 5) menace, and 6) physical power and violence. This clear gradation of power resources at the local level is important to explain observed phenomena in the irrigation sector, such as the collection of water fees without maintaining the irrigation system, the existence of WUAs on paper without the real participation of the water appropriators, or the frequent violation of the formal water appropriation rules. It appears that the power resources have been ranked in a way that the most important three are also known to be affiliated with social capital formation, whereas the last three are related to non-functioning local-self governance resource systems and, moreover, their escalation. It can be assumed that among other factors, a high degree of asymmetry of power resource endowment is responsible for whether power resources, such as access to information, are used for individual or collective benefit.

At this point, it should be mentioned that in the early years of transitions from the 1990s onward, the exercise of physical violence played a much higher role in determining social and economic transactions. Interviewees frequently mentioned that menace and physical power are still issues but not as important as they were a few years ago. This gives some empirical evidence on the dynamic in the perception of power resources. It can be assumed that during the process of transition towards market economics and democracy, more 'primitive' determinants, such as physical violence, are replaced by more 'sophisticated' determinants, such as access to information. With ongoing reforms in Bulgaria and accession to the EU in 2007, the recognition of the importance of information and connection to the 'right' people seem to increase. These dynamics in judgement relate to social learning about decisive factors which influence effective governance structures, irrespective of how the natural resource is exploited, good or bad.

DISCUSSION

It is evident that the abuse of power significantly influences decisions and actions taken in Bulgaria's irrigation sector. Based on an empirical study, six power resources of local actors in the irrigation sector were revealed. Some of those are similar to the ones discussed in the distributional theory of institutional change, while others may complement the theoretical debate. I follow Morriss (1987), who already points out that we must compare the power resources and weight them differently. Following the concept of power applied in this study (Zartman and Rubin, 2003; Lukes, 2005), I did not measure the individual resources of A per se, but measured the subjective perception of A and B of the importance of the power holder's abilities. This also contributes to the awareness that the influence of power resources changes over time.

Using statistical procedures, I tested whether there are differences in the assessment of the power resources between different actors' groups. The sample analysis showed that which village one lives in, whether or not one is a leader, and whether one is a subsistence farmer or an agricultural producer had no significant influence on the ranking of power resources and the perception of power. This shows an even more robust and valid ranking across social sub-groups.

Some remarks on the implications of this power analysis on the current decentralisation efforts in the Bulgarian water sector follow. Disseminating organisational blueprints for WUAs throughout the world is generally inadequate to change people's incentives and behaviours (Ostrom, 2007). Mollinga et al. (2007) call such kind of reforms even a social engineering approach to stress that institutions are often treated as things and not as dynamic relationships and processes. Central authorities are often not willing to delegate power to user organisations (Mollinga et al., 2007) or, they create farmer organisations without considering farmers' incentives and capabilities (Tang, 1992). Chambers (1988), for instance, concludes that farmers cannot be organised through persuasion or fiat but will only participate if they perceive an advantage. The success of transferring these blueprints to post-socialist countries in South-Eastern Europe to facilitate rehabilitation of deteriorated irrigation systems is particularly questionable. Transition societies experienced more than 40 years of socialist systems, which distinctly shaped their mental models and action patterns, as exemplified in their current refusal of agricultural collaboration and lack of self-initiative and the weak position of local authorities (Sehring, 2009).

In Bulgaria, hardly any WUA has been effective at the local level in terms of local self-governance. One reason is that the heterogeneity of actors' interests and their different endowment with power resources has been disregarded. People may ignore, oppose, or take advantage (for personal gain) of these institutional transplants. On the one hand, every new rule changes the distribution of benefits and duties among various actors. Distributional aspects and power relations must be taken into account because actors who fear losing their powerful favourable positions will oppose the new rule (Dinar et al., 2004; Andersson and Ostrom, 2008). On the other hand, new formal rules, due to the high level of information asymmetry, might even allow some actors to maintain and strengthen power abuse strategies and thus hinder the envisaged formal aim of equal distribution of benefits (Sehring, 2009). Blomquist et al. (2005) support the argument that extreme asymmetries in resource endowments among actors can imperil decentralisation success because those who fear becoming worse-off after the alteration may oppose it. However, this general statement must be qualified in one respect. Some inequality of resource endowment is necessary because some actors must bear the costs to take a leadership role. Those with greater endowments are willing to bear a disproportionate share of the initial costs of organising institutional arrangements in order to stimulate movement. Thus, power heterogeneity can also facilitate policy objectives.

The prevailing power abuse of individual actors must be carefully considered in the crafting of new institutions or revising existing ones to facilitate collective action. Finding institutional solutions must be part of a larger plan. A number of aspects, including issues of integrated rural development, rural poverty, insufficient social security systems, lack of education, information on rural population, and

unreliable legal systems, must be considered in a comprehensive approach. To make WUAs effective the design must consider the local heterogeneity in access to information, which – as this study has shown – is perceived as the most important power resource impacting the irrigation sector. Moreover, the WUA design should integrate compensation measures for powerful actors who will be worse-off after the alteration. This may mitigate their opposition against the institutional change. By just transferring blueprint institutions without adapting the design to the country's specificities – in this case the power abuse behaviour – the institutions may not become effective.

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REFERENCES

- Acheson, J. and Knight, J. 2000. Distribution fights, coordination games, and lobster management. *Comparative Studies in Society and History* 42(1): 209-238.
- Adhikari, B. 2005. Poverty, property rights and collective action: Understanding the distributional aspects of common property resource management. *Environment and Development Economics* 10(1): 7-31.
- Agrawal, A. 2001. Common property institutions and sustainable governance of resources. *World Development* 29(10): 1649-1672.
- Allen, J. 2003. *Lost geographies of power*. Malden, Oxford, Melbourne, Berlin: Blackwell Publishing.
- Allio, L.; Dobek, M.; Mikhailow, N. and Weimer, D. 1997. Post-communist privatization as a test of theories of institutional change. In Weimer, D. (Ed), *The political economy of property rights: Institutional change and credibility in the reform of centrally planned economies*, pp. 319-348, Cambridge: Cambridge University Press.
- Andersson, K. and Ostrom, E. 2008. Analyzing decentralized resource regimes from a polycentric perspective. *Policy Science* 41(1): 71-93.
- Armitage, D.; Plummer, R.; Berkes, F.; Arthur, R.; Charles, A.; Davidson-Hunt, I.; Diduck, A.; Doubleday, N.; Johnson, D.; Marschke, M.; McConney, P.; Pinkerton, E. and Wollenberg, E. 2009. Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment* 7(2): 95-102.
- Bacharach, S.B. and Lawler, E.J. 1976. The perception of power. *Social Forces* 55(1): 123-134.
- Baland, J.-M. and Platteau, J.-P. 1998. Division of the commons: A partial assessment of the new institutional economics of land rights. *American Journal of Agricultural Economics* 80(3): 644-650.
- Balcerowicz, L. 1995. *Socialism, capitalism, transformation*. Budapest: Central European University Press.
- Blomquist, W.; Ariel, D. and Kemper, K. 2005. *Comparison of institutional arrangements for river basin management in eight basins*. World Bank Policy Research Working Paper No. 3636. Washington, DC: World Bank.
- Bortz, J.; Lienert, G. and Boehnke, K. 2000. *Verteilungsfreie Methoden der Biostatistik, 2. Auflage*. Berlin, Heidelberg: Springer.
- Braham, M. and Holler, M. 2005. The impossibility of a preference-based power index. *Journal of Theoretical Politics* 17(1): 137-157.
- Broderick, K. 2005. Communities in catchments: Implications for natural resource management. *Geographical Research* 43(3): 286-296.
- Cascão, A.E. 2009. Changing power relations in the Nile river basin: Unilateralism vs. Cooperation. *Water Alternatives* 2(2): 245-268.
- Chambers, R. 1988. *Managing canal irrigation: Practical analysis from South Asia*. Institute of Development Studies, University of Sussex, UK: Cambridge University Press.

- Dahl, R. 1957. The concept of power. *Behavioral Science* 2(3): 201-215.
- Daniel, W. 1978. *Applied nonparametric statistics*. Boston: Houghton Mifflin Company.
- Derkzen, P.; Franklin, A. and Bock, B. 2008. Examining power struggles as a signifier of successful partnership working: A case study of partnership dynamics. *Journal of Rural Studies* 24(4): 458-466.
- DiMaggio, P. and Powell, W. 1991. Introduction. In Powell, W.W. and DiMaggio, P. (Eds), *The new institutionalism in organizational analysis*, pp. 1-40. Chicago: University of Chicago Press.
- Dinar, A.; Balakrishnan, T. and Wambia, J. 2004. Politics of institutional reforms in the water and drainage sector of Pakistan. *Journal of Environment and Development Economics* 9(3): 309-445.
- Furubotn, R. and Richter, E.G. 1999. *Neue Institutionenökonomik*. Tübingen: Mohr Siebeck.
- Giessen, L.; Kleinschmit, D. and Böcher, M. 2009. Between power and legitimacy – Discourse and expertise in forest and environmental governance. *Forest Policy and Economics* 11(5-6): 452-453.
- Hagedorn, K.; Arzt, K. and Peters, U. 2002. Institutional arrangements for environmental co-operatives: A conceptual framework. In Hagedorn, K. (Ed), *Environmental co-operation and institutional change: Theories and policies for European agriculture*, pp. 3-25. Cheltenham: Edward Elgar.
- Hall, P.A. and Taylor, R.C.R. 1996. Political science and the three new institutionalisms. *Political Studies* 44(5): 936-957.
- Hanisch, M. and Schlüter, A. 2000. Institutional analysis and institutional change: What to learn from the case of Bulgarian land reform? In Tillack, P. and Schulze, E. (Eds), *Land ownership, land markets and their influence on the efficiency of agricultural production in Central and Eastern Europe*, pp. 152-168. Kiel: Wissenschaftsverlag Vauk.
- Kingston, C. and Caballero, G. 2009. Comparing theories of institutional change. *Journal of Institutional Economics* 5(2): 151-180.
- Knight, J. 1992. *Institutions and social conflict*. Cambridge: Cambridge University Press.
- Knight, J. 1995. Models, interpretations, and theories: Constructing explanations of institutional emergence and change. In Knight, J. and Sened, I. (Eds), *Explaining social institutions*, pp. 95-119. Ann Arbor: University of Michigan Press.
- Knight, J. and North, D. 1997. Explaining the complexity of institutional change. In Weimer, D. (Ed), *The political economy of property rights. Institutional change and credibility in the reform of centrally planned economies*, pp. 349-354. Cambridge: Cambridge University Press.
- Lukes, S. 2005. *Power: A radical view*. Second Edition (first edition in 1974). New York: Palgrave Macmillan.
- Mehta, L. 2003. Problems of publicness and access rights: Perspectives from the water domain. In Kaul, I.; Conceição, P.; Le Goulven, K. and Mendoza, R. (Eds), *Providing global public goods: Managing globalization*, pp. 556-576. Oxford: Oxford University Press.
- Meinzen-Dick, R.; Raju, K.V. and Ashok, G. 2002. What affects organization and collective action for managing resources? Evidence from canal irrigation systems in India. *World Development* 30(4): 649-666.
- Molle, F.; Mollinga, P. and Meinzen-Dick, R. 2008. Water, politics and development: Introducing water alternatives. *Water Alternatives* 1(1): 1-6.
- Mollinga, P.P.; Meinzen-Dick, R.S. and Merrey, D.J. 2007. Politics, plurality and problemsheds: A strategic approach for reform of agricultural water resources management. *Development Policy Review* 25(6): 699-719.
- Morriss, P. 1987. *Power: A philosophical analysis*. Manchester: Manchester University Press.
- Munro, G. 2009. Game theory and the development of resource management policy: The case of international fisheries. *Environment and Development Economics* 14(special issue 1): 7-27.
- Napel, S. and Widgrén, M. 2005. The possibility of a preference-based power index. *Journal of Theoretical Politics* 17(3): 377-387.
- North, D. C. 1990. *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.
- Ostrom, E. 2007. A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences of the United States of America* 104(39): 15181-15187.
- Penov, I.; Theesfeld, I. and Gatzweiler, F. 2003. Irrigation and water regulation systems in transition: The case of Bulgaria in comparison with Latvia, East Germany and Romania. In Gatzweiler, F. and K. Hagedorn (Eds), *Institutional change in Central and Eastern European agriculture and environment*, Vol. 3. Berlin: Food and Agriculture Organisation of the United Nations (FAO) and Humboldt University of Berlin.
- Pettigrew, A. 1972. Information control as a power resource. *Sociology* 6(2): 187-204.
- Sehring, J. 2009. Path dependencies and institutional bricolage in post-Soviet water governance. *Water Alternatives* 2(1): 61-81.

- Selman, R.L. 1981. The development of interpersonal competence: The role of understanding in conduct. *Developmental Review* 1(4): 401-422.
- Schlüter, A. 2001. *Institutioneller Wandel und Transformation: Restitution, Transformation und Privatisierung in der tschechischen Landwirtschaft*. Institutioneller Wandel der Landwirtschaft und Ressourcennutzung 14. Aachen: Shaker.
- Shleifer, A. and Treisman, D. 1998. *The economics and politics of transition to an open market economy – Russia*. Paris: Development Centre Studies. Organisation for Economic Co-operation and Development.
- Tang, S.Y. 1992. *Institutions and collective action: Self-governance in irrigation*. San Francisco, CA: Institute for Contemporary Studies Press.
- Theesfeld, I. 2008. Irrigation sector in Bulgaria: Impacts of post-socialist policy reforms. *Water Policy* 10(4): 375-389.
- Theesfeld, I. 2004. Constraints on collective action in a transitional economy: The case of Bulgaria's irrigation sector. *World Development* 32(2): 251-271.
- Thiel, A. and Egerton, C. Forthcoming (2011). Re-scaling of resource governance as institutional change: The case of water governance in Portugal. *Journal of Environmental Planning and Management*.
- Toufique, K.A. 1997. Some observations on power and property rights in the inland fisheries of Bangladesh. *World Development* 25(3): 457-467.
- Williamson, O. 1996. Efficiency, power, authority and economic organization. In Groenewegen, J. (Ed), *Transaction cost economics and beyond*, pp. 11-42. Dordrecht: Kluwer.
- Wittman, H. 2009. Reframing agrarian citizenship: Land, life and power in Brazil. *Journal of Rural Studies* 25(1): 120-130.
- Zartman, W. and Rubin, J. 2003. The study of power and the practice of negotiation. In Zartman, W. and Rubin, J. (Eds), *Power and negotiation*, pp. 3-28. Ann Arbor: The University of Michigan Press.
- Zeitoun, M. 2008. *Power and water in the Middle East: The hidden politics of the Palestinian-Israeli water conflict*. London and New York: I.B. Tauris.
- Zwarteveen, M. 2008. Men, masculinities and water powers in irrigation. *Water Alternatives* 1(1): 111-130.