

INSTITUTIONS FOR ADAPTING TO CLIMATE CHANGE IN THE TISZA RIVER BASIN

Piotr Matczak¹⁾; Zsuzsanna Flachner²⁾ and Saskia E. Werners³⁾

1) Polish Academy of Sciences, PL. matczak@amu.edu.pl

2) Hungarian Academy of Sciences - RISSAC, HU. flachner@rissac.hu

3) Wageningen University and Research Centre, NL. werners@mungo.nl

Abstract

Adaptation is increasingly seen as an inevitable answer to the challenges posed by climate change. Recent predictions of an increased incidence of extreme events have been the driving force behind the quest for adaptation strategies to maintain safety and reduce climate related problems in managed river basins. Current initiatives focus on the mainstreaming of adaptation, the appraisal of specific adaptation options and the role of institutions in adaptation. This paper looks at adapting to climate change as a collective action in the new institutional economics context. Climate change is an additional source of risks for organisations. To cope with these risks, organisations use both formal legal institutions (such as laws and binding agreements) and informal social institutions (such as norms, conventions, self-imposed codes of conduct). Trust towards the government, and mediating organizations (NGOs, business, etc) is widely considered as an important factor in decreasing the enforcement costs of institutions and opportunistic behaviour.

This paper aims to identify what formal and informal institutions allow organisations to manage the risks associated with climate change. The paper firstly presents a literature overview of formal and informal institutions for adapting to climate change. Secondly it compares formal and informal institutions in the Hungarian Tisza river basin. It appraises how these institutions are perceived to facilitate adapting to climate change. Evidence from the Tisza region so far supports that successful adaptation requires both informal and formal institutions. Formal institutions can mainstream adaptation and are required to include adaptation in longer term planning, investment and large-scale infrastructure. Informal institutions are crucial in strengthening adaptive capacity and implementing non-structural measures. In implementing adaptation the role of informal institutions seems to have been neglected.

INTRODUCTION

Climate change is likely to cause more frequent and less predictable floods, heat waves, droughts etc. (IPCC 2007). Significant uncertainties associated with climate impacts make the application of mitigation and adaptation measures difficult. Thus, notwithstanding the importance of mitigation measures, adaptation is gaining attention since climate impacts are unavoidable.

Since 1980 weather related disasters are treated not only as physical happenings. Efficient adaptation involves not only structural (technical) measures, but also has to take into account socio-economic aspect (Helmer and Hilhorst 2006).

Difficulty lies however in the necessity to combine the global scale measures (since climate change is a phenomenon of supranational scale) with the regional and local ones (Schipper and Pelling 2006). Implementation of large, top-down policies, based on international agreements, and national regulations brings the problem of accountability¹.

¹ Accountability is understood as proactive process by which public officials inform about and justify their plans of action, their behaviour and results and are sanctioned accordingly (IBRD 2005).

The multi-scale approach has been discussed in the area of natural resources management (Roth 2004) and social sciences (Biermann, 2007).

Institutions offer trustworthy ways of weighting the needs of local communities and global commons and are of crucial importance. Moreover, Adger (2001) poses the question, whether the state is able to deliver adaptive capacity, and how far national policies must be coherent with local norms and based on local social capital.

It is argued that a source of adaptation capacity can be found at the level of local communities (Allen 2006; Adger 2001). The idea of Community Based Disaster Preparedness searches for adaptation at the local level. However, drawbacks of reliance on local capacities are pointed out too (Bollin 2003; Allen 2006). Adger (2001) advocates focus on collective action, social capital, and co-management (Plummer and FitzGibbon 2006; Adger et al 2005) as a basis for adaptation capabilities.

Adaptation to climate change requires both planned, top-down action and autonomous, locally rooted efforts. Uncertainties connected with climate change make it difficult to devise generally

applicable adaptation measures. Adaptive capacity is more importance instead. There is little knowledge how to facilitate adaptation, however.

This paper explores planned and autonomous adaptation in the Hungarian part of the Tisza river basin. Strength and weaknesses of formal and informal institutions in supporting adaptation are investigated. The paper presents the formal background and first results of a study on the role of institutions in adaptation.

INSTITUTIONS

Coping with climate related risk requires coordination and regulation, i.e. establishing institutions. The importance of institutional aspects is often mentioned in the context of climate change (Feldman and Mann 1991; Bulkeley 2001; WHO 2002; Adger et al. 2003; WHO 2004; Kunreuther et al. 2004; Lorenzoni et al. 2005; Schipper and Pelling 2006; O'Brien et al. 2006; IPCC 2001). Institutions are understood in a wide meaning, comprising of organisations like administration bodies, agencies, laws and regulations. A more precise notion of institutions worked out within the conceptual framework of the new institutional economics (Ostrom 1990; 2005; North 1990), offers useful insights in the study of adaptation. Institutions are understood, as: "sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregations rules will be used, what procedures must be followed, what information must be or must not be provided, and what payoffs will be assigned to individuals dependent on their actions" (Ostrom 1990, p. 51). Institutions are built in order to deal with production and sustaining of any kind of public goods. The function of institution lies in the ability to deal with spill over effect, in terms of externalities, and with free rider problems in terms of decision-making and collective action. Moreover, it is emphasised that institutions can reduce uncertainties of human actions (North 1990) and decrease risks (Root 2005).

Formal and informal institutions

The global scale of climate change involves large-scale policies. Costs of information and enforcement are increasing when a top-down policy is applied (Williamson 1985). Often local knowledge and capabilities are disregarded. In this respect, a distinction between formal and informal institutions offers insight. Formal institutions are legally introduced and enforced by state institutions. They are embedded in state

operations, based on laws, enforced and monitored by the state. Informal institutions rely on enforcement methods not supported by the state. Examples are: customs, traditions, rules of conduct, etc. Awareness raising campaigns and public information actions are largely targeting informal institutions, trying to establish them, strengthen, or – change. Also informal network relations between actors, based on ties of sympathy, interest, corruption², family relations etc. are based on informal institutions. Although formal, legal institutions play a much bigger role in modern societies, the importance of informal institutions should not be disregarded (Ingram and Nee 1998; World Bank 2002). They often regulate behaviour in the private sphere and they are especially important when informal norms and formal regulation collide. Ellickson's (1998) study of farmer's disputes in California shows unexpectedly high reliance on informal rules. Moreover, in countries of low GDP per capita, informal institutions can play roles, which in developed societies are attributed to formal ones (Platteau 2000)³.

Both formal and informal institutions have a role in adaptation to climate change. The former offer rigid enforcement (helping to deal with the collective action problems, spill-over effects, externalities), while the latter use locally rooted compliance based on tradition. Additionally, the relation between governance levels is important. Below, institutions are discussed on the community level, on the state level and the relationship between these.

Adaptation institutions at the community level

Centralisation of adaptation policies can be flawed. Measures can fail at the local level, where formal rules meet informal practices (Nee and Ingram 1998; Hurrelmann 2005). In this respect informal institutions operation on the local level can hinder implementation of policies. At the same time, the global scale of the climate change challenge gives little space for local communities to adapt, when taking into account the scale of the impacts compared to their own resources (Marsh 2005). Nevertheless, there is adaptation potential on the local level. Local government plays a fundamental role in land - use, urban density, etc. Climate change impacts will be felt and differentiated mainly at the local level. If climate change policies

² In post communist countries many aspects of government collapsed and were replaced by a new network economy (Grabher and Stark, 1998)

³ Property rights can serve as an example.

are to be effective at the individual and household level, local government will have to play a key role to foster informal networks of expertise and cooperation among local businesses, local schools, colleges, universities, libraries, NGOs, churches, and other social groups, that is policy networks (Crabbé and Robin, 2006; O’Riordan *et al.*, 1998).

The role of informal institutions has been recognized for climate change policies. The background paper for this conference affirms that adaptive and inclusive earth system governance requires the consent and involvement of agencies beyond the state (Biermann, 2007). Allen (2006) notices the importance of informal institutions in promoting partnerships of local and government actors in preparedness to disasters. Adger (2001) argues that adaptation to climate related risks is rooted in local culture and traditions. It can involve certain, although not easily measurable, adaptation capacity. In terms of internal features of a community, Adger points at the role of collective action⁴, and social capital⁵ in adaptation. Social capital can be treated as a specific institution that establishes the basis for collective action (Nostrum 1994). Badger investigates two types of social capital: bonding (concerning ties within a group) and bridging (related to trust relations reaching outside the group), and notices a role in adaptation for both. The **bonding** type of social capital, based basically on kinship, provides help in case of disaster and recovery but does not help much in pro-active adaptation. The **bridging** type of social capital, based on reciprocity – not on family ties, helps to maintain wider social relations and can offer help in establishing different type of social services e.g. health care systems and community flood protection networks (Table 1).

The importance of informal institutions for adaptation is a core assumption in Community Based Disaster Preparedness (CBDP). The CBDP approach focuses on the adaptive abilities of a community, emphasizing the role of self-reliance of a community, awareness of its members and their practical skills. The idea is to empower local people in adaptive capacities⁶. Several measures⁷

can be employed in order to achieve this (Allen 2006: Bollin 2003): a) technical information dissemination; b) raising awareness of risk; c) assessing local knowledge and resources; d) mobilizing local people.

There are, however, several difficulties in the application of CBDP. Firstly, although there are capabilities to cope with a disaster within a community, a community itself can hardly be treated as homogeneous. Hence, several features should be considered when CBDP is to be design: a) presence of minorities (e.g. ethnic minorities); b) vested local interests; c) instability of a community caused by e.g. migration opportunities, large external investments; d) concentration of tie densities (e.g. in Philippines case family relations are stronger than civil society and the state in providing security (Allen 2006)) and e) increase of national political influence (polarization). Also turnover of personnel influences the results (Bollin 2003). CBDP implementation can strengthen tensions existing within a community. If officials select participants without recognition of local circumstances it can result in disempowerment of local knowledge and local community. Allen notices a dangerous tendency to search for short term design and effects of isolated small scale projects, and concentration on physical hazards rather than people’s experience of vulnerability.

The role of state in building local adaptation

The role of local, informal institutions in adaptation to climate change is important but since many climate change impacts are of supra local scale a substantial contribution to adaptation has to come from the state (e.g. flood protection programs, energy sector strategy).

Concerning the relation between state and community, Collier (1998) distinguishes two forms of social capital. The first one appears at the civil level and provides common values, traditions, norms, informal networks etc. It is located within a community. The second one can be found at government level, and helps to enforce societal contracts and provides rule of law. The second type of social capital offers the institutional environment for operations of local actors.

Exploring the role of the state in relations to social capital Adger (2001) differentiates between three types of governmental conduct with respect to policies’ design and implementation: a) the state promoting security and sustainability; b) the state

⁴ Collective action results rely on mutual interdependence of performance of actors.

⁵ Social capital is understood as "...features of social organisation, such as trust, norms, that can improve the efficiency of society by facilitating co-ordinated actions" (Putnam, et al. 1993).

⁶ Allen observes the shift from independent role of civil society (1980-90s) to partnership relations between government and civil sectors.

⁷ CBDP is an approach distant from interventionist, focused on the technology

enforcing policies by coercion; c) the ineffective or weak state (Table 1). Adger emphasizes that a state can be of a different “quality” and conduct. When the state is weak or absent then social capital can replace its duties. Adger offers the example of coastal management in Vietnam. Similar cases can be found in post-socialist countries: irrigation systems in Bulgaria (Theesfeld 2003) and economic life in Russia (Rose 1999). At the same time, a properly working state can substitute weak social ties (Juetting 2003).

Table 1: Styles of policy implementation depending on the quality of state and type of social capital (after Adger 2001).

	State promotes security and sustainability	State works through coercion	Ineffective state, lack of legitimacy
Bridging social capital	Social and policy learning; participatory planning; co management	Conflicts	Migrations; network economy (Rose 1999); criminal and corruption networks.
Bonding social capital	State substitutes external linkages	Local conflicts (hidden)	Communities take over the functions of the state

Dynamic aspect of adaptation capacity

Introducing adaptation policies is a dynamic process. The existing institutions (both formal and informal) and resources form the background for policy implementation. The policy design and performance of the state can empower local institutions and use them, can disregard them, and new institutions can contradict existing ones.

Adaptation measures can be introduced relying on existing informal institutions. For Asian examples, Adger (2001) mentions the informal networks of credits; networks helping in maintaining religious buildings, funerals, and marriage ceremonies, as resources of social capital offering a basis for adaptation policies. Molnár *et al* (2004) emphasizes the importance of community responsibility and joined management of local water networks both for individual and community benefits. Jalali (2002) emphasizes the role of media in managing a disaster. Also well-developed vertical relations based on synergy between the state and civil sector are helpful for establishing novel adaptive arrangements.

In many cases, attempts to increase adaptive capacity require establishing new institutions. The very idea of CBDP aims to build institutions regulating the area within civil society and the area between state and civil sector, in order to reduce vulnerability. The state has initiative power in this

respect. Building a good information exchange and cooperation between regulatory agencies and civil sector working closely together, establishing a platform for discussion or - action groups can produce good results (Bollin 2003; Adger 2001).

However successful conduct is not easy. Experience from Bangladesh shows that when flood management was prepared without proper funding delivery, it resulted in state control over the engaged civil sector (Allen 2006). Vulnerability can be politicised and become part of an argument on the scope of the responsibility of the state, land use planning etc. Furthermore, building bridges and cooperation between different actors (policy, research, civic and local administration, farmers) to support the establishment of new institutions is difficult and needs careful planning, time and trust (Flachner, 2005).

In general to establish an institution is difficult in itself. It requires a common engagement that is problematic. Households are reluctant to invest in communal projects. Collective action without special enforcement or incentives reaches a sub-optimal level or cannot start at all (Olson 1965; Ostrom 1990). Free riders (not participating in costs of institution preparation, maintenance and sanctioning but counting on the benefits from it) have to be avoided and made to comply. Otherwise the institutions fail or do not emerge.

For these reasons, the actors operating in the formal sphere are more effective than the informal ones. They are able to gain power and resources to work in a scale wide enough to deal with externalities (for example in a scale allowing for integrated management of resources). They also have capabilities to avoid free rider problem – e.g. they are able to exert taxes or force into action all the stakeholders. Taxation is a basis for dealing with risks (Root 2005). Nowadays, not only the essential state is responsible for establishment and enforcement of institutions. Majone (1996) argues that relatively independent semi-governmental agencies have a bigger role in many cases.

However, state involvement is not without deficiencies either. Its conduct is biased because of its own, internal dynamics: bureaucratic slippage (ability of the bureaucracy to implement a policy which is not preferred by the principal (Majone 2004)), budget maximisation syndrome, etc. Moreover, formal, state institutions are costly in operation. As a result, government bodies are reluctant to implement policies if they do not bring value-added incentives for administration. Thus, neither formal nor informal institutions can be regarded as a definite solution for adaptation to climate change.

DATA

Below, the role of formal and informal institutions in relation to adaptation to climate change in the Tisza river basin (Hungary) is presented and discussed. The New Vásárhelyi Plan is taken as a main object of investigation. The data were collected through interviews with stakeholders representing national (ministries, water authorities, physical planning) and local organisations (environmental NGOs, academic institutions) in Hungary, a workshop with local stakeholders of the Tisza basin, and analysis of documents on the New Vásárhelyi Program and other projects prepared for the region.

RESULTS

Tisza river region

The Tisza river is the largest tributary of the Danube. Its total watershed area is 157 186 km². The Tisza's tributaries originate in the Carpathian Mountains in the territories of Romania, Slovakia and Ukraine. It flows through the Pannonian flood plain of eastern Hungary and then south into Serbia and Montenegro. Almost 50 per cent of the Hungarian territory is covered by the Middle and Lower Tisza. Tisza is the second biggest river of Hungary. It has special geographical and historical features. It is unique in terms of wetlands and conservation areas, very regulated riverbed and frequent floods.

The Tisza floodplain area was utilized in a very complex way until the 18th century providing sufficient income for the communities along the river. These activities were mainly organized around the operation of "fok" - channel between the main riverbed and the floodplain, cutting through the natural levee. The fok (Fokgazdálkodás), i.e. hook-management had traditionally developed through hundreds of years. It works through diverting, and temporarily retaining water in the floodplain for agriculture and fisheries, and growing fruit. This sustainable system included small pits and hand-made water steering canals, and vegetation. It secured income for local communities (Andrásfaly, 1975, Molnár, 2002). Habsburg nobilities started improving the shipping transportation on the Tisza, weakening the `fok` system. The main change of the Tisza River was the first Vásárhelyi Plan initiated in the nineteenth century, when 32 percent of the river length was regulated. The former huge floodplain was drained, decreasing it by 84 percent. Also a system of dikes was constructed. The changes brought degradation of the traditional way of management and finally the decline of the whole region. Industrial pollution increased in the

communist era. Privatisation started at the beginning of the 1990s and brought a dramatic drop of efficiency of the irrigation systems (large drainage, irrigation channels). Large areas have unclear property status (non divided land) resulting in imprecise responsibility for water system maintenance and taxes (State of the art, KIOP, 2006).

After the collapse of communism the idea of a New Vásárhelyi Plan (VTI) appeared. It gained momentum from the severe floods and droughts in recent years that occurred despite development and improvement of the dikes system.

The risks caused by climate change in the Middle Tisza are the result of a long-term process (Balogh *et al*, 2005). Climate change enlarges problems of historic and local origin. The impacts of human interventions are further challenged by climate change in areas such as nature, food production security, water, safety, and socio-economic sustainability.

The role of formal and informal institutions in water and land use management

Four main management regimes can be distinguished over the last two hundred years in the Tisza river basin: a) the operation of the fok system (up to mid nineteenth century); b) the period between the first Vásárhelyi plan implementation and beginning of preparation of the new Vásárhelyi plan (from the end of nineteenth to the end of twentieth century); c) development of the new Vásárhelyi plan and the beginning of implementation (2000 - 2006) and d) implementation and redefinition of the new Vásárhelyi plan (current).

Fok system

"The Fok" system was strongly based on informal, evolutionary grown institutions. Communities and larger individual landowners (nobilities) owned the smaller water steering systems on their property. They operated the smaller water steering systems for their own benefit. Local authorities managed the larger water schemes. The management responded to natural processes (seasonal floods), allowing to use these processes for agriculture, fishing etc. The community work and informal exchange of help were strong. The informal obligations of the community members were the main driving force sustaining the system. The formal institutions played a relatively small role. These were connected to monarch power and included property rights and obligations to the crown.

Interventions of the formal power started the undermining (indirectly) of the 'fok' system. In the XVIII century the monarch searched for land to give to nobles. The Tisza river area was used for this purpose. Consequently, nobles started to drain and use the land more intensively for agricultural production. Local farmers were against the changes but the system of the traditional management started slowly to disintegrate.

The first Vásárhelyi plan

The first Vásárhelyi plan was an ambitious program of land and water management in the whole region. It profoundly changed the landscape in the river basin, through implementation of the system of dikes and channel structure. The shallow water flooding in the area disappeared. It decreased the benefits from fishing and in the longer run it resulted in soil degradation and grain production decline after 20-30 years of cultivation. At the beginning of the twentieth century the region faced crisis and stagnation. The implementation of the first Vásárhelyi plan was based on strong state regulatory institutions. It was strengthened during the communist era, when national government played a dominant role in the water steering system. Also anti-flood measures were introduced in a formal centralized mode. Water boards, a formal body attached to the state, were responsible for the second level water steering system. Regulations were enforced on individual landowners and farmers.

The period was characterized by weakening of informal institutions, e.g. degradation of community work and the informal exchange of help. The formalization of economic and social life induced the second economy, parallel to the official one (Hankiss 1990; Rona-Tas 1990). Within this sphere informal institutions were established, often opposing formal norms. E.g. illegal wells were common, and people treated water as their private property.

New Vásárhelyi plan development and implementation

Informal adaptation to the "rules of the game" in the communism system, in the form of the second economy was interrupted by two factors: change of the political and economic system, and change of the natural system. Concerning the latter, local community members observed a decline of shallow flooding, destroying the possibility of fishing. An important event was the water contamination in 2000. Moreover, in terms of climate change, until 1998 floods in the area were less frequent. Since then there have been many some of which severe. Moreover floods became

more unpredictable in terms of seasonality. Climate change projections suggest more erratic rainfall and temperature rise, resulting in more frequent, intense and irregular floods and droughts (Láng, 2006). The floods raised the flood protection issue but also the inefficiency of the last 150 years of management started to be discussed. As a result several initiatives and projects and also the large scale policy - New Vásárhelyi Plan (VTT) were prepared. The first version appeared in 2002. Initially, flood protection was the main context of the Plan. However, it was aimed to stimulate regional development in this remote part of the country. The main characteristic of the project that is important for adaptation, is the attempt to restore the multifunctional land use structure. Flood protection and nature conservation can benefit from the reintroduction and utilisation of natural floodplains. Floodplain restoration is also believed to contribute to sustainable economic development of the region that now experiences economic and social crisis (www.bokartisz.hu).

The plan was designed within the formal and centralised structures of water management bodies and ministries. The plan promised funding for large-scale infrastructure investments together with subsidies for land use change. The work on the plan design motivated NGOs and actors from academic institutions to participate in the development of the plan. Also local governments started to be active in the plan preparation. The national government invited other actors to participate in plan development and funded participatory planning. Although the development of the plan started within the formal state structures, non-state actors gained influence and advocated solutions, which included informal institutions, e.g. reintroducing 'fok-type' management.

Notwithstanding that the plan has several measures to empower local, informal institutions, the implementation so far has focused on large scale infrastructural investments. The support of informal institutions and regional development measures [e.g. support for land use change] are delayed. For example in the Bodroghöz area a retention area is under preparation without planning the operation of the reservoir with local authorities or the appropriate land use change. Although the implemented measures are not the cheapest, they all follow the tradition of engineering infrastructure solutions. For example, to strengthen tourism potential, the technical measure was selected to include the basis for bicycle roads in the top of dykes that were renewed (fifty km) or newly build (another fifty km). Very few non-infrastructural measures were

implemented: trainings were offered for water authority on flood prevention.

Central authorities and water boards have decisive power. NGOs' and research communities' status is not clear, and despite their efforts (lobbying, consultations, pilot projects) they are marginalized. Information dissemination on the implementation is poor. Local people (e.g. the mayors) are involved in the design of the implementation plans only when they are active and want to. There is no formal consultation process. Though generally the planners inform local communities about the project, it is unclear whether feedback gets integrated into the planning process.

Table 2: Approaches of main actors in the Tisza river towards cooperation concerning VTT.

	Initial approach	Conduct in development VTT
Local governments	Demanding help from central government	Have problems with budget. See their role as more important in lobbying for Tisza valley. See the benefits of the suggested measures (risk reduction combined with economic & social development; biomass, water issues, tourism)
Central government ministries	Difficulties in cooperation between ministries because of money distribution (separated budgets - source: government reports); necessity to establish coordination unit was recognized.	Sectoral approach because of lack of financial coordination.
Authorities (water, forest, agriculture, nature)	Worked separately, but they were forced to debate and to cooperate in order to achieve solutions.	Strengthening cooperation; reorganization last years (less staff and resources) it forces them to be partners in projects, they have to cooperate also with local governments to reach common understanding, and integrated solutions.
NGOs	Opposition to central government, trying to assess issues and solutions in complex manner (Bodrogkoz, Bokartisz). Started cooperation & demonstration projects.	Satisfaction with the fact that VTT included their ideas. Climate change is a new argument to improve implementation of VTT. Limited role in implementation of VTT.
Local communities	Hoping that government offers solutions.	Awareness of solutions worked out by themselves. Farmers are willing to reshape their land (water utilisation project); they are supportive to new ideas. Social capacity still exists (the memory of the tradition is still present, inherited from parents).

	Initial approach	Conduct in development VTT
Private sector (agribusiness)	Short term profits orientation.	Slight change: environmental sensitive category of business is prone to change (if there is a subsidy provided).
Academic institutions	Research of Tisza based on scientific interest.	After 2002: more integration (multidisciplinary approach and participation in policy discussions and development). There are attempts to establish the Tisza research group; there is the competition among the institutions however.

Challenges of the VTT implementation

Implementation of the plan is delayed due to budgetary problem of the national government and a shift of interest caused by the political swing. The VTT law and the governmental order were modified three times over the last one and a half years and a new modification is in the pipeline. Tensions among different lobbies within the administration caused deadlocks in establishing a central coordinating program office. Moreover, information about the implementation and future directions is very limited.

Difficulties with implementation of the plan come also from the unclear property rights. After nationalisation in the communist times the privatisation in the Tisza region was relatively slow, because the land in this remote part of the country was less valuable for quick privatisation. As a result of privatisation there is an extremely mosaic land ownership in the region. Property rights are often not completely clear. There are lands that are not divided joint properties. Also the canal and drainage systems were destroyed or not maintained because of changes of property rights (Láng, 2006).

Blurred property rights constitute an important factor in terms of water management, for any change agreement has to be reached by all the owners which is sometimes difficult and time consuming. Additionally, since re-privatisation tickets (a measure of re-privatisation in Hungary) could be sold, land is in many cases in the hands of people living outside the region. It also creates difficulty for policies because owners do not always have interest in any action.

Property rights issue affect adaptation. Water use is partially informally privatised, e.g. wells are used according to informal rules. Those who cannot effort buying it, take timber from the forest. Also creeks are informally treated as common land but, at the same time, by farmers as arable land. The status is unresolved: for the community it is

common, but farmers include creeks in their land as their own. These informal property right attributions pose a problem for water and land use management. Adaptation measures to climate change have to be combined with wider socio-economic development measures (as within multi functional land and water management). Separated measures dealing with flood protection (or drought) can face difficulties when meeting with informal practices. Whereas it is suggested that community management of land and water systems can integrate minorities and strengthen the integration process.

Social capital

There is little data on the type of social capital in the region (in terms of bridging- bonding types). Migration however points at bridging social capital. The region faces depopulation and aging (VÁTI, 2003). Due to economic crisis inhabitants move away, using social links to help them find a new location.

Concerning trust towards the national government and local government, a study of Albert et al. (2006) show that in terms of preparedness to floods, water authorities, water associations and local government are ranked higher than central government.

Certain lack of trust towards central government is observed in all post-communist countries, and it is a legacy of the post war era. Since the 1990s the policies for the Tisza region show sudden shifts. The impression is that each new government makes its own policies disregarding previous ones (UNDP 2004).

The awareness of the risk exists in the area, especially concerning floods. It is however locally perceived. Wider awareness of the impacts of floods, droughts (also in terms of climate change) is brought by outsiders – environmental NGOs and by scholars. Local governments could have played important role in building the social capital. As a result of rather radical decentralisation at the beginning of 1990s, they are however small and weak in terms of resources.

An ethnic factor can be of certain role in terms of social capital, since there is significant Roma minority in the area. An ethnographic study by Fel (2001) shows that Roma community was treated with a distance, although at the same time there was a tradition of collective action and help within a village community in case of necessity (like fire).

Vision of the future

Local actors (NGOs, local governments), and activists from academic institutions are concerned

about the deep social, economic crisis of the Tisza basin region. As a result a radical change of the type of development is proposed by many local actors. The fok system is an important reference point, as a local management style, which provided local sustainability, in social, economic and environmental sense. The proposed change assumes empowerment of local communities, and informal institutions. The recognition of ecosystem services – not just climate adaptation and flood risk reduction, but preserving biodiversity, landscape values – are crucial in the development of complex environmental, socio-economic institutions (e.g. water pricing, insurance schemes, agri-environmental payments). Climate change in this vision constitutes a supportive argument for the necessity to restore locally based sustainability.

DISCUSSION AND CONCLUSIONS

Within the last two hundred years water and land management in the Tisza river basin evolved from an adaptive system based on the informally driven 'fok system' towards a formal and centralised system of water and land management. The shift entailed economic and social decline in the longer run. Moreover structural flood protection measures resulted in an inflexibly system that is increasingly challenged by climate change.

Restoration of a water and land management regime based on local sustainability, and similar to the idea of 'fok', is a driving idea of the activists' movement in the Tisza region. The ideas involve building local capabilities, and in this respect it is in line with establishing community based adaptation capabilities. Also multifunctional development and land management can be a measure strengthening adaptation.

The VIT is an ambitious attempt to solve several problems of the Tisza river basin within one integral policy. Water management and flood protection concerns initiated the project primarily. However, in the last fifteen years the emphasis shifted to cover nature protection, local socio-economic development and climate change issues also.

The mobilisation of NGOs and local actors to promote locally based water and land use measures was successful during the preparation phase of VIT. Ideas about multifunctional land management were included in the body of the plan. During implementation however non-structural measures have been marginalized.

This illustrates the difficult position of the central government. Although the solutions based on

multifunctional land use and on local adaptation capabilities are recognized as desirable, they require both informal and formal institutions. The process is not a simple devolution of power but must be combined with strengthening the capabilities of local communities. The plan's "muddling through" implementation is dominated by a sectoral approach and makes the advocacies of the multifunctional solutions feel powerless. The dominant position of the central government is evident in the information supply. Very little is known about the implementation of the VTT and the future plans about it. Despite the necessity of information and education, there is very limited access to the information of the plan conduct.

It is a matter of further investigation how far local adaptive capacity can be rebuilt with or without support. It entails another question: how can external support be organized and what can be the role of state institutions and NGOs? Evidence from the Tisza region so far suggests that the role of informal institutions was marginalized in recent conduct. The local capacities were limited, and despite the declarative recognition of its importance, there was no platform to strengthen the role of local actors. This led to disappointment of local activists who counted on being involved in the process. Establishment of the Tisza alliance in June 2006 (elotisza.hu) was motivated by the dissatisfaction of the local actors and NGO regarding the implementation of the VTT.

Evidence from the Tisza region so far supports the conclusion that successful adaptation requires both informal and formal institutions. Whereas informal institutions are crucial in strengthening autonomous adaptation and adaptive capacity, formal institutions can mainstream adaptation and are required to include adaptation in longer term planning, investment and large scale infrastructure.

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LITERATURE:

Adger W.N., 2001. *Social capital and climate change*, Norwich: Tyndall Centre Working Paper No. 8
 Adger W.N., Huq S., Brown K., Conway D., Hulme M., 2003. *Adaptation to climate change in the*

developing world, *Progress in Development Studies* 3,3, pp.: 179–195
 Adger, W. N., Brown K., Tompkins E.L., 2005. The political economy of cross-scale networks in resource co-management, *Ecology & Society* 10(2): 9. www.ecologyandsociety.org/vol10/iss2/art9
 Albert F., Dávid B., Ferencz Z., Flachner Z., Tamás P., Vári A., 2006. Indicators of vulnerability to floods. Questionnaire survey in the Bodrogek Area, unpublished report.
 Allen K.M., 2006. Community-based disaster preparedness and climate adaptation: local capacity building in the Philippines, *Disasters*, 30(1): 81–101.
 Andrásfalvy B., 1975. A Duna mente népének ártéri gazdálkodása Tolna és Baranya megyében az ármentesítés befejezéséig. Szekszárd (Tolna Megyei levéltár, Tanulmányok Tolna megye történetéből, VII.) 16. o.
 Balogh P.; J. Sendzimir, A. Vári (2005) Modelling Biocomplexity in the Tisza River Basin within a Participatory Adaptive Framework, *Proceedings International Environmental Modelling and Software Society iEMSs 2004*
 Biermann F., 2007. 'Earth system governance' as a crosscutting theme of global change research. *Global Environmental Change* doi:10.1016/j.gloenvcha.2006.11.010
 Bollin Ch., 2003. Community-based disaster risk management approach. Experience gained in Central America, Eschborn: GTZ.
 Bulkeley H., 2001. Governing climate change: the politics of risk society? *Transactions - Institute of British Geographers*, n 26: 430-47.
 Collier P., 1998. **Social Capital and Poverty**, Social Capital Initiative WP No 4, The World Bank, Washington DC.
 Crabbé P. and M. Robin, 2006. Institutional adaptation of water resource infrastructures to climate change in Eastern Ontario. *Climatic Change* 78: 103–133
 Ellickson R., 1998. **On Coase and cattle**, in: M.C. Brinton and V. Nee red., *The new institutionalism in sociology*, Stanford: Stanford Univ. Press
 Fel E., 2001. Fejezetek Tiszaigazarsadalmanak megismeresehez, in: *Regi falusi tarsadalmak*, Fel E., Hofer T., Pozsony: Kalligram: pp. 199-236.
 Feldman D.L., Mann D., 1991. *Policy Analysis and the Management of Climate Change: Institutional Adaptability in the Face of Scientific Uncertainty*, *Policy Studies Journal*, Vol. 19, No. 2: 43-49.
 Flachner Zs., 2005. Mosonni judit féle könyv fejezet
 Hankiss E., 1990. **East European Alternatives**. Oxford: Clarendon Press.
 Helmer M., Hilhorst D., 2006. Natural disasters and climate change, *Disasters*, 30(1): 1–4.
 Hurrelmann A., 2005. **Agricultural land markets. Organizations, institutions costs and contracts in Poland**, Aachen: Shaker Verlag.
 IPCC, 2001. *Climate change 2001, Synthesis report*, Cambridge: Cambridge University Press.
 IPCC, 2007. **Climate Change 2007: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth**

- Assessment Report. Summary for Policymakers**, IPCC Secretariat, Geneva, CH
- Jalali R., 2002. Civil Society and the State: Turkey after the Earthquake, *Disasters* vol. 26 2: 120-139.
- Juetting J., 2003. Institutions and development: a critical review, OECD working paper no 210.
- Kunreuther H., Meyer R., Van den Bulte Ch., 2004. Risk Analysis for Extreme Events: Economic Incentives for Reducing Future Losses, Gaithersburg: National Institute of Standards and Technology.
- Lorenzoni I., Pidgeon N.F., O'Connor R.E., 2005. Dangerous Climate Change: The Role for Risk Research, *Risk Analysis*, Vol. 25, No. 6: 1387- 1398
- Majone G., 1996. *Regulating Europe*, London: Routledge.
- Majone G., 2004. Dowody, argumenty i perswazja w procesie politycznym, [Evidence, argument and persuasion in the policy process], Warszawa: Scholar
- Marsh G., 2005. The concept of 'community': inclusion and empowerment in relation to vulnerability, resilience and disaster management, 7th Conference of European Sociological Association paper, Torun 7-9 September 2005.
- Molnár G., 2002. A Tiszánál, Budakeszi, Ekvilibrium Kiadó.
- Molnár G., 2002. Merlin mester üzenete, kutatási jelentés a MAKK-nak.
- Molnár G., Flachner Zs., Kajner P. (szerk), 2004. Bodroglak esettanulmány, VTT. 1 kutatás keretében
- Nee V., Ingram P., 1998. **Embeddedness and beyond: institutions, exchange, and social structure**, in: M.C. Brinton and V. Nee red., *The new institutionalism in sociology*, Stanford: Stanford Univ. Press.
- North D.C., 1990. **Institutions, institutional change and economic performance**, Cambridge: Cambridge Univ. Press.
- O'Brien G., O'Keefe P., Rose J., Wisner B., 2006. Climate change and disaster management, *Disasters*, 30(1): 64-80.
- Olson M., 1965. **The logic of collective action**, Cambridge, Mass.: Harvard University Press.
- O'Riordan, T., Cooper, C. L., Jordan, A., Rayner, S., Richards, K. R., Runci, P and Yoffe, S. (1998) 'Institutional Framework for Political Action', in Rayner, S. and Malone, E. L. (eds), *Human Choice & Climate Change*, vol. 1, Battelle Press, Columbus (OH), pp. 345-439.
- Ostrom E., 1990. **Governing the commons**, Cambridge: Cambridge University Press.
- Ostrom E., 2005. **Understanding institutional diversity**, Princeton: Princeton University Press.
- Ostrom O., 1994. Constituting Social Capital and Collective Action, *Journal of Theoretical Politics* 6 (4)
- Platteau J.-P., 2000. **Institutions, social norms, and economic development**, Amsterdam: Harwood Academic Publishers.
- Plummer R., FitzGibbon J., 2006. People matter: The importance of social capital in the co-management of natural resources, *Natural Resources Forum* 30 pp. 51-62.
- Putnam R. Leonardi R., Nanetti R., 1993. **Making Democracy Work: Civic Traditions in Modern Italy**, Princeton University Press, Princeton, USA.
- Róna-Tas Á., 1990. The Social Origins of the End of Socialism: The Second Economy in Hungary. Kézirat.
- Root H.L., 2005. **Capital and collusion. The Politics of Risk and Uncertainty in Economic Development**, Princeton: Princeton University Press.
- Rose R., 1999. Getting Things Done in an Anti-modern Society: Social Capital Networks in Russia, in: Dasgupta and Seregeldin eds., *Social Capital: A Multifaceted Perspective*, World Bank, Washington DC, USA
- Roth R., 2004. Spatial organization of environmental knowledge: conservation conflicts in the inhabited forest of northern Thailand. **Ecology and Society** 9(3):5. www.ecologyandsociety.org/vol9/iss3/art5.
- Schipper L., Pelling M., 2006. Disaster risk, climate change and international development: scope for, and challenges to, integration, *Disasters*, 2006, 30(1): 19-38.
- KIOP, 2006. State of the art, Report.
- Láng I., 2006. The project "VAHAVA", Executive summary, Ministry for the Environment and Water Management (KvVM) and the Hungarian Academy of Sciences (MTA), Budapest, May 2006, klima.vahava@office.mta.hu
- Theesfeld I., 2003. Constraints on collective action in a transitional economy: the case of Bulgaria's irrigation sector, *World Development* 32 2.
- UNDP, 2004. Rapid environmental assessment of the Tisza river basin, Geneva: UNEP/Regional Office for Europe.
- VÁTI - VIZITERV, 2003. Megvalósítási terv a tiszai völgyi árapasztó tározó rendszer I. Ütemére valamint a kapcsolódó kistérségekben az életfeltételeket javító intézkedésekre.
- WHO, 2002. **Floods: climate change and adaptation strategies for human health**, Copenhagen.
- WHO, 2004. **Heat waves: risks and responses**, Copenhagen.
- Williamson O., 1985. **The economic institutions of capitalism. Firms, markets, relational contracting** New York: Free Press.
- World Bank, 2002. **World development report 2002: building institutions for markets**, Oxford: Oxford University Press.