

# A Model-based Stakeholder Approach for Designing Disaster Insurance

*Joanne Linnerooth-Bayer and Anna Vári*

## Introduction

The Hungarian government is greatly concerned about the fiscal implications of continuing the tradition of assuming almost total responsibility for disaster risk losses; financial authorities would welcome more private involvement. Hungary faces catastrophic flood risks over half of its territory, and floods appear to be worsening in intensity and frequency. Public authorities are thus faced with increased liability for (i) maintaining the state's vast network of structural flood-prevention measures, many of which have been criticized in terms of their cost effectiveness in a World Bank-financed study (Halcrow 1999), and (ii) offering generous compensation (approaching 100 percent of damage) to flood victims. Hungarian membership in the European Union has committed the government to a program of fiscal austerity and for this reason financial authorities are seeking ways to transfer risk to households and businesses in exposed areas. However, many Hungarians regard the transfer of liability for flood losses to citizens, especially those living in very poor areas, as unfair. One of the more controversial issues in Hungary, and throughout highly exposed countries in Europe, Asia and Latin America, is the respective roles of the government and the private market in preventing disaster losses and providing relief to flood victims.

Economists view private responsibility for disaster risks as important for providing market incentives for individual loss-prevention measures and to discourage development in high-risk regions. Attribution of responsibility invokes fundamental questions of equity and social solidarity in responding to extreme circumstances, especially in poor and vulnerable regions. How much should taxpayers in non-risk areas contribute to loss prevention and compensation of victims in vulnerable communities? To what extent should those living in high-risk areas bear the burden and should they be encouraged to relocate or take loss-reduction measures? Experts, alone, cannot decide these value-laden questions. The solution requires

consideration in a broad based democratic process that takes into account the diverse constructions of the problems.

The drawbacks of relying solely on an expert-driven process for disaster risk management have become apparent in Turkey. The implementation of a recent decree on an insurance pool is stalled and perhaps even jeopardized by the reluctance of the Turkish parliament to legislate its continuation. Turkey has experienced more than twelve major earthquakes in the last century and recent estimates suggest a yearly probability as high as 0.02 of a major earthquake in Istanbul (Erdik 2000). A pressing issue facing Turkish policy makers is how much to invest in the prevention of human and economic losses and how to pool the economic losses that inevitably remain. The recently introduced Turkish Catastrophe Insurance Pool (TCIP), an initiative of the Turkish government and the World Bank, attempts to solve the fundamental problem of the non-affordability of earthquake insurance in highly exposed developing countries and link insurance with loss reduction. To keep premiums low, the TCIP offers limited cover and transfers some of the risk out of the country with World Bank support. Earthquake insurance policies will be *obligatory* for all property owners, who pay a (partially) *risk-based* fee to a (privately administered) *public fund*. The fee is based on the seismic zone (location) of the property, the construction of the building and mitigation measures implemented. Importantly, only persons holding insurance policies will be eligible for additional government assistance after a disaster, thus moving significantly in the direction of proactive risk management.

The TCIP also takes an important step towards transferring responsibility for post-disaster relief and recovery from the government to households in risk zones, and in so doing so provides incentives for property owners to retrofit their apartments and take other risk-reduction measures. The system sets another important precedent. For the first time, a layer of insured risks will be absorbed by an international entity, in this case the World Bank, through a contingent loan facility offering favorable conditions. This groundbreaking system could be a model for proactive disaster aid from wealthy countries to poor ones. The scheme is receiving attention in the climate-change community as a possibility for industrialized countries to support adaptation measures in developing countries (Linnerooth-Bayer, et al. 2003). The fund, however, has been criticized in that it makes no allowance for financing directly loss-reduction measures (Balamir 2002). It is also unfortunate that its full implementation is stalled by the failure of the Turkish parliament to pass the requisite legislation for its continuation.

A pilot project, carried out by the International Institute for Applied Systems Analysis (IIASA) with the Hungarian Academy of Sciences and Stockholm University,<sup>1</sup> developed and tested a model-based, community participation procedure for designing a disaster reduction and insurance system for Hungary. The focus was on the very poor Upper Tisza river region in northeastern Hungary. In this paper we describe a participatory process that combines stakeholder interviews, a public questionnaire and a stakeholder workshop. A challenge for this process was to identify the contending perspectives and preferred policy directions for flood risk management, and more concretely to identify a “clumsy” policy path for a nationwide, public-private insurance/compensation system. A clumsy policy can be thought of as one that enjoys wide support among stakeholders and is based on different perceptions of the problem and competing values and worldviews (see Linnerooth-Bayer and Vári, forthcoming). A unique feature of this process was a computer simulation model of flood losses, a so-called catastrophe model that made use of Monte Carlo simulations and advanced adaptive stochastic optimization. The model illustrated the outcomes of the contending policy measures for reducing and sharing flood losses suggested by the stakeholders.

The pilot “Tisza study” was a success in the sense that the stakeholders, who held strongly competing views on the flood risk pooling issue and its resolution, reached a consensus on a way forward. This consensus has similarities, and also important differences, with the TCIP. Most significantly, the Hungarian stakeholders agreed on a radical change from current practice and, consistent with the TCIP, only households with partial insurance cover would be eligible for post-disaster government assistance. However, they were unanimously opposed to mandatory insurance policies, which they viewed as a tax, and most stakeholders opposed risk-based premiums in poor regions opting instead for social solidarity (similar to the French insurance pool). These results cannot be transplanted to Turkey, but the Hungarian consensus does raise the question of whether a stakeholder process in designing the earthquake insurance scheme might have avoided the current parliamentary stalemate.

We begin the next section by describing the background of the flood risk problem in Hungary, specifically in the Upper Tisza river basin. We turn in section 3 to illustrating the competing views of the problem and its solution based on extensive interviews with 24 active stakeholders (round 1). In action 4 we report on the results of a nationwide public survey that elicited detailed views on the flood problem, its causes and possible responses

---

<sup>1</sup> The study was funded by the Swedish FORMAS.

(round 2). Based on the results of the interviews and public survey, three plausible policy options for the design of an insurance system were identified (round 3). In section 5 we describe the catastrophe/policy model that simulated the distribution of future flood losses based on policy options identified. In other words, the model answered the question: what would be the losses to the local population, the national government and private insurance companies if one of the insurance regimes was legislated? Armed with this model, stakeholders revisited the options, which resulted in a revised set of three policy paths (round 4). Section 6 describes the last stakeholder iteration (round 5), which took the form of a deliberative stakeholder workshop where participants chose and argued for their preferred policy option. The paper concludes by presenting the consensus reached at this workshop on a policy direction for a public-private insurance system in Hungary.

## **Background**

One of the highest flood-risk areas in Hungary, and one of the poorest regions in Europe, is the Upper Tisza river basin in the northeastern part of the country. The Tisza River originates in the Carpathians in the Ukraine and flows through Romania and Slovakia to Hungary, eventually reaching the Danube in Serbia. The intensity and frequency of floods in this region and throughout Hungary appear to be increasing, but there is little consensus of the role land use practices such as deforestation and climate change are playing. Pecher et al. (1999) point out that from 1877 to 1933, the average period between high water discharges resulting in disastrous floods on the Tisza River was 18 years; from 1933 to 1964 it was only three to four years. Since 1998, river water levels have broken records annually, but the extensive network of levees surrounding the river has prevented major losses. The 2001 flood, however, burst through the protective levees causing extensive damage. Since flood waves originating upstream in Ukraine arrive in Hungary at very high speeds, there is little time for warning and preparation.

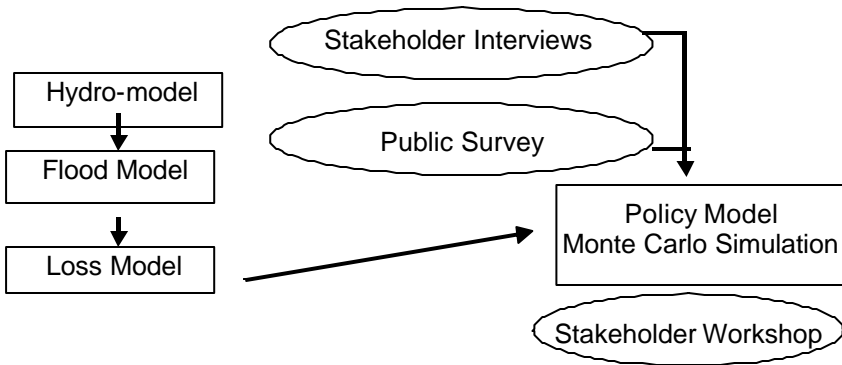
Communities in the Upper Tisza region, especially high-risk areas near the Tisza River and its tributaries, are among the poorest in Hungary. Most of the predominantly farming towns, with bad road connections, are located far from cities. Especially among the less skilled Roma population, the rate of unemployment in the region is very high and agriculture alone cannot support the local population. Riverine flooding and inland waters have aggravated this situation considerably. There are communities, for instance, where free seed is distributed, but the residents are unwilling to sow mainly due to flood risk (Horváth, et al. 2001).

More positively, the area has a large and undeveloped potential for recreation, tourism, and nature conservation. There are pristine areas surrounding the meandering Tisza River and its flood plain is sprinkled with old villages, traditional farms and historic buildings. Tourism was on the rise until 2000, when the area was stigmatized by a cyanide spill into the Szamos and Tisza rivers caused by the breakage of a tailings impoundment maintained by the AURUL Australian-Romanian joint venture mining company in northwestern Romania. Until this event, water sports had been developing in the area; however, infrastructure supporting these sports remains underdeveloped, and there is uncertainty about the future of the region with regard to tourism (Vári, et al. forthcoming).

While there is little controversy that flood risks are a problem in the Tisza region and throughout much of Hungary, there is little agreement on *why* they are a problem or *what should be done* about them. The challenge to some stakeholders is to design cost-effective flood-control interventions, and according to others, to move people out of areas where the costs are too high. Seen differently, however, overflowing rivers are a natural part of the ebb and flow of ecosystems, and the challenge is to live in harmony with the river. Likewise, there are different views with regard to who should bear the losses. Many view government as responsible for protecting the public, thus government should absorb the losses. Social solidarity with flood victims is a valued public virtue that promotes a humanitarian and equitable society. Others are concerned about disincentives created by overly generous public compensation and see individual responsibility as the cornerstone of a flood risk system.

The challenge for this pilot project was to design and test a stakeholder process that could potentially reach consensus on a flood risk management system, taking into account these contending constructs of the problem and its solution. The process described in the next sections and illustrated in figure 1 included stakeholder interviews, a public questionnaire, a flood-risk policy model and a stakeholder workshop.

**Figure 1: The Upper Tisza Study**



## Round One: Stakeholder Interviews to Identify Feasible Policy Paths

Nearly all Hungarians have a stake in the flood risk management system for the Upper Tisza region. Citizens are impacted directly through exposure to flood risks or indirectly through tax payments for flood loss mitigation and relief. Flood insurance payments subsidize those living in high-risk areas and foregone public amenities due to flood-relief expenditures. For instance, after the 1998 Tisza flood, the central government justified the suspension of building a new section of the Budapest subway in order to divert funds for flood relief. For the purpose of eliciting stakeholder views on flood risk management strategies for the Upper Tisza region, round one of the participatory process was carried out with face-to-face, open-ended interviews with those stakeholders who are actively involved in and informed of policy issues. These included twenty-four persons representing central, regional and local government agencies, farmers and entrepreneurs, NGO activists and insurance companies (Vári 2001). From these interviews, three types, but contending, flood-policy strategies emerged: state protection, individual responsibility, and ecological preservation of the region.

### State Protection

In Hungary, like all formerly socialist countries of Central and Eastern Europe, the central government has traditionally taken the primary responsibility for protecting the public from floods and their impacts. In the socialist regime prior to 1990, the powerful national water authority (Vituki) boasted a staff of 25,000 people working in Budapest and twelve regional branches. The main mission of Vituki was to protect Hungary's territory from riverine flooding and the authorities invested huge sums in a vast network of protective levees, including 3,000 kilometers of embankments along the Tisza River. From a hydrologists' view, these enormous

expenditures could be justified. Foremost, no one in Hungary should be exposed to a life-threatening flood risk. Secondly, without the levees, it was argued, huge areas of Hungary could be flooded. Government estimates show that an unprotected flood on the Tisza could inundate up to 17 percent of the territory of Hungary (Ministry of Transportation and Water Management 2001). Until recently, these investments had not been analyzed from a cost-benefit perspective.

Levees are not a once-time measure since their maintenance and improvement require continuous investment. As the Tisza experience shows, flood waves appear to be worsening in intensity, with a corresponding imperative for authorities to build the levees higher and higher. Indeed, after the once-in-a-hundred-years flood wave nearly topped the embankments in 1998, the central government accelerated its levee-construction program for the Upper Tisza and its tributaries (Horváth, et al. 2001). This once-in-a-hundred-years flood was exceeded just three years later when an 11-meter high flood wave broke through the levees causing extensive damage - and justification for the water authorities to build the levees even higher. Whereas few Hungarians oppose the protection offered by the government, the authors of a recent study funded by the World Bank question whether the costs justify the resources protected in the Tisza basin (Halcrow 1999). Since there is little economic output from subsistence farming, it may make economic sense for the people in the high-risk areas to relocate. Despite these reservations, following the 1998 Tisza flood, the government invested US\$5 million in strengthening and heightening some 10 kilometers of levees along the river. Following the levee breach of March 2001, the government recognized the insufficiency of even these heightened levees. Officials began discussing other flood-mitigation measures, including the construction of emergency reservoirs in Hungary and upstream Ukraine to increase the capacity of the main riverbed and change land use practices in the flood plains (Váradí 2001). Structural flood-protection measures are supported by nearly all stakeholders interviewed. They consider the strengthening and heightening of the existing levees as inevitable, even if only along certain sections of the river.

Along with taking full responsibility for protecting the Hungarian public from flood risk, the government is held accountable for water that comes through or over levees. There is no statutory requirement for the Hungarian government to compensate flood victims, yet the national authorities almost always assume full liability for private damage in the event of a levee breach. They also compensate victims generously for other types of flood damage such as groundwater inundation. After the Tisza floods in 2001, the government fully rebuilt nearly 1,000 houses (with raised platforms to

reduce the risk of further flood damage) that had washed away. While no blame was attributed to residents, businesses and farmers in high-risk areas, everyone agreed on the importance of zoning restrictions within the at-risk areas – another top-down flood protection measure. This taxpayer solidarity with flood victims is typical in all former socialist countries of Central Europe, and as recent floods in Germany and Austria showed, it is also typical in Central Europe more generally. It also fits the interests and worldview of hierarchical organizations; when compensation is at the discretion of authorities, they decide who deserves and how much is deserved. Hierarchical government has strong appeal to those who see assistance to disaster victims, even if it encourages risk-taking behavior, as promoting a humanitarian and stable society. Indeed, after the outpouring of assistance to flood victims in Austria, many commentators considered the costly flood events as positive in reinforcing Austrian humanitarian values and social cohesiveness.

### **Individual Responsibility**

Following the political transition in 1990, many, especially the powerful Finance Ministry, began to view significant government expenditure on protective flood levees, victim relief and reconstruction (and on the requisite bureaucratic machinery) as economically unsustainable. As a case in point, the rebuilding and repair of damaged homes and buildings from the 2001 flood was criticized as excessive by many of the stakeholder interviewees. While government officials hesitate to relinquish public authority and control in the financing of flood risk, externally imposed demand for fiscal responsibility is forcing officials to encourage more private responsibility in preventing and insuring flood losses. This move toward individual responsibility is contested by the water authorities who continue to see their role as providing uncompromised flood protection.

While fiscal necessity may force a partly reluctant government to switch towards more individual responsibility, stakeholders who would like to see less government intervention generally welcome this change. A main concern among those holding this view is that government responsibility creates disincentives for individuals to take protective actions. After the huge costs of the floods in the U.S. Midwest in 1993, the U.S. Army Corps of Engineers came under heavy attack for creating a seemingly risk-free zone that had attracted large investments in protected areas (Quijano 2001). If uninsured disaster victims are guaranteed grants and low-interest loans that enable them to continue to locate their property in hazard-prone areas, taxpayers will be subject to increasingly larger expenditures for bailing out victims of future disasters. For this reason, the authors of a book suggesting



reforms to the U.S. natural disaster program argue for making private responsibility and insurance a cornerstone of catastrophic risk management (Kunreuther and Roth 1998).

The stakeholder discourse in Hungary is notably short on attributing responsibility to individuals or communities in high-risk areas. With the exception of blaming the new landlords in the Tisza area for not maintaining the water drains and culverts, the stakeholders made little mention of individual loss-reduction measures. Nor is there a sense that individuals and communities should be fully insured. This is true throughout Central Europe. For instance, after the 1997 floods in Poland, the prime minister made a public statement that uninsured victims had only themselves to blame for their financial losses and should not expect government compensation. This remark raised such a public outcry that the prime minister was forced to apologize (Stripple 1998).

In comparison to Western European countries and the U.S., a large percentage of Hungarian households, almost 60 percent, carry flood insurance offered by one Hungarian and 16 foreign-owned insurers (Horváth, et al. 2001). The reason for this high insurance uptake is that flood policies are “bundled” with residential property insurance that is required for homeowner mortgage. In the poor Upper Tisza region, however, only about 40 percent of the households have purchased flood insurance. While insurance is not uncommon, insurers offer only extremely limited cover, mainly for levee breakage or over-topping. The premium for homeowner flood insurance is independent of the risk; in fact, insurers charge all households in Hungary an equal percentage of their property insurance premium (flat rate) to cover flooding. This has resulted in significant cross-subsidization from people living in low-risk areas. Like in the U.K., cross-subsidization makes it possible for poor people in high-risk areas to afford flood coverage, albeit limited. This sharing of risk is a cornerstone of the current insurance compensation regime.

In Hungary, the notion of incentives to promote individual loss-reduction initiatives, including risk-based insurance premiums, received mixed reviews. The incentive issue appeared somewhat irrelevant for very poor areas, as one participant at the stakeholder workshop aptly put it: “The issue is not that I want to grow wheat at the wrong place, but it's rather that I won't be able to restart my life after a flood.” However, many respondents did agree that the government might withhold compensation of flood losses from those living in or owning buildings without a permit. Opinions also varied with regard to providing financial incentives for transferring people out of inundated areas. Some stakeholders expected that many people would move

away anyway because of the region's manifold problems. Others claimed that the local people are happy where they live and would not welcome deserting their historic villages even with financial support. They pointed to the negative effects of relocation incentives, noting that more people would seek scarce jobs in urban centers. There was little concern about people moving into high-risk areas because of the region's economic disadvantages.

Another important finding, especially with regard to the TCIP, was that mandatory insurance was rejected by a majority of stakeholders. Generally, stakeholders were suspicious of private insurers and regarded mandatory policies as a tax. Even the insurance representative was in opposition, stating that the concept may be contrary to the Hungarian constitution.

### **Ecological Preservation**

While few Hungarians appear to be concerned about inefficiencies regarding the allocation of costs and benefits in the levee construction program, many voices, in particular those of environmentalists, raised objections to the levees for other reasons. Protecting the upstream areas with engineered, structural measures ultimately pushes river water downstream to riparians of the lower Tisza River and the Danube River. Levees are thus viewed as harmful and playing a role in the destruction of the river basin's ecology. What is needed is a holistic approach to the region's sustainable development, perhaps even turning the area into a national park. Rather than framing the problem as primarily a failure of individuals and communities to take protective actions, many see the failure as lying within the system, particularly the failure of the authorities to institute sustainable and holistic policies that prevent disasters and their losses.

A local environmental NGO pointed to systemic sources of flooding, such as growing urbanization, the increase in paved and impermeable surfaces, deforestation and other land-use practices, and the vulnerability of the poor. Environmentalists saw the problem as stemming from increased soil erosion due to extensive clear felling and forest cutting in Ukraine. By some estimates, the wooded area of the Ukraine's Transcarpathian region has been reduced by one-half to two-thirds of its former area (Pecher, 1999). Indeed, there was almost unanimous agreement among stakeholders on the value of reforestation in the catchments areas, especially in the Ukraine. There was a great deal of skepticism however, on how effective a role the Hungarian government could play in addressing this issue. Environmentalists, among others, point their fingers at unrestricted timber markets across the border and reject government efforts to control floods by simply building higher levees. Many stakeholders thus call for the sustainable management of the entire river basin, and environmentalists even propose removing levees in

some places to restore the river's natural flow, rehabilitate wetlands and create natural reservoirs. Interestingly, some local mayors joined the environmentalists in support of these alternative solutions.

Since flooding *as a problem*, should not exist in the first place (flooding is a natural part of ecosystems), these voices are remarkably silent on how the flood burden should be distributed or pooled. However, among most of the interviewees, there was a deep distrust of private insurance companies and a sense that increased private insurance in poor areas like the Upper Tisza is grossly unfair. Egalitarian voices called for mutual insurance arrangements with continuing cross-subsidies to those less fortunate who are unable to afford the risks with which they live. Solidarity with disaster victims is a valued social attribute, even a moral imperative, but it should not take the form of hierarchical paternalism.

### **The Contested Terrain**

The stakeholder interviews point to three distinct strategies the Hungarian community can take for reducing flood losses in the Upper Tisza region and for offering relief to flood victims. At one extreme, the government can continue to absorb a large share of the costs of mitigation and public relief by continuing to build and maintain levees, generously compensate flood victims, and control development in flood-risk areas with top-down zoning regulations. These choices will likely lead to a worsening of the central government's budget deficit and, despite regulation, encourage undesired development in flood-prone areas.

Alternatively, the government can withdraw resources from this area and rely more strongly on market forces to encourage individual responsibility for reducing losses and insuring against them. However, even proponents of this strategy rejected mandatory insurance, and with the exception of the insurance company representative, there was widespread opposition to risk-based policies. This strategy would likely lead to increased diligence on the part of farmers and landowners, but also an increased burden on vulnerable populations. It could also lead to out-migration and the abandonment of some historic villages.

A third policy strategy would be to preserve the area's ecology. Those who support these policy measures state that this could be achieved through subsidized programs to help farmers change land-use practices, the re-naturalization of the river through levee removal, and the provision of infrastructure for soft tourism. Insurance may be an option, but only by circumventing commercial insurers with non-profit, mutual arrangements. This should not preclude solidarity in providing flood relief and

compensation. Skeptics of this approach point out that these measures will not reduce the risks to already existing villages and may require relocation of villagers and farms. Also, excluding the 16 commercial insurers covering floods in Hungary will not solve the government's budgetary problems.

While these three contending policy paths – state protectionism, individual responsibility and ecological preservation – emerged from the interviews, this does not mean that the stakeholders consistently advocated any one policy direction. On the contrary, stakeholders often took a mixed view. Almost all agreed that levees in certain areas are essential and individual initiatives to reduce flood risk should be encouraged, sometimes with economic incentives. There was near unanimity that a transfer of the burden to an already vulnerable population cannot be justified by arguments of efficiency and loss reduction. Typical policy paths are intricate and overlapping in the eyes of stakeholders, yet there is little question that at the institutional and policy levels – the “meso” level – the policy terrain is contested along these lines. The challenge for the IIASA study was to identify the relative depth of support for these contending and contested policy directions (and their hybrids), and more importantly to identify an intersection of these directions, or a clumsy path, that could command a wide base of support among stakeholders. For this purpose, empirical information on stakeholder views and the possibility for compromise was elicited through a public survey.

## **Round Two: The Public Survey**

Based on stakeholder interviews, a questionnaire with face-to-face interviews was administered to 400 Hungarians. The purpose was to elicit public stakeholder views on Hungary's options for reducing flood risk and providing relief to victims. Four separate locations in Hungary were chosen in order to include stakeholders at high risk to flooding in both rural and urban areas, as well as urban and rural stakeholders who subsidize those living in high-risk areas through their tax and insurance payments. The sample size in each area was 100. Settlements in rural areas were chosen randomly, and the number of participants was determined according to population size. The sample was selected to be representative in terms of gender and age for each region (for more survey details see Vári, et al. 2003).

The public survey confirmed that when it comes to floods, the majority of Hungarians continue to view their world as it has been - with a paternalistic state assuming responsibility for their well-being. The main causes of flooding were seen as lack of levee maintenance, clearing of large forest

areas in the catchments area and insufficient height and strength of the levees. Significantly, the least important cause was attributed to local people taking insufficient preventive measures or building in flood-risk areas. At the same time, a third of the respondents blamed the authorities for having issued building permits in areas with high inundation risk. In mitigating the risks, low rankings were given to measures such as financial incentives, including risk-based insurance premiums, encouraging inhabitants to migrate out of high-risk areas, the introduction of alternative agricultural practices and re-naturalization of parts of the river. These results confirm the findings of stakeholder interviews in which it was found that a majority of Hungarians blame their government or neighboring countries for escalating flood losses. Few appear to hold those living and working in high-risk areas as responsible for contributing increased flood risk.

In line with this perspective, responses strongly indicate that responsibility should be mainly in the hands of the central government rather than in the hands of property owners living in high-risk areas. When people were asked to select those responsible for assuming flood risk (more than one answer could be given), 92 percent of respondents put the central government in first or second place, 51 percent held neighboring countries responsible, 49 percent cited municipalities, and only 10 percent held property owners responsible. Corresponding to the view that the central government is mainly responsible for flood losses, a large majority of the respondents would fully or partially support the continuation of Hungary's generous public compensation system. Importantly, an equally large majority was, at the same time, sympathetic with switching to more individual responsibility. Indeed, later questions show a great deal of support for a joint public-private insurance system in Hungary.

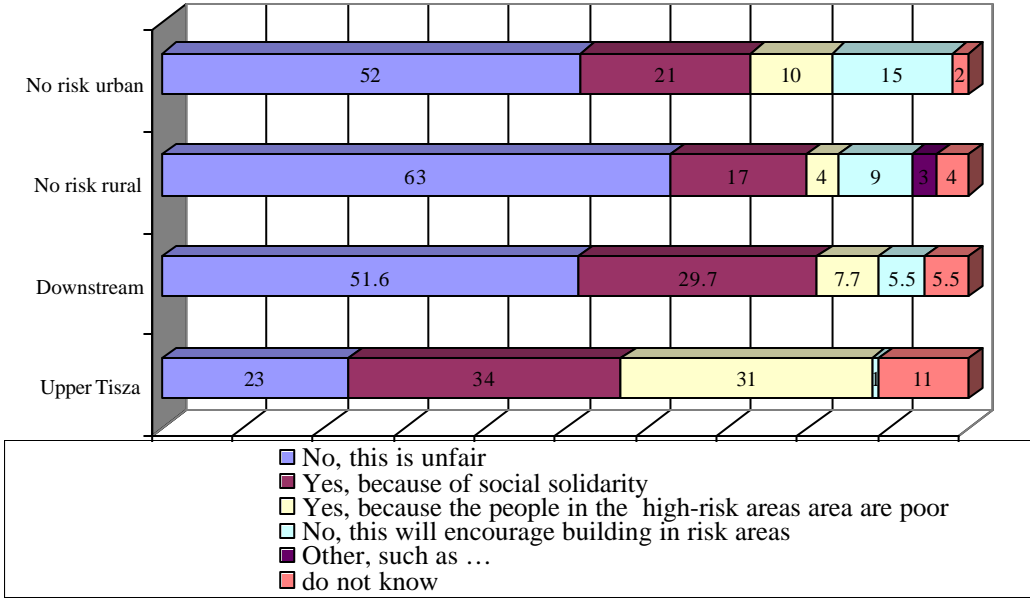
What motivates Hungarians to express such strong solidarity with flood victims? Considering Hungary's history of government protection against flooding, it is not surprising that 51 percent of respondents justify financial assistance to flood victims, claiming that flood protection is the *responsibility* of the government and thus flooding is the fault of the government. If the river overflows the levees and floods the villages, the government is to blame since it has not built the levees strong or high enough. Alternatively, 26 percent of respondents justify victim relief on the grounds that the government has always provided compensation. Nineteen percent justify financial support to victims on the solidarity principle. This strong majority does not mean that there are no contending views in Hungary. A small but important minority of respondents is *not* in favor of compensating flood victims. Among the cons, respondents thought that compensation is too costly for taxpayers and that it often goes to the

wealthy. They also felt that compensation discourages people from purchasing insurance.

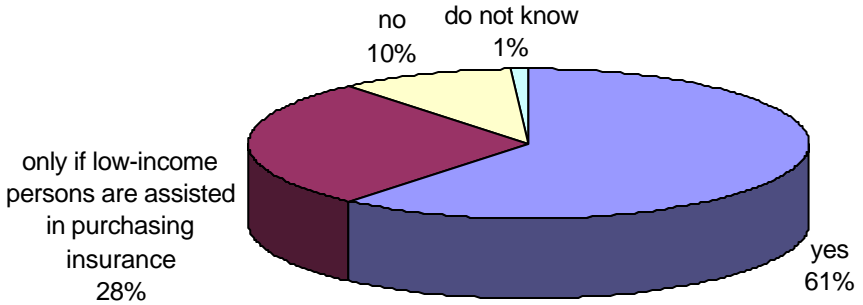
This plurality of views was evident throughout the survey results. For example, there were mixed views on whether households in low-risk areas would be willing to pay higher flood insurance premiums to subsidize the premiums of those in poor, high-risk areas. As shown in figure 2, people in low-risk areas considered cross-subsidization unfair, but a surprising number, between 20 and 30 percent, supported cross subsidies on the grounds of social solidarity, especially for poor regions. This result was consistent with responses to taxpayer support: nearly *one-third* of the respondents in the low- and no-risk areas support taxpayer solidarity with Tisza flood victims. It is remarkable that approximately *76 percent* of the respondents thought the government should compensate every victim regardless of the victim's economic circumstances or role in preventing losses.

**Figure 2: Respondents' views on risk sharing by region**

**Should insurers charge the same insurance premium for people living in low-risk areas (e.g, the hills) as for people living in high-risk areas (e.g, the Tisza area)?**



**Figure 3: Respondents' views on whether property owners should insure themselves against flood damage**



A majority of respondents fully or partially subscribe to the continuation of Hungary's generous victim compensation system, and at the same time a majority of interviewees are in favor of more individual responsibility. Exploring this duality further, as shown in figure 3, over 60 percent of people surveyed (but fewer in the Upper Tisza region) thought it would be desirable for property owners to have insurance against flood losses. Only about half as many (but higher in the Upper Tisza region) shared this opinion on the condition that low-income individuals receive public assistance in purchasing insurance. Although private insurance was viewed for the most part as desirable, *only about a third of the respondents thought it should be mandatory and another third thought it should be conditional on assistance to low-income persons*. Most importantly, half of the respondents supported a mixed public-private system of victim relief. This finding is consistent with earlier results indicating that many Hungarians regard government compensation and private insurance as complementary.

It is beyond the scope of this paper to discuss all questions and responses on the public survey. As a short summary, the questionnaire results confirmed that the Hungarian public has differing views concerning the management of flood risk in the Upper Tisza region. These views appear to depend to some extent upon economic interests – those living in high and dry areas are less disposed to generous taxpayer aid and other forms of solidarity with flood victims – and to an important extent on notions of a fair society. Almost one third of people surveyed in the high-dry areas support flood aid. The results showed little sympathy for extreme market positions or extreme ideas on a more ecological solution to the problem. Hierarchical government still commands wide support in Hungary. However, in light of recent history, the minority views in favor of increased individual responsibility and more holistic development policies are revealing and important.

### **Round Three: Designing a National Insurance Program**

It can be recalled that a challenge for this pilot study was to develop a citizen participatory process that can accommodate the different perspectives and articulate a way forward. Ideally the process would lead to a flood insurance program that is compatible with the Hungarian legal, economic and political system and is viewed as efficient and fair by the stakeholders. Following the first two information-gathering rounds (the stakeholder interviews and public questionnaire), the research team proposed three policy paths or options that appeared consistent with the majority and minority views of the stakeholders and that were compatible with the political and institutional setting. These options took account of (1) the apparent widespread stakeholder support for continuing large government involvement in a



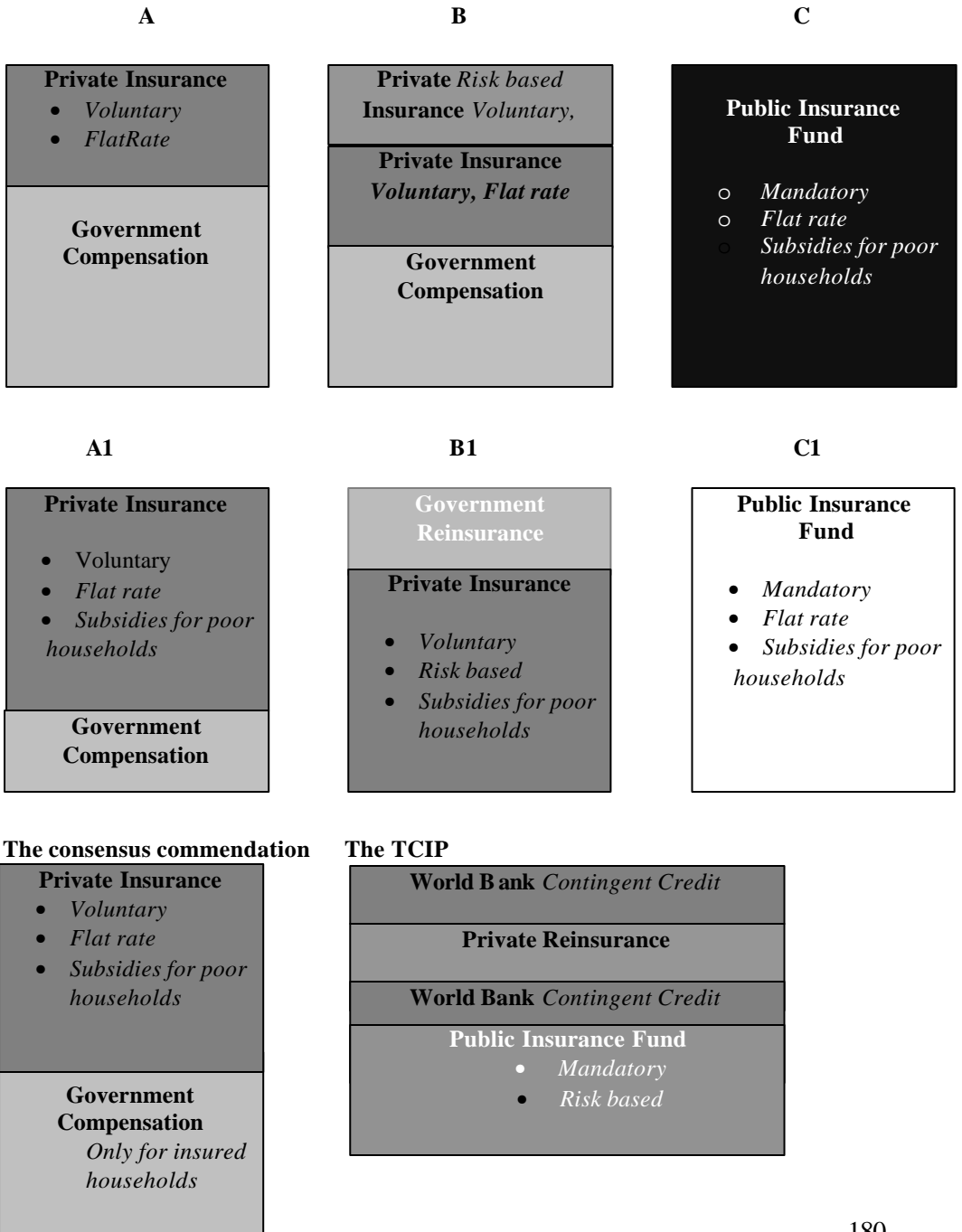
national insurance program with post-disaster relief to flood victims; and (2) the simultaneous endorsement of introducing limited individual responsibility and insurance. The three policy options for a nation-wide public/private insurance system are shown in figure 4 and described below:

*Option A* continues current practices by combining extensive government post-disaster relief with voluntary, flat-rate (cross-subsidized) insurance;

*Option B* places more responsibility on households living in high-risk areas to reduce their risks and purchase insurance. The government thus compensates victims by a lesser amount (perhaps only assuring their subsistence), and the public role is supplemented by two insurance layers: voluntary (but bundled) private insurance based on a flat-rate premium and, if a household wishes greater coverage, voluntary, risk-based insurance (this option was suggested in the World Bank report, see Halcrow 1999).

Option C is notably similar to the TCIP in a sense that it reduces the role of private insurers with the creation of a fully public, but privately administered, insurance system (government disaster fund) financed through mandatory contributions from all property owners throughout Hungary. Unlike the TCIP, however, the Hungarian system contributions would not be based on flood risk and the government would subsidize insurance premiums for low-income households.

**Figure 4: Insurance Program Options**



## **Round Four: Revising the Policy Options with Support from a Flood Risk Policy Model**

To demonstrate the financial consequences of the three pooling options (A, B and C in figure 4) a flood risk policy model was developed for a pilot area in the Upper Tisza region in collaboration with VITUKI Consult (Brouwers 2002; Ekenberg, et al. 2002; Ermolieva 2002, Galambos et al. 2001; Hansson, et al. 2001). Depending on the option chosen, the aim of the model was to simulate the incidence of future flood losses on three key stakeholder groups: flood victims in the pilot basin, insurance companies and the central government. The simulation model generated a probabilistic distribution of future flood losses in the pilot basin over ten years and illustrated the effects of this distribution given selected policy interventions. As shown in figure 1, it consisted of four modules: (1) a one-dimensional, hydrological model of the river based on probabilistic input of water levels at the source, (2) a GIS-based flood model with values for residential properties, industry and crops in the pilot area, (3) an inundation or flood-loss model with property vulnerabilities and (4) a policy module that illustrated the effects of policy changes. Modules one to three integrated the following assessments: probability of the peril (high water) in the selected geographic region, probability of levee failure or over-topping of the levee, vulnerability of the properties concerned and the potential financial loss. The policy model simulated the effects of selected insurance-pool options on the profits of insurers, on the government budget and on those living in the pilot basin.

The model was designed to be as realistic as possible given available data and knowledge, but it was not presented to the stakeholders as a full reality. Ravetz (2003) suggests that models be viewed as metaphors, as illustrations of reality without any pretence of representing the full complexity of the physical and behavioral context. Many simplifying assumptions with respect to the data, the scale of the analysis and the functioning of the physical/economic system were necessary (for a detailed description of the assumptions and parameters, see Brouwers 2002).

Armed with model simulations of options A, B and C shown in figure 4, the IIASA team returned to the key stakeholders to refine the policy options based on the interviewee's values, knowledge of the political playing field and economic constraints (see Ekenberg, et al. 2002). A slightly different picture emerged from the more detailed discussions with stakeholders informed by the model results. The revised options (A1, B1 and C1 illustrated in figure 4) differ from those described above mainly in the reduction of government compensation to victims, fully eliminating this compensation in options B and C. The full elimination of any post-disaster

government support for rebuilding the homes of flood victims (and other forms of compensation) was a radical shift from earlier stakeholder positions. It was triggered by the recognition that *solidarity need not mean extensive post-disaster compensation but could also take the form of subsidies for pre-disaster loss reduction and insurance*. Indeed, across-the-board government relief might mean that households with insurance actually receive more than 100 percent compensation for losses. This was rejected by several stakeholders who found such compensation unfair. This combination of government relief through a market mechanism, which would also appeal to social justice, was a first hint at a consensus “clumsy” policy package.

Another interesting view, which counters the economist’s emphasis on building incentive structures to dissuade people from moving to high-risk areas, is the wish to keep people in risky areas. Bearing in mind that a significant portion of Hungary is at high risk for flooding, relocation might be more expensive than other measures. “In the Upper Tisza basin, people can survive on very little money and lead reasonable lives, which would not be possible if they were relocated to cities.” (Interview with a local mayor, 2002). Correspondingly, many stakeholders expressed dissatisfaction with instituting risk-based premiums. An exception, not surprisingly, was voiced by a representative of the Association of Hungarian Insurers (MABISZ), who would like to see more risk-based insurance but with the government aiding those who cannot afford the high premiums: “The government should subsidize the poor by the difference between the risk-based and flat-rate premiums.” (Interview with a MABISZ representative, 2002). There was generally broad support for assisting low-income households in high-risk areas.

The diverse and mixed stakeholder views on the role of the government, individuals and the insurance industry in absorbing flood losses led to a revised set of options (A1, B1 and C1 shown in figure 4) for a nationwide insurance program (for details see Linnerooth-Bayer and Vári, forthcoming). In effect, stakeholders participated in revising the options from moderate support for state protectionism toward more market-oriented and egalitarian perspectives. The revisions reflected the almost unanimous view that poor households should be assisted and the polarized views on the respective roles of private, risk-based insurance and a government fund.

## **Round Five: The Stakeholder Workshop**

The stakeholder workshop was held in September 2002 in Vasarosnameny, a town in the Upper Tisza flood-risk area. Participants included representatives of the key stakeholder groups, the local mayor, a resident of

a non-risk area, the leader of a local environmental group, officials of the regional water management authority and the national authority for disaster management, and a representative of a major international brokerage firm. The representative from the Hungarian insurance industry was not able to attend.

The workshop was a forum for stakeholders to argue their policy positions and consider the arguments of other participants. The idea was to explore the ground where citizens can agree on a policy direction, but for different reasons. This may or may not exist, but deliberation and citizen participation can be effective means of formulating citizen grievances, ideas and views and feeding them into the policy process (Renn and Webler 1995).

The workshop began with a discussion of flood risk management issues in the region followed by the introduction of the three revised options shown in figure 4. The policy model showed simulation results of how these options distribute flood losses among the three stakeholder groups. Participants were asked to choose their preferred insurance policy option and were given time to change the option of their choice in any way to correspond more closely with their view of an efficient, fair and workable system. Participants were then grouped according to the option chosen and asked to negotiate a common view in their subgroup – a kind of mini-consensus within a single perspective (a similar discursive process was carried out in focus groups for pension reform, see Ney 2002).

After arguing for their policy perspectives, the workshop participants turned to a lively and heated discussion on a possible compromise. This deliberation led to the imaginative new system shown in figure 4: *Only households with private insurance would qualify for government assistance after a disaster, but the government would heavily subsidize poor households in their purchase of voluntary, private flood insurance.* It was also agreed that the government would not provide reinsurance for private insurers. This type of insurance program is similar to what is being currently discussed in Italy.

Details are shown in the box below:

|   |
|---|
| Consensus Option<br>Government compensation only to insured households<br>A private insurance system with<br>- bundled or separate policies for all types of natural disaster risks,<br>- covering approximately 50 percent of damage<br>- voluntary, flat-rate premiums<br>Government subsidies for poor households up to 100 percent of premium |
|---|

This consensus is a radical departure from current practice since the government will compensate victims *only* if they have purchased partial cover from private insurers. As shown in figure 4, this feature is identical to the TCIP. Here similarity with the TCIP ends, however, since the Hungarian stakeholders supported a voluntary, private system with substantial cross subsidies and solidarity among premium payers. This latter feature is characteristic of the French national insurance system (Linnerooth-Bayer, et al. 2001). In contrast to the French system, Hungarian taxpayers will play no role in guaranteeing the solvency of private insurers by offering public reinsurance. A public guarantee is also not necessary since the private insurers can collect premiums that allow them to purchase reinsurance in the private market.

This is not the case in Turkey and other highly exposed developing countries where a public-private system of the sort found in many developed countries (and proposed for Hungary) would not be affordable for most households. The Turkish system is the first of its kind in a developing country and it has been made possible partly by the World Bank's support in financing two separate layers of the risk. As shown in figure 4, the World Bank funds the second risk layer by agreeing to finance 100 percent of claims up to US\$82.5 million if the losses during the initial years are greater than the funds built up in the pool. A large part of the third risk layer has been ceded in the global reinsurance market, whereas the highest risk layer up to a certain limit is again financed by the World Bank. In total, the World Bank will provide up to US\$100 million in an uncommitted contingent loan facility (note that the subsidy is in terms of a loan with favorable terms). The facility is a standby (contingent) line of credit, with an option to be drawn (given to the pool) in the event of a disaster and against specific claims. The TCIP pays a standby contingent fee for this option every year in lieu of reinsurance premium. In turn, the World Bank can cover part of its risk exposure by engaging in risk transfer arrangements in the international financial markets in its own name. In this way, the Bank has substituted the unpredictable granting of post-disaster loans for a calculable annual commitment to the insurance system. The disbursement of this facility will be contingent upon progress in regulatory reform and prevention measures. A major obstacle is posed by the Turkish parliament, which at this writing had not passed the requisite legislation for continuation of this mandatory insurance pool.

The Hungarian compromise was articulated by giving a voice to all stakeholder perspectives. However, there are many caveats. The nine people at the workshop may not have adequately represented the full range of stakeholder perspectives and interests. The Hungarian insurance representative was not able to attend and a representative from the London-

based Benfield-Greig brokerage played the role of insurer. It is doubtful that Hungarian insurers would embrace the solution laid out in the compromise option, which requires them to offer expanded coverage at flat-based rates. Indeed, the main insurance company has recently withdrawn from the high-risk Tisza area since it has suffered extensive losses from the cascade of recent floods and residents cannot afford to pay the risk-based premiums. Moreover, in a follow-up interview with a high-level insurance representative, it was recently learned that the insurance industry is currently negotiating directly with government representatives in the prime minister's office. They are suggesting yet another version: the government would offer insurance at a highly subsidized rate and private insurers would withdraw entirely from high flood-risk areas. This version is a combination of options A1 and C1 and slants rewards in favor of insurers at the expense of taxpayers. A compromise solution is currently under negotiation in the Hungarian parliament, but the shape of the proposed legislation has not been finalized.

## Conclusions

For this pilot study, the insurance scheme selected is less important than the participatory, deliberative *process* that respects and builds upon conflicting stakeholder perspectives and achieves consensus on a policy path. Starting with a very broad survey of views, interests and perspectives, the range of policy options was narrowed and refined through iterative interactions with stakeholders, who were knowledgeable, influential, and representative (at the meso-level) of different worldviews and perspectives. This iterative interaction with the stakeholders profited from the flood risk policy model, which simulated the effects of selected insurance-pool options on the profits of insurers, on the government budget and on those living in the pilot basin.

The process gradually moved from contested discussions characterized by non-viable policy solutions to increasingly viable options. The discussions culminated in a stakeholder workshop with agreement on a single policy recommendation. This agreement was achieved through a process of deliberation, first in the mini-groups structured around a similar perspective and then among the different perspectives of the three groups. The arguments were based on differing ideas surrounding what constitutes a fair insurance program. Pragmatic considerations and economic interests were also taken into account. Importantly, many participants transcended their own economic interests to argue for one or another concept of a fair program.

One of the more significant findings of the public survey was that over *thirty percent* of the respondents living in high and dry areas were willing to purchase flood insurance at rates that assured subsidies to those living in risk areas. Another significant finding was the almost unanimous agreement that the government should assist poor inhabitants living in flood-risk areas. There was also recognition by key stakeholders that this assistance need not be in the form of direct compensation or rebuilt houses. Rather, it could take the form of a pre-disaster policy, namely subsidizing the insurance payments of poor households.

Stakeholder consensus on the design of a nationwide disaster insurance system in Hungary is similar to, though not exactly the same as, the agreement reached by the World Bank and Turkish policy makers on the design of the Turkish Catastrophe Insurance Pool. A main similarity is that the central governments in both countries will reduce their fiscal responsibility since they will be obligated to compensate earthquake and flood victims only with insurance. This is a major break from traditional practices in both countries, and some question its political feasibility. The important differences are twofold: first, in contrast to Turkey, disaster insurance in Hungary, as proposed by the stakeholders, would not be mandatory. In fact, all stakeholders opposed obligatory insurance, although the practice of bundling flood cover with property insurance that is mandatory for a mortgage, has already led to a very high uptake of insurance in Hungary (greater, for example, than in the U.S.). Also in contrast to Turkey, insurance payments in Hungary would not be risk based. As a demonstration of social solidarity, the government would provide subsidies to poor households to purchase private insurance.

Many Hungarians appear to value social solidarity with disaster victims more than incentive gains from risk-based premiums. This option was endorsed by the Hungarian government despite its fiscal concerns because of the longer-term perspective of building a culture of private responsibility in poor and vulnerable areas. While economists view this finding as inefficient, ultimately leading to higher economic losses, economists' concern with distorted prices and misplaced incentives may be less appropriate for developing countries. Whereas risk-based premiums are viewed as essential in wealthy countries to avoid subsidies to large-scale, high-end development in high-risk areas, the loss-reduction measures that poor farmers can take in the Tisza region are limited and may not increase substantially with the incentives imposed by risk-based insurance pricing. Moreover, the main concern is not that pricey development will move into the Tisza area, but that poor farmers will leave and seek non-existent jobs in cities. In the case of poor countries, it may be prudent to follow the UK's example and start



with subsidized insurance premiums and gradually move to risk-based policies as the region and country develops.

The Hungarian stakeholder consensus, based only on nine workshop participants, clearly cannot claim to be representative of the full range of policy options in Hungary. In fact, the insurance company voice was underrepresented at the workshop. The purpose of deliberative stakeholder processes is not to replace representative democracy, but to sensitize political representatives and policy makers to the diverse constructions of a problem and its solutions and to explore areas of agreement. The results of the Hungarian process cannot be transplanted to Turkey, but interesting questions have been raised. Has the stakeholder process in Turkey, where stakeholders are informed by a seismic catastrophe model, flagged the difficulties now apparent in the parliament when legislating the program?

In sum, the Tisza project is innovative in four ways: First, it develops an integrated risk assessment approach by combining information technology with public participation through stakeholder interviews, surveys and stakeholder workshops; second, techniques for public involvement are grounded in a recognition and respect of diverse values and views on the part of stakeholders and the need to develop democratic governing institutions; third, it is based on (and extends) the methodology of catastrophe modeling by combining Monte Carlo simulations to generate probability loss distribution; and fourth, it has reached a “pilot” consensus on an innovative disaster insurance scheme for Hungary that has good prospects for receiving wide-scale credibility, legitimacy and support.

## References

- Balamir, M. (2002). The Obligatory Earthquake Insurance (Decree 587; 27.12.1999), Draft paper, Middle East Technical University, Ankara.
- Brouwers, L. (2002). Spatial and Temporal Modelling of Flood Management Policies in the Upper Tisza Basin, Draft Paper, International Institute of Applied Systems Analysis, Laxenburg, Austria.
- Dryzek, J. (2000), “Introduction: the Deliberative Turn in Democracy Theory” in John Dryzek (2000), *Deliberative Democracy and Beyond*, Oxford, Oxford University Press.
- Ekenberg, L., Brouwers, L., Danielson, M., Hansson, K., Johansson, J., Riabacke, A., Vári, A. (2002). Flood Risk Management Policy in the Upper Tisza Basin: A System Analytical Approach. Simulation and Analysis of Three Flood Management Strategies. Interim Report, International Institute for Applied Systems Analysis, Laxenburg, Austria
- Elster, J. (1998), “Introduction” in Jon Elster (ed.) (1998), *Deliberative Democracy*, Cambridge University Press, New York, Cambridge University Press.

- Erdik, M. (2000). Report on 1999 Kocaeli and Duzce (Turkey) Earthquakes, Proceedings of the Second EuroConference on Global Change and Catastrophe Risk Management: Earthquake Risks in Europe, July, 6-9, 2000, IIASA, Laxenburg, Austria. <http://www.iiasa.ac.at/Research/RMS/july2000/>
- Ermolieva, T. (2002). Alternative Flood-loss Sharing Programs in the Upper Tisza Region, Hungary: A Dynamic Multi-Agent Stochastic Optimization Framework, Draft Paper, International Institute of Applied Systems Analysis, Laxenburg, Austria.
- Fearon, J. D. (1998), "Deliberation as Discussion" in Jon Elster (ed.) (1998), *Deliberative Democracy*, Cambridge University Press, New York, Cambridge University Press.
- Ferencz, Z. (2001). Floods on the Tisza River – Policy Decisions Based on Public Views. Draft Paper, International Institute of Applied Systems Analysis, Laxenburg, Austria.
- Habermas, J. (1984), *The Theory of Communicative Action I: Reason and the Rationalisation of Society*, Boston, Beacon Press.
- Galambos, I., Yuri, E. and Ermolieva, T. (2001). *Flood Risk Management Policy in the Upper Tisza Basin: Mathematical and Numeric Modelling*, Draft IIASA Report.
- Halcrow, W. (1999). Flood Control Development in Hungary: Feasibility Study. Final Report. Halcrow Group Ltd.
- Hansson, K. and Ekenberg, L. (2001). *Modelling Policy Options for Flood Management*, Stockholm University/KTH, Sweden. Submitted to the *Natural Hazards Review*.
- Horváth, G., Kisgyörgy, S., Sendzimir, J. and Vári, A. (2001). The 1998 Upper Tisza Flood, Hungary: Case Study Report, Draft Paper, International Institute of Applied Systems Analysis, Austria.
- Kunreuther, H. and Roth, R.Sr. (1998). *Paying the Price: The Status and Role of Insurance Against Natural Disasters in the United States*, Washington, D.C., Joseph Henry Press.
- Linnerooth-Bayer, J., Quijano, S., Löfstedt, R. and Elahi, S. (2001). The Uninsured Elements of Natural Catastrophic Losses: Seven Case Studies of Earthquake and Flood Disasters, Paper prepared for the TSUNAMI project on "The Uninsured Elements of Natural Catastrophic Losses", International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.
- Linnerooth-Bayer, J. and A. Vári (forthcoming). Clumsy paper
- Linnerooth-Bayer, J., Mace, M.J. and Verheyren, R. (2003)
- Ministry of Transportation and Water Management (KVM) (2001). The Development of the New Vásárhelyi Plan. Background material for the press. (<http://www.vizugy.hu/vasarhelyi/sajtokozepekkozep.htm>) (In Hungarian)
- Ney, S. (2002). Focus Groups, Citizen Participation and Governance in Europe, Synthesis Report for EU Project on Pension Reform and Citizen Participation. <ftp://ftp.iccr.co.at/penref/d4-synthesisreport.pdf>
- Pecher, I., Stoiko, S. and Kichura, U. (1999). Conception for the Regeneration of the Upper Forest Boundary and for the Optimization of Hydrological Regime in the Ukrainian Carpathians, 1997, In J. Hamar and A. Sárkány-Kiss (eds), *The Upper*

- Tisa Valley: Preparatory Proposal for Ramsar Site Designation and an Ecological Background.* Szeged: Tisza Klub, pp. 207-213.
- Quijano, S. (2000). The 1993 Midwest Floods, USA, Paper prepared as part of the TSUNAMI Project on “The Uninsured Elements of Natural Catastrophic Losses,” International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.
- Ravetz, J.R. (2003). Models as Metaphors.
- Renn, O. and Webler, T. (1995), “A Brief Primer on Participation. Philosophy and Practice” in Ortwin Renn, Thomas Webler, and Peter Wiedemann (1995), *Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse*, Dordrecht, Kluwer.
- Ortwin, R., Webler, T. and Wiedemann, P. (1995), “A Need for Discourse on Citizen Participation: Objectives and Structure of the Book”, in Ortwin Renn, Thomas Webler, and Peter Wiedemann (1995), *Fairness and Competence in Citizen Participation: Evaluating Models for Environmental Discourse*, Dordrecht, Kluwer.
- Stripple, J. (1998). Securitizing the Risks of Climate Change: Institutional Innovations in the Insurance of Catastrophic Risk, IIASA Interim Report IR-98-098, International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Thompson, M., Ellis, R. and Wildavsky, A. (1990), *Cultural Theory*, Boulder, Co., Westview Press.
- Váradi, J. (2001). *How to Proceed After Floods and Before New Floods? Development of the Vásárhelyi Plan.* Budapest: Ministry of Transportation and Water Management. (In Hungarian)
- Vári, A., Linnerooth-Bayer, J. and Ferencz, Z. (2003). Stakeholder Views on Flood Risk Management in Hungary’s Upper Tisza Basin, In Linnerooth-Bayer J. and A. Amendola, Special Edition on Flood Risks in Europe, *Risk Analysis*, 23:537-627.
- Vári, A. (2001). Flood Risk Management in the Upper Tisza Region: Results of Stakeholder Interviews, Draft Report, IIASA.