

Preface

For arguably the first time in its history, the Republic of Turkey was compelled to take concrete steps to institutionalize disaster mitigation policies when two major earthquakes occurred in the Sea of Marmara region in the northwest part of the country, centering near İzmit and Düzce, respectively. Nearly a year has elapsed since the first structural change was enacted. This paper is written both to describe what these steps are, and to examine the Turkish Compulsory Insurance Pool (TCIP) that has been devised mainly as a funding mechanism for the existing building stock if major disasters should reoccur. Many of the opinions expressed in the text have found echo in reports to the “Improvement of Natural Hazard Insurance and Disaster Funding Strategy” project which is part of the TEFER (Turkey Emergency Flood and Earthquake Recovery) program undertaken by the Government of Turkey with World Bank funding.¹

Improvement in Disaster Mitigation and Enforcement

The enormity of the losses from the August 17, 1999 earthquake that centered near İzmit forced the Government of Turkey to send immediately to the Grand National Assembly a bill that enabled it to pass whatever legal instrument as was judged necessary through an instrument known as the “Governmental Decree with the Force of Law.” This bill was passed into law No. 4452 on August 27, 1999. It enables the Government to issue decrees quickly, with the understanding that within six months proper parliamentary procedures will be followed to make their text into law. The duration of this extraordinary privilege enjoyed by the executive branch has been extended through Law No. 4484. Given the strongly centralized character of the civil administration in Turkey, the Ministry of Public Works and Settlement has been accorded prime responsibility for implementation of these measures.

The recent parliamentary action described in this paper towards disaster mitigation has been in the form mostly of decrees. I will describe them below in their essence, but no complete translations will be provided. Later in the text, these steps will be placed in their context with reference to earlier events and observations and recommendations they generated.

1. Compulsory Earthquake Insurance (Decree No. 587, December 27, 1999)

All existing and future privately owned property is required to contribute to the Turkish Compulsory Insurance Pool (TCIP). Non-engineered rural housing is excluded.² Management of the pool is entrusted to a new entity called the “Natural Disasters Insurance Council” (DASK in the Turkish abbreviation). The model of the pool management is patterned after New Zealand’s Earthquake Council (EQC), or California Earthquake Authority (CEA) in California. The intent in this decree is to create a fund by homeowners’ annual payments for use in disasters so that no one will

¹ Consultancy services for this component of TEFER are provided by Willis Reinsurance and Cordis Consulting Limited.

² It is estimated that of the 14 million households in the country 10 million will be under TCIP coverage. Rural houses continue to be covered by the Disasters Law, and will receive government subsidized housing if their homes should be demolished by natural disasters.

be left homeless, with a nominal sum, currently capped at US\$26,000, being disbursed immediately to homeowners who are left homeless. Management of the fund and its risk will be the major challenges facing DASK. Currently TCIP has virtually zero market penetration because it became operational only on November 27, 2000. TCIP is not yet a household name in Turkey. Government deeds offices do require submission of proof of TCIP coverage during property sales transactions, but this affects a small part of all property. Much public information and education is required.

An important feature of this decree is its denial of assistance in accordance with the Disasters Law No. 7269 when homeowners have not participated in the Pool.

2. *Building Construction Supervision (Decree No. 595, April 10, 2000)*

The intent of this decree is to ensure that nominal quality standards are henceforth abided with in the building construction continuum in Turkey. Institutional buildings are excluded because presumably both design and construction oversight for these is exercised by engineers in governmental cadres. Actors who are responsible for a given building are the design engineer, contractor, site engineer and building supervision firm. Design engineers are required to have the title of “expert engineer”, similar to a professional engineer. The way in which the system functions has been described in the preceding section. In essence, the building supervision firm exercises the duties of the municipal or governorate offices in ensuring both the correctness of the designs, and conformance of the actual construction to the design. In each provincial capital and town with more than 50,000 population, a building supervision oversight commission is established under the general coordination of the field office of the Ministry of Public Works and Settlement. This hierarchical structure is managed by a “Building Supervision Supreme Council” in Ankara that is embedded in the same ministry.

Fees for design and construction supervision are stated as ranging from 4 to 8 percent of the estimated cost of the building, and disbursed by the owner through the municipality. Unless there exists a confirmation that the building has been completed in conformance with the actual design, municipalities are not able to grant occupation permits for people to move into the premises. The building construction supervision firm is the prime responsible side for offsetting any losses of the owner that may arise during the first ten years after occupation permit, including those caused by natural disasters. For ensuring this compensatory liability, firms must purchase insurance for each job they supervise. All firms engaged in this type of activity have that coverage.

The enforcement of this decree was initiated in 27 pilot provinces, including all that were impacted by the 1999 earthquakes. All construction permit grants were suspended for 3 months until July 10, 2000, which only served to cause a louder uproar from the impacted professional groups. An estimated annual market of US\$1 billion is created for the engineering services industry in Turkey, and I expect that objections will abate as its benefits are better appreciated. It is true that the decree has aspects requiring corrective action, but it is equally incontestable that it represents a significant threshold in Turkey. An omission in the text of the decree is the detailed construction inspection procedures that are required for effective quality assurance. Architects feel that they have been left out of the inspection procedures, with the civil

engineering profession having received prime responsibility there. A number of regulations have also been issued to facilitate the implementation of the decree.

3 *Regulation for Implementation of Construction Supervision (May 26, 2000)*

Construction supervision firms are classified into three groups in order of reduced responsibility and manpower requirements. These firms must be owned by a majority of engineers or architects. Their chief mission is to ensure that the designs conform to the appropriate building code as well as the seismic code. Local site evaluations are specifically mentioned because of the bitter experience in Adapazarı through liquefaction and loss of strength. This regulation also contains clarifications on the way different-level supervision councils are to function, and how their records are to be kept.

4 *Revision of the Law on Engineering and Architecture No. 3458 and Law on the Union of Chambers of Turkish Engineers and Architects No. 6235 (Decree No. 601, June 28, 2000)*

The practice of engineering and architecture, and the empowerment of these groups to organize themselves into chambers, and a union comprising the different chambers are regulated by these two laws. With the introduction of “expert” engineers or architects in the process of construction supervision, corresponding amendments were required in the parent laws. This decree achieves that objective.

The chambers are enabled to set the guidelines for conferral of the expert title, but generous transition (grandfather) clauses have also been admitted.

5 *General Conditions for Mandatory Financial Liability Insurance for Construction Supervision Firms (July 10, 2000)*

This directive issued by the Undersecretariat of the Treasury sets the rules and procedures for the purchase of the mandatory financial liability insurance all supervision firms must have for each construction they undertake to oversee. Coverage articles refer to “unreasonable” damages caused by the disaster as being excluded from the intent of the underwriting, but no specific guidelines are mentioned. Optimistically, one may hope that firm precedents could be established to minimize legal complications, but in an area that will clearly have to depend on expert witnesses this may well be impossible to achieve. In successive articles the obligations of the insurer and the insured are spelled out when events leading to physical damages have occurred because causes of damage are often not easily ascribed to only one party in the building delivery process. While rules for arbitration have been described, I remain skeptical as to whether implementation of these will be feasible. The insurance premium is 1.3 percent of the insured value.

6. *Regulation Concerning Amendments in the Standardized Development Regulation for Municipalities Not Subject to Law No. 3030 (July 13, 2000)*

Law No. 3030 refers to the metropolitan municipal agglomerations of which there currently exist 15 in Turkey. Municipalities that are not part of a metropolitan scheme must abide with the standard set of requirements set out in the regulation in question. With more than 3,000 municipal governments to contend with, this was perceived as being essential for ensuring the achievable degree of rational land use in the country. The regulation amending some of the provision now makes explicit reference to the seismic design code as well as the building insulation code as constituting standard documents. Additional articles related to fire protection. Much improved clarity is now provided for the process leading to the issue of construction permit for a given building. In particular extensive geotechnical investigations are prescribed as a measure of avoiding undue building losses.

7. *Testing Laboratory Requirements for Decree No. 595 (July 30, 2000)*

Independent testing laboratories must certify that minimum requirements are met for building materials used in construction. This directive and a companion set out the requirements for these laboratories.

8. *General Conditions for Compulsory Earthquake Insurance (September 8, 2000)*

Issued by the Undersecretariat of the Treasury, this directive regulates the way in which insured parties shall make claims for losses against DASK. The amount payable by DASK covers essentially the minimum amount required for modest new accommodation in Turkish conditions. Homeowners can of course purchase additional insurance if their property is worth more. However, for additional coverage to be purchased, the compulsory insurance policy must be presented to the insurer.

9. *Tariff and Instructions for Compulsory Earthquake Insurance (September 8, 2000)*

While for 2000, the limiting compensation equals 20 billion TL (approximately US\$26,000), premiums are differentiated on the basis of location with respect to the earthquake zones map and type of construction. The premiums for the highest risk buildings, such as unreinforced masonry, are rated at 0.5 percent of the assessed value, which cannot exceed 20 billion TL. For a reinforced concrete building, the premiums are set at 0.2 percent. On this basis, the premium for a regular reinforced concrete building in the highest hazard zones in Figure 1 will be about US\$50 per year. While this sum is not unaffordable, annual property tax for many homes is less than this. This is because no property value assessment is made, but homeowners declare what they believe is the taxable value of their property. While sale prices for homes exceed substantially their declared value for taxation purposes this discrepancy goes unnoted.³ DASK will utilize the existing sales network of the

³ Property taxes are remitted to local governments that are poorly equipped to keep track of tax records. Deeds records are kept in offices that belong to the Ministry of Finance.

insurance companies doing business in Turkey. The commission to be paid to these agents is 12.5 percent of the premiums. Even so many insurance agencies are reluctant to collect premiums for DASK because it is incumbent upon them to notify homeowners when renewal is due. They claim that the expenses for notification that must be forwarded through a public notary are exorbitant.

Why These Draconian Measures?

In five urban earthquakes of the last decade (Erzincan, 1992, Dinar 1995, Adana/Ceyhan 1998, Kocaeli 1999, Düzce, 1999) some 20,000 people have been killed, the vast majority of them through the collapse of residential buildings. Altogether in these earthquakes 70,000 buildings have been damaged, and some 20,000 buildings destroyed. (Table 1). These radical changes have been enacted to stop the vicious circle of rushing to international lenders in the wake of disasters, but doing virtually nothing to prevent their recurrence.

Table 1: Recent earthquake losses in Turkey

| Event | Number of Casualties | Number of damaged buildings | Number of heavily damaged or collapsed buildings | Displaced households | Economic Loss/ US\$bn |
|--------------------|-----------------------------|------------------------------------|---|-----------------------------|------------------------------|
| Erzincan, 1992 | 645 | 8000 | 1450 | 8000 | 0.75 |
| Dinar, 1995 | 100 | 6543 | 2043 | 24000 | 0.25 |
| Adana/Ceyhan, 1998 | 150 | 21057 | 2000 | | 0.5 |
| Kocaeli, 1999 | >17000 | 24000 | 6000 | 600,000 | 18 |
| Düzce, 1999 | 759 | 10121 | 800 | | 1 |

The costs of the damage from these events in the destroyed buildings alone have been estimated at US\$20bn. The consequential losses to business activity, of temporary accommodation and in relief and rescue costs are probably as much again.

Reduction in the degree of damage to buildings is therefore of crucial importance in planning for mitigation of the effects of future earthquakes, and in particular, to limit future losses to the Turkish Catastrophe Insurance Pool (TCIP). There are two separate problems: improving the resistance of new buildings, those constructed today and in the future, and improving the resistance of the existing buildings. Other barriers exist that exacerbate the situation in achieving a robust building stock in the country.

1 Mitigation options for new buildings

For the new buildings, the current Turkish earthquake code, if applied, would limit future earthquake losses to acceptable levels. Further, the knowledge of the earthquake hazard and local ground conditions in many cities now enables areas of particularly high earthquake risk to be identified and avoided in future development. The problem is to ensure enforcement and compliance with the code on the part of

designers and builders of these new buildings, and to enforce any desirable urban hazard zoning on the part of owners and developers. In essence, this is what Decree No. 595 intends to accomplish.

2. *Mitigation options for existing buildings*

For the existing buildings, the options are to demolish and replace them, to leave them as they are, or to strengthen them. Given the huge numbers of buildings involved, demolition and replacement, as well as being very costly, would result in a vast long term housing deficit. On the other hand to take no action would be to condemn a very large population of people living in high-risk buildings in the earthquake zones to a potentially high risk of death or injury in future events. The third option, retrofitting, is also costly and disruptive, although with proper planning it can be substantially less so than demolition and replacement, while offering a very substantial improvement in seismic protection. In practice, all three options for addressing seismic risk in the existing housing stock (i.e., demolition and replacement, no action and retrofit) are likely to feature in an optimum strategy, but retrofit is likely to be the usual preferred option for high risk buildings.

3. *High-risk buildings*

The vast majority of Turkey's urban population today lives in multi-story apartment blocks constructed of reinforced concrete. Statistics on urban housing indicate that in the three largest cities (İstanbul, İzmir, Ankara) over 50 percent of the buildings in existence today are of reinforced concrete frame construction, and over 75 percent of these are of more than three stories. Some 80 percent of urban households therefore live in these mid-rise apartments blocks. Table 2 shows recent estimates of distribution of building types by household for the three main cities in the year 2000. The annual increment over recent years is even more heavily dominated by mid-rise RC frame construction - perhaps over 90 percent of new housing.

Table 2: Percentage of building types from DIE (1997)

| PROVINCE | RC 1-3 stories | RC 4-7 stories | Timber Frame | Brick/Block unreinforced | | Rubble Masonry | Squared Masonry | Adobe | Other |
|----------------|----------------|----------------|--------------|--------------------------|-------|----------------|-----------------|-------|-------|
| | | | | Block | Brick | | | | |
| ADANA | 7.6 | 29.1 | 1.5 | 36.9 | 17.1 | 2.1 | 2.1 | 2.3 | 1.2 |
| ANKARA | 7.0 | 26.6 | 1.7 | 30.8 | 22.2 | 1.4 | 1.4 | 8.5 | 0.4 |
| İSTANBUL | 13.5 | 52.9 | 1.8 | 15.8 | 15.0 | 0.3 | 0.3 | 0.1 | 0.2 |
| İZMİR | 11.5 | 44.8 | 0.2 | 5.7 | 27.0 | 3.3 | 3.3 | 3.9 | 0.4 |
| Average | 9.9 | 38.4 | 1.3 | 22.3 | 20.3 | 1.8 | 1.8 | 3.7 | 0.5 |

DIE: State Institute of Statistics

Recent earthquakes have once again demonstrated that this type of construction is much more vulnerable to damage or collapse in an earthquake than the low-rise construction in which most other people live. Table 3 shows the comparative performance of mid-rise and low-rise buildings in damage surveys carried out after the August 1999 Kocaeli earthquake by the Architectural Institute of Japan, indicating that buildings of 4 stories and above were much more prone to serious damage and collapse than low-rise buildings.

Table 3. Damage Survey Results in Gölcük

| Building Type | Number surveyed | No damage | Light | Heavy Damage/ Collapse |
|---------------|-----------------|-----------|-------|---------------------------|
| Masonry | 680 | 0 | 100% | 8% |
| RC | 1953 | 0 | 100% | 26% |
| 1-3 storeys | 619 | 0 | 100% | 6% |
| 4+storeys | 1299 | 0 | 100% | 34% |

In the light of these brief observations, a number of recommendations for retrofitting existing buildings can be crafted. I believe that TCIP will have to become the centerpiece mechanism for disaster mitigation in Turkey. Therefore, this nexus position is emphasized.

Recommendation 1

The Executive Council of the TCIP should take measures to reduce the vulnerability of apartment blocks by supporting efforts to encourage building owners to carry out strengthening programs (retrofitting), thus limiting future anticipated large losses to the existing building stock. Apartment blocks of 4 to 10 stories constructed with infilled reinforced concrete frames should be the prime target for such strengthening, particularly those built without adequate building controls, as experience has shown this is the most vulnerable building type. This calls for extensive studies for prioritizing the typology of the most vulnerable types, ages and configurations of buildings. Given estimates of occurrence of damaging earthquakes in various cities, an ordered list of target cities might be prepared.

Recommendation 2

It is recommended that the normal mode of strengthening of mid-rise concrete frame buildings in Turkey should be to introduce a system of concrete shear walls to increase lateral resistance, stiffness and ductility. Individual schemes could use concentric walls within existing frames or external 'buttressing' or wing walls, but it can be expected that in the majority of cases walls would be of the concentric type, for which ample experience has already been gained in Turkey.

Recommendation 3

The TCIP should support a program of work to draw up a set of Retrofitting Guidelines, to assist designers and contractors in developing viable schemes which are appropriate to the mid-rise building stock of Turkey, and to the most common type of retrofitting expected to be used. These should be along the lines below:

- Rapid assessment of vulnerable buildings
- Decision-making on the appropriate type of retrofitting scheme to adopt
- Evaluating the existing condition of the structure and materials
- Connecting new elements to existing structure
- Determining the required strength and stiffness of the new elements
- Ensuring the adequacy of the foundations

The Guidelines should also present a set of representative designs for RC frame buildings of up to 5 stories that would satisfy the proposed retrofit guidelines, and be suitable for implementation by non-specialist contractors or owner/occupiers. We must examine the costs and benefits carefully before embarking upon a broad retrofitting scheme.

Costs and Benefits of Strengthening

Comparison of repair and building costs between countries is probably of little value, because of widely differing labor and materials costs. The cost of retrofitting as a ratio of complete construction costs may be comparable. It is important that cost should distinguish between the structural costs of the retrofit project, and the overall cost including reinstatement of finishes. Often the opportunity is taken during structural upgrading to improve the building in other ways, which again can make cost ratios misleading. A further issue is that if the building is in use, the cost to its tenants in relocation while it is under strengthening will add to the overall cost of the project. Where the building is already empty because of earthquake damage these costs do not arise – or will be lower. Recent Turkish experience with shear wall schemes seems to suggest that the structural work and reinstatement of finishes costs about 40 percent of complete reconstruction, though with a major refurbishment of services and non-structural elements this can rise to 60 percent. The structural work alone may account for about 25 percent of rebuilding costs. These costs do not include any costs of re-housing the inhabitants for 6-9 months while the work is carried out. Undertaking a cost-benefit analysis of a retrofit option involves estimating what is likely to be the cost of repair over a given future time period with and without the retrofit intervention and assuming uniform seismicity over time, and comparing the saved repair cost, plus any increases in revenues (or reductions in taxes or insurance premiums) for the safer building with the cost of the intervention. The outcome will depend heavily on the assumed discount rate for future benefits, and the assumed level of seismicity. Only in the areas of highest seismicity, and for the weakest buildings is the intervention likely to prove economically viable (ie giving a positive rate of return). The rate of return can be expected to be highest for the least costly strengthening project.

Gülkan estimated the costs and benefits associated with a program of retrofit in Dinar carried out under the direction of METU. Thirty five RC buildings with a combined floor area of 24,200 m² were strengthened by adding shear walls, with an average cost of US\$45/m². This suggests that if a general program of structural rehabilitation been carried out before the earthquake, covering both RC and masonry buildings, it would have cost US\$8 m; nearly all the 92 deaths would have been saved, at a cost of US\$90,000 per life saved. If the building had been to a higher standard in the first place – strict quality assurance is assumed to have cost an additional 10 percent on initial construction costs – then US\$4.9 million would have been needed to save 92 lives, at a cost of US\$53,000 per saved life. These calculations do not of course include any estimate of the probability of a damaging earthquake striking Dinar. This study has shown that the estimated total cost of the Dinar earthquake was US\$250 million, more than 30 times the structural damage costs, and strengthening would also have saved many lives. If these benefits are added, the intervention is likely to be more easily justified. This study did not consider the prior

probability of an earthquake striking the city, and assumed a perfectly effective retrofit would have been placed.

These considerations show one reason why building owners in Turkey are reluctant to opt for retrofitting strategies. If life loss and the other social costs associated with an earthquake are taken out of account building owners are likely to consider the expected future losses small by comparison with the hefty immediate costs of retrofit schemes. Likewise, if the risk is shifted to insurance, there is no conceivable reduction in insurance premium that would be sufficient to pay, on its own, for the costs of retrofitting. However, the benefits from such a retrofit program would extend beyond the benefits to the owners, reducing many sources of loss which would otherwise be borne by society at large. Another relevant factor to consider in people's reluctance to upgrade the structural quality of their homes is the extremely short existence periods of most housing in Turkey. Because of wildly spiraling costs of land in urban centers, building regulations are under constant pressure from property owners for increased heights. Local governments have proven to offer little resistance to these pressures that have continued to increase population densities, congested streets, and inadequate urban services. So, in effect, one generation of poor quality houses follows another at as short intervals as 30-40 years.

Thus a more comprehensive scheme of incentives would be needed, requiring other sources of external funding support; and the use of public sources of funding for this could be justified. This is discussed in the next section in the form of rhetorical questions, leading to further recommendations.

Obstacles and Incentives to Retrofitting

From the cost-benefit calculations presented in the previous section, it is clear that financial benefit to the building owner (or the TCIP) on its own is an insufficient incentive to undertake retrofitting. If a major program or campaign of retrofitting is to be brought about additional incentives will be needed, which relate to the additional benefits which earthquake loss reduction will bring. In this section we consider who pays for such retrofitting work as is carried out today, whether there is a shortage of skills – either in design or construction – which would inhibit a larger campaign of retrofitting, and what the perceived obstacles to retrofitting on the part of the building owners who would need to take action. International and Turkish experience are compared on each topic, leading to recommendations.

Who pays for retrofitting?

In Turkey, where most retrofitting takes place in the context of repair of post-earthquake damage, the way this scheme is now structured, the government pays, and the owners sign an agreement of their debt, then pay back over time. The interest is very low, much less than the inflation rate, so the payback is very little after a few years. But even this debt is sufficient to deter some owners from undertaking necessary repairs, preferring to live in weakened buildings. It is not clear whether the buildings are in fact insured during the pay-back period.

Is there a shortage of design or construction skills for retrofitting?

In Turkey, at the present level of retrofit, there is (not surprisingly) no skills shortage. Retrofit experience has been gained by designers and to a certain extent by contractors. Short training courses and seminars on retrofit design issues have been organized by engineering associations and universities. But the skills needed to make a correct structural assessment for a building, and then to suggest ways of addressing any deficiencies are not widely available.

What are the perceived obstacles to retrofitting?

A combination of costs and lack of appreciation that their property is at risk are the two principal reasons why most people do not undertake retrofitting. Lack of simple technical guidance may be an additional reason.

How could more retrofitting work be stimulated?

On the basis of the above evidence it would seem that the obstacles are of three types; lack of awareness, lack of financial incentive (perhaps the largest), and lack of adequate technical guidance.

Since the 1999 Kocaeli and Düzce earthquakes, and subsequent press coverage of academic studies indicating heightened risk in the İstanbul region, public awareness of the risk is at an all-time high. Most people owning and living in mid-rise and high-rise apartment blocks are also be aware of the poor performance of such buildings in the 1999 earthquakes. But awareness of the opportunities for making these buildings safer through retrofitting, and what this might involve is not widely understood.

The cost-benefit calculations in the previous section indicate clearly that reduced risk of future damage to their property is not, on its own, sufficient to create an economic argument for owners to retrofit. But the benefits of a retrofitting program would extend far beyond the owners, to their occupants, to the insurance pool, to the public health services and to society at large. It could save many lives. There are thus very strong arguments for support from public funds for owners who wish to strengthen their buildings. From the experience of other countries they could be offered a range of incentives which might include:

- Reduced insurance premiums
- Soft loans from government as now used for post-earthquake repair
- Direct assistance from TCIP funds
- Tax advantages
- Easing of planning restrictions

A further possible incentive might be to declare a class of buildings as “hazardous buildings,” and require by legally enforced decree that strengthening take place within a prescribed maximum period of time. Owners are then free to decide whether to strengthen or demolish their buildings, and there is likely to be some

further incentive to retrofitting from the increased rents which can be charged for strengthened buildings.

Details of how such laws or incentives would be made available would need to be worked out by the Treasury and other affected Ministries on the basis of detailed economic studies, which would properly take account of all the benefits to society of a major retrofit program.

The present insufficiency of technical guidance on retrofitting could be addressed through the preparation and publication of a seismic retrofitting code to fit standard cases, with an associated handbook. The retrofitting code should allow for a range of different standards that would allow the possibility that the standard represented by the current Turkish code was not always appropriate. There is a lot of good practical material published in the US which could form one source for the retrofitting code and handbook. The Turkish retrofitting code should not aim to be comprehensive, but rather give clear and concise rules for the most common buildings at risk.

There would need to be an associated training program designed to inform all the separate parties interested (building owners, designers, local authority inspectors, and builders) of the techniques, issues and practicalities involved.

These observations lead to further recommendations:

Recommendation 4

The Executive Council of TCIP should initiate a series of economic studies to identify and quantify in detail the economic benefits and reduction of life loss and injury which would result from a large-scale program of retrofitting high-risk buildings. Arising from these studies should be a set of recommendations for financial incentives to encourage retrofitting, which might include:

- Reduced insurance premiums
- Soft loans from government
- Direct assistance from TCIP funds
- Tax advantages
- Easing of planning restrictions

Demonstration projects need to be carried out in selected cities to serve as examples.

Recommendation 5

The Executive Council of the TCIP should consult with the key departments of the Turkish Government and the City or Municipal Authorities for the highest risk cities about the desirability or feasibility of "Hazardous Building Ordinances." Such ordinances would require evaluation and where necessary strengthening of a certain defined classes of highly vulnerable buildings within particular high-risk zones over a defined timescale.

Recommendation 6

The Executive Council of the TCIP should provide support and encouragement for a program of training and public awareness at all levels to support the introduction of retrofit programs. In particular training programs should support the needs of builders, engineers and architects and local authority officials, and awareness programs should be directed towards house-owners and their tenants.

Recommendation 7

The Council of the TCIP should cooperate with the State Planning Organization and the Ministry of Public Works and Settlement in prescribing disaster-resistant housing policies, and encourage expansion of the Construction Supervision Law.

Conclusions

Will these measures turn the tide in Turkey? For many years the official policy in Turkey has been one of paying losses of the impacted populations through the public funds. With no effective mitigation measures or even disincentives against owners of non-regulation and un-permitted houses in place, this has been gradually turned into a boon for the survivors. (Paradoxically, citizens in a province bordering Erzincan stated in 1992 that they too needed an earthquake to transform their city in the same way as Erzincan was transformed. A city of only 100,000, the total investments and assistance given there totaled nearly US\$0.5 billion.) The Government of Turkey now appears to be determined to relinquish its role of the benevolent natural disasters insurer for zero premiums. Ultimately, everyone pays for this generosity, but it does not create social justice but its opposite. Violators are awarded, no incentives are created toward practice of good engineering and quality construction practices. Local governments hide behind an illusion of assuring quality, fully aware that such is hardly the case.

A glaring omission in the newly crafted system is of course the fact that no rewards have been worked out for mitigation measures. I have addressed this by importing recommendations into the text that may be taken up by DASK. If homeowners decide to upgrade their buildings, this is currently not recognized in reduced premiums, or increased benefits. Too much emphasis has been placed on the purely technical measures of earthquake protection, but this has occurred at the expense of improved settlement and spatial planning policies. A complete revision of Law No. 3194 and its attendant legislation is essential, but no steps have been taken in that direction. The building construction supervision scheme is directed mostly to checking designs when in fact violations occur at the construction site.

When compulsory earthquake insurance became effective on September 27, 2000 transactions at the property deeds offices ground to a halt because proof of insurance coverage was required. When consumers discovered that insurance companies had not yet begun to sell this coverage, their outcry was echoed by the media, and the implementation was immediately postponed for two months, until November 27. I believe that this was a grave error, for it falsely conveyed the message to everyone that the government was not serious about exercising its own

policy. The Chamber of Commerce in Ankara put out full-page ads in the national papers, claiming that DASK would become yet another layer of superfluous bureaucracy that would not be able to fulfill its objectives. Difficult though the initial steps may be, I see no alternative for the country at large but to press forward. Another natural disaster of the dimensions of 1999 is not supportable.

The most challenging issue standing before DASK is the question of transferring its risk to the international capital markets and re-insurers. This will require considerable skill, and become possible only if mitigation becomes a way of life in Turkey.