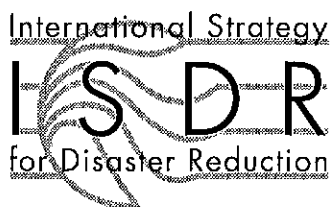


# THE SOCIO-ECONOMIC CONSEQUENCES OF THE EARTHQUAKE AT IZMIT, TURKEY

*(17 August 1999)*

United Nations Secretariat for the International  
Strategy for Disaster Reduction  
(ISDR)





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**UNITED NATIONS  
New York and Geneva, 2001**



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## Acronyms

ECLAC	Economic Commission for Latin America and the Caribbean
EERL	Emergency Earthquake Recovery Loan
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GHI	Geohazards International
IDNDR	International Decade for Natural Disaster Reduction
IMF	International Monetary Fund
ISDR	International Strategy for Disaster Reduction
MEER	Marmara Earthquake Emergency Reconstruction Project
Munich Re	Munich Reinsurance
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
RADIUS	Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters
SEE's	State Economic Enterprises
SME	Small and Medium Enterprise
SPO	State Planning Organization
UNCTAD	United Nations Conference on Trade and Development
UNDAC	United Nations Disaster Assessment Coordination
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WTO	World Trade Organization

## **INTRODUCTION**

Turkey is a country with an area of 780,000 km<sup>2</sup> and a population of more than 63,450,000 people. Part lies in an area where earthquakes are frequent.<sup>1</sup> Turkey has suffered several natural disasters of this kind, for it is at the junction of a number of tectonic plates: the Eurasian plate to the north, the African-Arabian plate to the south and the plate from Iran to the east. There have been 122 recorded earthquakes during the present century and they have caused enormous damage. The worst occurred in eastern Turkey on 27 December 1939 and cost 45,000 lives. There have been nine earthquakes of an average magnitude of 6.8 on the Richter scale in Turkey in the past three decades; the most destructive was the one which hit the north-west of the country, near the Sea of Marmara, on 17 August 1999.<sup>2</sup> The epicentre of this magnitude 7.4 earthquake was 2.8 km from the town of Golcuk in Izmit province. Horizontal ground movement measured 2 m, and vertical displacement was as much as 20 cm in some parts of the stricken region. The earthquake occurred at the western edge of the northern Anatolian plate, a point from which the plate, which is caught between the African and Arabian plates, begins to split, with several fractures extending westwards under the Sea of Marmara and all along the coast.<sup>3</sup> Geophysicists consider it to have been one of the strongest this century, close to the 7.9 earthquake that destroyed San Francisco in 1906.<sup>4</sup>

The 17 August 1999 earthquake, now known as the Izmit earthquake, affected an area of 31,250 km<sup>2</sup> and a third of Turkey's total population.<sup>5</sup> It caused substantial human and material losses. Scores of thousands of people were injured or killed and hundreds of thousands were left

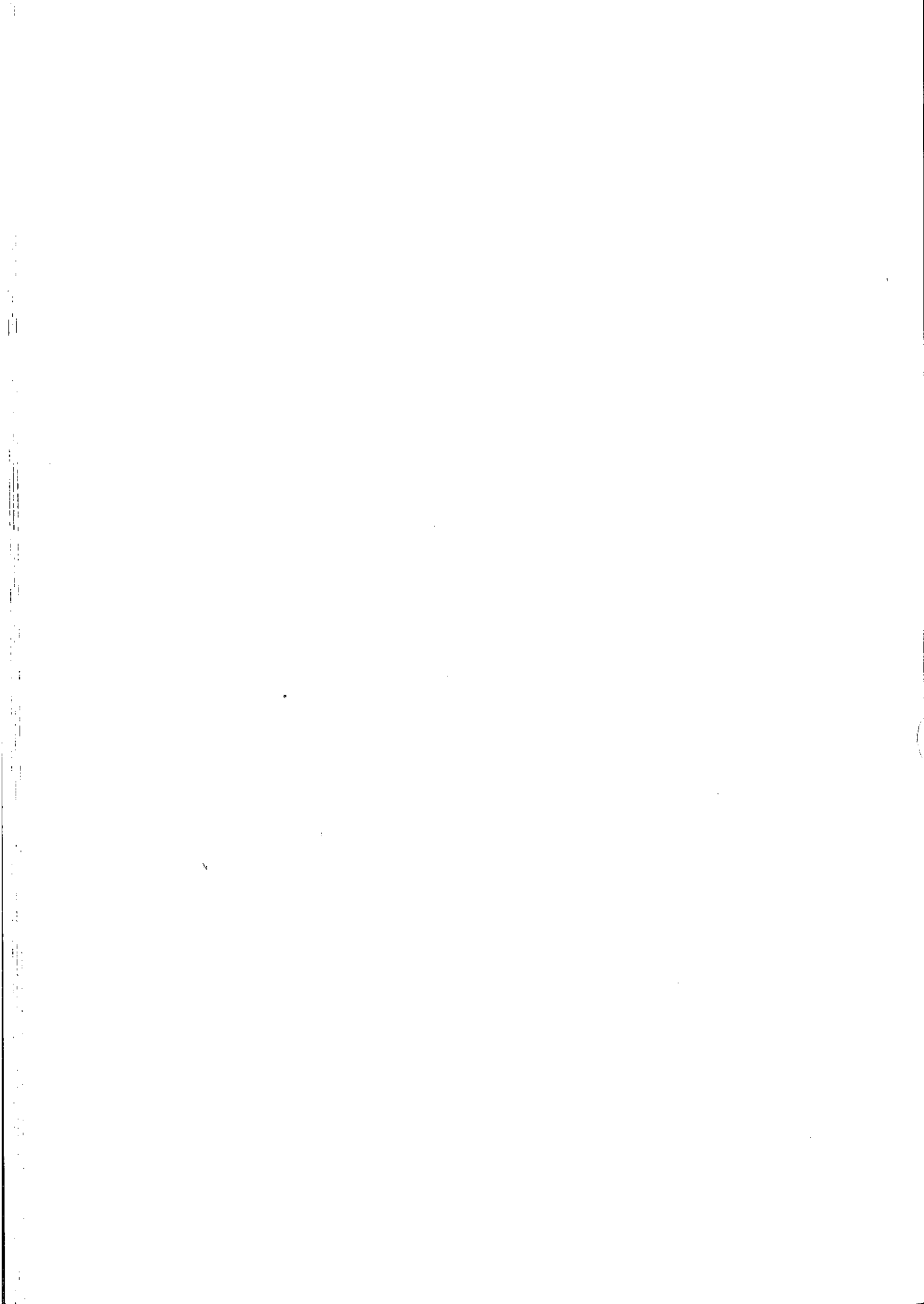
homeless.<sup>6</sup> Thousands of settlements were totally or partly destroyed.

Furthermore, the earthquake seriously affected the region containing the country's greatest industrial potential: Izmit is the centre for major industries, including refining and petrochemicals. Altogether, nine provinces containing 45 per cent of Turkey's industry and accounting for one third of its gross domestic product (GDP) were affected to some degree: Kocaeli (Izmit), Sakarya (Adapazari), Yalova, Bolu, Bursa, Istanbul, Eskisehir, Tekirda and Zonguldak.<sup>7</sup>

The disaster occurred at a time when the Turkish economy was suffering from huge capital outflows and a recession as a result of the collapse of the Russian market, a major export destination, and increased competition on the home market following devaluations in the emerging market economies.<sup>8</sup>

It is from this viewpoint that the present study will seek to examine the economic and social consequences of the disaster for the country.

The first chapter will, therefore, look at the economic environment in Turkey before the Izmit earthquake and the place which the stricken region held in the national economy. That seems a logical first step in order to be able to compare the situation with the economic trends after the disaster. Chapter II will give an overall assessment of the impact of the earthquake: the direct and indirect losses and the macroeconomic secondary effects. Chapter III will contain recommendations for a policy for sustainable management of earthquakes in Turkey.



## Chapter One

# THE ECONOMIC SITUATION IN TURKEY BEFORE THE IZMIT EARTHQUAKE

### A. Review of recent macroeconomic developments

Over the past decade, the Turkish economy has been prevented by substantial swings from realizing its potential for steady long-term growth.

In 1992 and 1993, for example, growth measured 6.4 per cent and 8.1 per cent respectively and was due to a rise in private-sector consumption (thanks to real growth in wages and a real fall in consumer prices) and to private investment under the influence of improvement in the industrial capacity utilization rate.<sup>9</sup> In 1994, however, Turkey experienced a severe economic recession. A large budget deficit and real currency appreciation engendered a financial and exchange-rate crisis and, in turn, a 6 per cent drop in real GDP for the year.<sup>10</sup>

Between 1995 and 1998, the Turkish economy grew. GDP averaged 7.5 per cent in 1997 and peaked at 8.7 per cent in the first quarter of 1998. Consumer prices, which had been steady at around 75 per cent in 1987, moved above 100 per cent in early 1998.<sup>11</sup>

While it withstood the Asian crisis, the Turkish economy was hit particularly hard by the collapse of the Russian financial market in August 1998, massive capital flight (amounting to US\$ 7 billion, virtually cancelling out the capital inflow of 1997), and the slowdown in activity caused by devaluations in emerging market economies viewed as potential importers.<sup>12</sup>

It goes without saying that, in 1997, Eastern Europe and the former Soviet Union were the destinations for about 16 per cent of Turkey's total exports. The consequence of this crisis was a sharp drop of approximately US\$ 2-3 billion in exchange reserves. Other factors also contributed to the crisis, particularly an increase in agricultural support funds, which led to higher cash demands

from State banks and the introduction of withholding charges on inter-bank transactions.<sup>13</sup>

The budget deficit and the high inflation—110 per cent in 1994 and 80 per cent in 1998—were principally caused by social security spending and the payment of very high interest rates.<sup>14</sup>

Regarding public finance, Turkey has had to deal with a balance-of-payments deficit, as well as with a trade deficit that reached US\$ 14 billion in 1993. The current-account deficit, which reached US\$ 5 billion, or 2.9 per cent of GDP, in 1996 was a further difficulty.<sup>15</sup>

Regarding expenditure, interest payments on the foreign debt continue to weigh heavily on the Turkish economy. The amount paid to creditors in 1997 was US\$ 4.6 billion, or practically as much as Turkey earned from tourism.<sup>16</sup>

The Turkish Government reacted effectively to the crisis, announcing as early as 1994 an emergency stabilization programme providing for increases in prices charged by State-owned enterprises, a levy on business capital and structural reforms, including a further privatization programme.

Thanks to this programme, the economy grew at between 7 per cent and 6 per cent in 1995-1996, and particularly strongly in 1997, when international reserves rose to 19 billion dollars, or the equivalent of five years' merchandise imports. The stock exchange index also rose, reaching 86 per cent in 1997.<sup>17</sup>

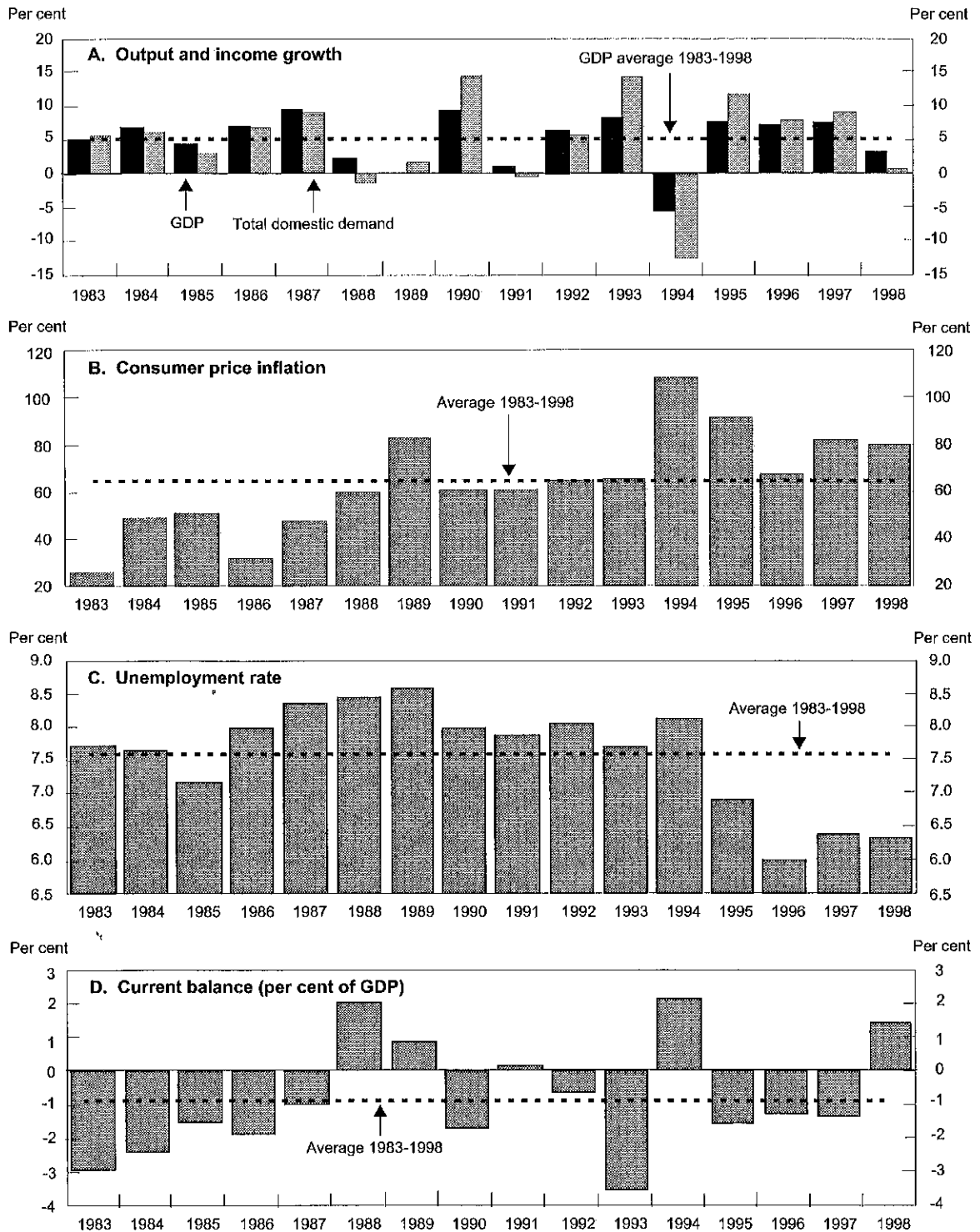
A further three-year stabilization programme supported by the International Monetary Fund (IMF) through quarterly surveys began in January 1998. It provides for a package of measures to combat inflation and improve coordination of macroeconomic policy and structural reform. One of its main objectives is to cut inflation to 56 per cent in 1999 and to less than 10 per cent in 2000.<sup>18</sup>



The tables below show Turkey's macroeconomic performance prior to 1999.

FIGURE 1

## Macroeconomic performance



Source: State Planning Organization.

## B. Trade patterns

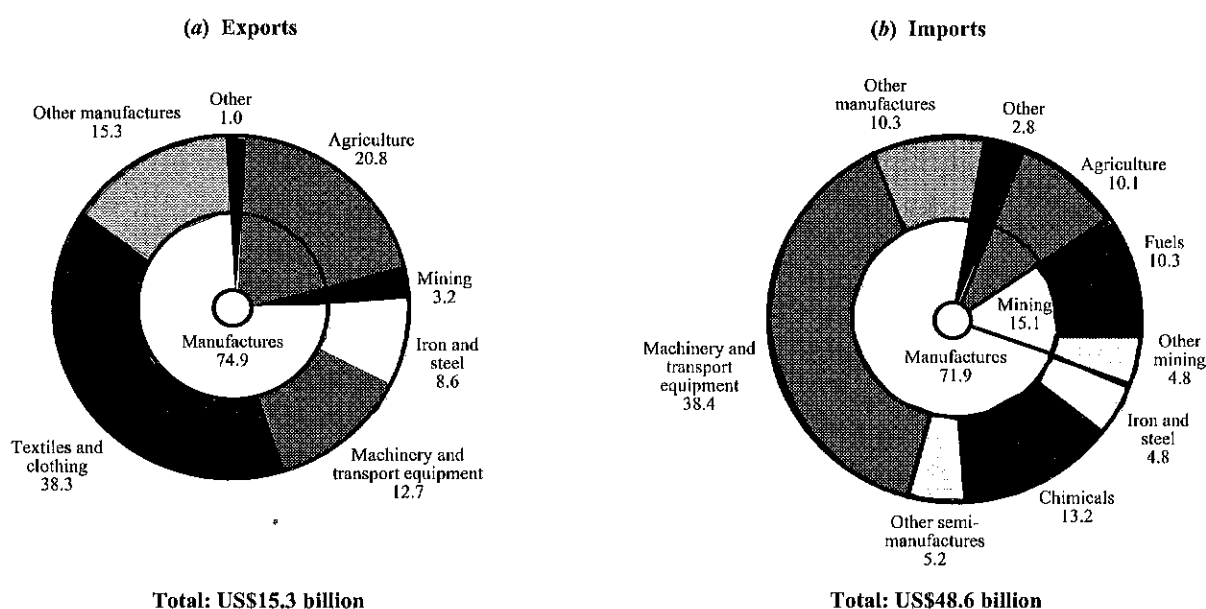
Since 1993, the essentially agricultural economy of Turkey has been marked by the predominance of industrial and service sectors. That is particularly attributable to the steady rise in activity in the trade sector, and in transport and communications.

### (a) Trade in goods

Between 1994 and 1997, the contribution of agriculture to GDP declined by 2 per cent, to 14 per cent, while that of industry rose to 37 per cent. In 1998, industrial exports grew by 2.8 per cent and accounted for 87.6 per

cent of total exports. The manufacturing sector currently provides some 40 per cent of all jobs while agriculture, despite its modest contribution to GDP, accounts for some 45 per cent.<sup>19</sup>

In imports, the dominant sector is manufacturing, which had a 72 per cent share in 1997. The major imports are machinery and transport equipment, which rose from US\$ 7,663 billion in 1994 to 18,220 billion in 1998, and chemicals and related products, which rose from US\$ 3,216 billion in 1994 to US\$ 6,576 billion in 1998. The proportions of imported agricultural products (speciality foodstuffs and tropical crops) are low: 10.5 per cent in 1993 and 10.1 per cent in 1997.<sup>20</sup> The table below shows the structure of trade in goods by product group in 1997:<sup>21</sup>



Source: UNSD, Comtrade databe (SITC Rev.1).

### (b) Trade in services

The services sector accounts for a very significant proportion of Turkey's trade. Income from services in 1996 was of the order of US\$ 13 billion, or 7 per cent of GDP. In 1998, the services sector, with the exception of construction, grew by 3.3 per cent, down from the 6.9 per cent of 1997.

Developments in the most important services subsectors in 1998 were as follows:

- Tourism accounted for 43 per cent of total earnings in 1996. In 1998, income from tourism amounted to 10,352,369 billion Turkish liras;
- Financial institutions grew by 6.3 per cent, compared with 4.1 per cent in 1997;
- Transport and communications grew by 5.9 per cent, compared with 3.2 per cent in 1997;
- Trade grew by only 2 per cent, compared with 12.3 per cent in 1997.<sup>22</sup>

## C. Investment

Investment, concerning mostly manufacturing and services, was among the sectors to show a decline. The fall was particularly marked between 1994 and 1997. For example, direct foreign investment, which was US\$ 2,125 million in 1993, amounted only to 1,678 million in 1997. Similarly, portfolio investment fell from US\$ 3,917 million in 1993 to US\$ 1,634 million in 1997.<sup>23</sup>

Among the factors contributing to the sharp change in the attitude of foreign investors attitude were rapid inflation and the crisis in Russia. In the second half of 1998, there was a heavy outflow of capital: the amount (US\$ 7 billion) corresponded to capital inflow since the beginning of 1999.

There was also a further outflow of some US\$ 4 billion, attributable, according to OECD, to unrecorded capital flight to offshore financial centres and to under-reporting of export earnings for fear of further foreign-exchange losses.<sup>24</sup>

However, the situation improved in 1998, with public-sector and private investment growing by 88.2 per cent and 75 per cent respectively by comparison with 1997.<sup>25</sup>

Investor confidence, too, seemed to be growing in the first half of 1999, thanks to the formation of the new Government and the general stabilization of emerging markets. Unfortunately, the earthquake that struck the Izmit industrial region on 17 August 1999—the extent of the damage of which has yet to be fully determined—has now cast doubt on Turkey's economic future for the next few years.

#### D. Brief review of the economic importance of the stricken region (Izmit)

The earthquake of 17 August 1999 struck the Izmit industrial region 90 km from Istanbul. This region contains 23 per cent of Turkey's population and 45 per cent of its industrial capacity. It accounts for a third of GDP, half of income tax receipts and 18 per cent of other receipts.<sup>26</sup> The disaster affected several provinces, especially those of Kocaeli, Sakarya and Yalova, which account for 6.2 per cent of GDP and 13.1 per cent of industrial value added. The Izmit region is also known for its tourist attractions, particularly in Kocaeli province. The area's principal manufacturing industries are cement, petrochemicals, pharmaceuticals, motor vehicles and tyres.

Turkey's principal oil refinery, at Tüpras, suffered enormous damage in the fire that followed the disaster. The 2.5 billion dollar refinery had an annual oil output of 27.6 million tons, or one third of the national total. It was the keystone of the privatization programme that was scheduled to begin early in the year 2000. No refinery anywhere else in the world had been so heavily damaged

since the 1964 earthquake in Japan. Some observers feel that the fire will have ecological consequences for the stricken region, to add to the pollution caused by oil spills, especially in the Gulf of Izmit between Yalova, Izmit and Golcuk.<sup>27</sup>

In addition, the extensive damage at Izmit port will, according to experts, result in a 500 million dollar fall in exports in the second half of 1999 and a 250 million dollar fall in 2000.

There follows a description by the State Planning Organization of the main indicators of the local economy in seven provinces affected by the earthquake (Kocaeli, Sakarya, Yalova, Bolu, Bursa, Eskisehir and Istanbul):\*

Population	GNP (Percentage)	Industrial value added (Percentage)	Total bank (Percentage)	Total bank credits (Percentage)
14 444 298	34.7	46.7	49.6	46.3

#### *The share on total of taxpayers*

Income:	30.8%
Corporate:	44.9%
Value added:	33.5%

#### *The share on insured person*

The social security institution:	39.7%
The social security organization and craftsmen and tradesmen and other self-employed people:	20.3%

\* Source: State Planning Organization.

## Chapter Two

# OVERALL ASSESSMENT OF THE IMPACT OF THE IZMIT EARTHQUAKE

An overall evaluation of the damage caused by the earthquake in the Izmit industrial region is not easy to make and cannot be exhaustive three months after the disaster. A reliable assessment will be possible only when all the relief operations have been completed and all relevant information on the disaster has been gathered. Nevertheless, even as things now stand, a preliminary evaluation based on the data supplied by international agencies involved in these relief operations will give us a better grasp of the real situation with regard to the losses that the disaster has caused in social and economic terms in Turkey. It therefore seems appropriate, first of all, to provide a recapitulation of the damage sustained by the population and by the various economic sectors before looking at its impact on the principal macroeconomic aggregates.

The effects of the earthquake may be broadly classified in three categories: direct, indirect and secondary effects.<sup>28</sup>

### A. Recapitulation of direct losses

Direct damage includes all human losses and total or partial destruction of infrastructure, as well as the estimated cost of the demolition and clean-up operations required in the stricken region.<sup>29</sup>

#### (a) Human losses

The disaster region accounts for 23 per cent of Turkey's population, 6 per cent of which has sustained considerable losses. According to the latest estimates provided by the Crisis Management Centre attached to the Office of the Turkish Prime Minister, dated 10 September 1999, the human losses totalled 15,466 dead, 23,954 injured and more than 600,000 homeless.<sup>30</sup>

The table below shows the number of losses by region:

<i>Province</i>	<i>Dead</i>	<i>Injured</i>
Bolu	264	1 163
Bursa	263	333
Eskisehir	86	83
Istanbul	978	3 547
Kocaeli	4 088	4 147
Golcuk	4 556	5 064
Sakarya	2 627	5 084
Tekirda	..	35
Yalova	2 501	4 472
Zonguldak	3	26
<b>Total</b>	<b>15 466</b>	<b>23 954</b>

#### (b) Material losses, by sector

##### (i) Housing

The cost of earthquake damage in the housing sector ranges from US\$ 1.1 to 1.6 billion.<sup>31</sup> The greatest amount of destruction was recorded in the Istanbul region (Kocaeli and Sakarya), where a total of more than 53,000 dwellings were completely destroyed.

In this regard, the Munich Reinsurance report prepared after the Izmit disaster suggests that those losses may have been understated. While it is true that older buildings are not in conformity with the recent applicable building codes, all buildings erected within the past decade have had to comply with the new code drawn up in 1998 to deal with the risks. Nevertheless, the newer buildings have performed far less well than expected, on account of not having been built to the required standards and of having been erected in the area already identified as a risk zone.

The summary table below shows the results of an assessment of damage in the built-up areas concerned:

Province	Completely destroyed	Partly destroyed	Slightly damaged
Bolu	3 226	4 782	3 233
Bursa	32	109	431
Eskisehir	70	32	204
Istanbul	3 614	12 370	10 630
Kocaeli	23 254	21 316	21 481
Sakarya	20 104	11 381	17 953
Yalova	10 134	8 870	14 459
<b>Total</b>	<b>60 434</b>	<b>58 860</b>	<b>68 391</b>

### (ii) Social sector

This sector includes water and sanitation, education, health and nutrition.

**a. Water and sanitation:** The supply of drinking water and restoration of the sewerage system are among the major concerns of the Turkish Government. According to UNICEF estimates covering the first six months after the disaster, the rehabilitation of this sector will require US\$ 6,043,590. By 10 September 1999, contributions received from donors amounted to no more than US\$ 2,108,408.

**b. Education and social psychology:** The total budget necessary for the recovery of this sector is in the order of US\$ 100 million. In all, 424 schools were heavily or slightly damaged. Estimates for the rebuilding of schools and other teaching institutions amount to US\$ 28 million, and those for the renovation of other institutions to US\$ 11.4 million, making a total of US\$ 39.4 million.

In addition, 547,000 pupils/students and 21,000 teachers have been affected. Rebuilding the schools that were totally destroyed will take a year. That time-frame poses a problem in regard to the education of 37,000 pupils/students and the reassignment of 1,040 teachers.

**c. Health and nutrition:** The losses in these two sectors are relatively small compared with those in other sectors. Of 47 public and private hospitals in the disaster region, 12 were affected to varying degrees, 5 of them being seriously damaged; 28 health centres were completely destroyed and 20 others were partly affected.

In this field, UNICEF has launched a programme to raise immunity levels (EPI reactivation). This programme also aims to establish a system of health monitoring. Its cost has been estimated at US\$ 2,058,000, of which a contribution of only US\$ 752,948 has been made by donors.<sup>32</sup> In all, the Turkish Government evaluates the funding requirements to pay for the services provided to disaster victims and the damage caused to health facilities at 27 billion Turkish liras (LT).

### (iii) Infrastructure

According to preliminary estimates, 50 per cent of public buildings were destroyed in the provinces of Adaparazi, Izmit and Yalova. In the transport sector, the earthquake also caused appreciable damage to several installations (bridges, roads, motorways), especially between Istanbul and Adaparazi over a distance of 40 km, and also to other road systems in the country over a distance of 410 km.

Furthermore, rail transport installations and railways between Adaparazi and Istanbul and on another railway between Beskopru and Bilecik were severely damaged. For example, the Tuvasas plant in Adaparazi, which used to produce 100 to 200 wagons a year and employed 1,400 people, was damaged and will be closed for some time.

The port sector was not spared either. The port of Derince, with an annual throughput of 2 million tons, was seriously affected (docks, cranes and warehouses damaged and cracks in buildings). Repair work will be difficult, according to the EMAP Business International report, because these port facilities were not insured.<sup>33</sup>

### (iv) Other sectors

The telecommunications sector was affected by an optical fibre fault between Ankara and Istanbul. The electricity sector, for its part, sustained losses owing to the breakdown of the main electricity generating plant in the stricken region.

As regards the supply of oil and gas, the country will experience difficulties in the months ahead. The main petroleum refinery in Tüpras will be operational again only three months after the disaster, at 50 per cent of its capacity. Repairs will be completed, according to the experts, only in 12 to 15 months.

In conclusion, the above-mentioned financial losses may be broken down by sector as follows:<sup>34</sup>

	US\$ Million
Housing	1 600
Education	100
Health	37
Public infrastructure	70
Road transport	78
Rail transport	72
Ports	12
Telecommunications	38.4
Electricity and distribution system	22.5
Oil and gas	387

## B. Indirect social and economic effects

As indicated above, the Izmit earthquake caused considerable direct human and material damage. Other indirect losses resulted from damage to production capacity and the social and economic infrastructure. These losses include the shortfall in the output of goods and services and the estimated cost of the interim services to be provided while initial operating capacity is being restored.<sup>35</sup>

Immediately after the Izmit earthquake, it became clear that the cost of indirect losses would impose an extra burden on the budget. The State of Turkey was faced with the problem of providing relief for the population affected and of finding the funds needed to put in place a reconstruction plan. These losses, according to the World Bank, mean a reduction in GNP for 1999 of between 0.6 per cent and 1 per cent, or the equivalent of US\$ 1.2 to 2 billion.

### (a) Social cost

Losses sustained by the State in the social sector include the cost of providing accommodation for the homeless and State compensation to the victims. They also include expenditures to deal with the problem of environmental degradation and the shortfall in production due to the stoppage of work.

#### (i) Accommodation

After the earthquake, the Turkish Government had to meet the needs of more than 600,000 people left homeless by the disaster. The estimated cost of providing accommodation for these people is in the order of US\$ 107 million. The aim is to make supplies available to them to build temporary homes and to renovate existing dwellings. The cost of temporary rehabilitation itself is in the order of US\$ 391 million.<sup>36</sup>

#### (ii) Social reform

A number of earthquake victims have become disabled and other families have lost their heads of household. To alleviate their suffering, the Government has decided to grant them compensation that will be awarded during the last quarter of 1999 and will amount to US\$ 30 million, or LT 14.4 billion.

In this connection, the law on social welfare was amended on 9 September 1999 to enable people finding themselves unemployed to receive such assistance. Pursuant to this amendment, insurance companies operating in the stricken regions have been called upon to change their criteria of eligibility. Thus, for example, it will be enough for an employee to have paid a premium for only one year instead of ten years as before in order to qualify for a disability pension. The difference in respect of the remaining years will be covered by the treasury.<sup>37</sup>

Under this amendment, a deceased person's family is entitled to receive a standard compensation amount for the death and another monthly pension. The compensation depends on the number of days for which the deceased person has paid. This entitlement also applies in

respect of a young deceased person who had been unable to meet the requirements concerning the length of contributions for his family to benefit.

The World Bank estimates the monthly average for the payment of this pension by the State at TL 46 million and that for the disability benefit at LT 81 million.

For the year 1999, social welfare benefits for disability and death total LT 21 billion, while social insurance benefits amount to LT 21.8 billion.<sup>38</sup> Lastly, following the earthquake, the Government instituted a reform of retirement schemes to reduce the deficit of the social security system, which represents 20 per cent of GNP. The age of retirement will be 58/60 for new employees and 52/56 for contributors already in employment, with a transitional period of 10 years. This reform will lower the GNP deficit by 1 per cent.<sup>39</sup>

The Turkish Government will furthermore have to meet the cost of protecting child victims of the earthquake. Three orphanages and a home for the elderly were completely destroyed in the stricken region. Other centres providing shelter have to be rehabilitated. The total costs for social assistance and for rebuilding social welfare institutions are estimated at US\$ 85.4 million and US\$ 1.4 million, respectively, for 1999.

#### (iii) Effects on the environment

The Izmit earthquake was responsible for the fire that broke out at the Tüpras refinery. For several days, the refinery discharged thousands of tons of oil (30,000), which spread to and contaminated the coastal region of Izmit, Golcuk and Yalova. Seven storage tanks out of a total of 80 were completely demolished, and some 4,700 tons of acyl nitrite were released by the Aska chemical plant in Yalova. This caused the death of a number of domestic animals. Scientific tests found that the seawater contained 3 to 4 mg of acyl nitrite. Some chemicals, including carbon monoxide and particles generated by polycyclic aromatic hydrocarbons, affected an area of 10 km<sup>2</sup>, and their toxic effects were significant especially in the province of Kocaeli.

Moreover, according to studies conducted by Istanbul University's Marine Research Institute, there are now very high levels of hydrogen sulphide (H<sub>2</sub>S) in the sea. The pollution is likely to remain for a long time and will undoubtedly affect fishery resources and also human health through contaminated food products and drinking water.<sup>40</sup>

Expressing his concerns regarding the disaster, Mr. Durmus Osman, Turkey's Minister of Health, has drawn attention to the potential health and environmental risks. He has pointed out that his country will be confronted with the dual risk of an epidemic and of acid rain including the toxic gas and particulate emissions from the Tüpras refinery.

Environmentally sound management of the Marmara region will certainly be expensive, and the cost of cleaning-up the coast and marine environment alone is estimated at US\$ 5 million.<sup>41</sup>

Furthermore, State enterprises (Botas Petroleum Pipeline Corporation) have evaluated the cost of inspecting the gas pipelines in the stricken coastal region at US\$ 1 million. Botas also estimates that checking the safety of its installations will require at least US\$ 500,000.

There are other costs to be added as well. These relate to the treatment of river water and the disposal of waste or pesticides (hazardous products) used at some of the plants and enterprises destroyed by the earthquake. The cost of transporting debris to the coast has not yet been determined and the environmental consequences of dumping it in the sea or near rivers will increasingly make themselves felt.<sup>42</sup>

#### (iv) Effects on the employment sector

The earthquake struck a region containing 45 per cent of the country's industrial potential and with an active population of 1,364,000, or 47.36 per cent of the total, 51.66 per cent of whom are considered to be highly skilled workers.

Because of the damage to the region's infrastructure, 321,000 people, or 23.5 per cent of the active population, are out of work. The employees of industrial and agricultural SMEs, 50 per cent of whom have lost their jobs, have been hit even harder as they do not have social insurance covering unemployment. The number of dismissals will certainly go on rising because without State aid the heads of enterprises, especially SMEs, are unlikely in the near future to be able to continue their activities with the same financial capacity and the same number of employees. This may well exacerbate the economic situation of the workers, given that 35 per cent of them, like half of Turkey's active population, are not declared by employers and are therefore not covered by collective agreements that provide for the payment of compensation at a standard rate proportionate to length of employment in the event of dismissal.<sup>43</sup>

In sum, production losses resulting from the stoppage of work are estimated by Munich Reinsurance at US\$ 1 billion.<sup>44</sup>

#### (b) Indirect economic effects

In addition to the social cost, the Izmit earthquake has caused indirect economic losses involving a decrease in productive capacity and a decline in value added equivalent to 1.5 per cent of GNP for the last quarter of 1999. These losses have affected several sectors, including the banking and insurance sectors, tourism, agriculture and industry.

##### (i) Effects on infrastructure

In evaluating the indirect losses, the Turkish Government estimates that US\$ 500 million will be needed to compensate for the damage caused by the earthquake and to rebuild the energy, transport and telecommunications sectors. With a view to attracting foreign direct investment, it approved an amendment to the Constitution allowing foreign investors to have recourse to international arbitration in the event of any dispute.<sup>45</sup>

The funding requirements estimated by the Government for repair of the damaged sectors may be summarized as follows:

Sectors	Millions of US\$
Energy distribution facilities	2.7
Distribution facilities	70
Roads linking villages and motorways	271
Railway lines	39
Shipping lines	23
Communications	41.6
Public infrastructure	34.3

##### (ii) Effects on the banking sector

The International Monetary Fund has estimated that the earthquake's impact on the banking sector will be limited as compared with the effects on other sectors. Nevertheless, in order to take account of the population's economic needs, the Government has instituted administrative measures in the banking system similar to those adopted for social welfare.

The Government has requested the banks, both public and private, to comply with the decision annexed to decree No. 99/13233 promulgated on 28 August 1999 to deal with the disaster. The three State banks (Halk Bank, Ziraat Bank and Emlak Bank) will therefore defer payment of bank loans falling due from 12 months to 3 years for private individuals and companies affected by the earthquake, charging interest at half the initial rate agreed. Thus, for example, the amount of credit deferred by Emlak Bank is estimated at US\$ 117.2 million.

In this connection, it should be noted that outstanding loans in the stricken region granted by private and State banks for the various economic sectors and for private individuals amount to US\$ 1.5 billion, of which a third was extended to persons directly affected by the earthquake.<sup>46</sup>

Furthermore, the three national banks will grant loans to eligible persons for housing and investment over a period of more than five years with a one-year grace period and at a rate of interest which is half that applied for a similar amount borrowed before the earthquake. Loans for reconstruction together total US\$ 505 million.

Progressive losses of duty, according to State bank sources as shown in the table below, thus amount to LT 52.3 billion for 1999 and LT 127 billion for 2000.<sup>47</sup>

##### Progressive duty losses

Banks	CURRENT STOCK (billion LT)		New loans (billion LT)	
	1999	2000	1999	2000
Halk Bank	2.3	6.8	24.0	42.0
Ziraat Bank	7.5	22.6	9.6	28.7
Emlak Bank	8.9	26.9	..	..
<b>Total</b>	<b>18.7</b>	<b>56.3</b>	<b>33.6</b>	<b>70.7</b>

For their part, the private banks will revise the system of reimbursement of loans by their customers, deferring payment from 3 to 6 months without raising interest rates. This alone represents a revenue loss of US\$ 13.5 million.<sup>48</sup>

### (iii) Effects on agriculture

The agricultural sector is extremely important for Turkey. Its share of GDP is 15 per cent and its share in total employment 45 per cent. Agricultural production in the affected region centres mainly on olive oil, sunflower seed oil and cereals, together with greenhouse farming and livestock.<sup>49</sup>

The agricultural sector did not escape earthquake damage, which affected a number of provinces, including Kocaeli, Sakarya, Yalova, Bolu, Istanbul and Bursa. Fisheries were damaged by river, spring and sea pollution caused by chemical products released by the fire at the Tüpras refinery. Vegetable and greenhouse farming was also devastated. Serious damage was caused to barns, stables, henhouses, abattoirs, cold stores and food processing factories.

The State agricultural sector was also hard hit. Seven fishing ports in the region and irrigation channels were damaged (US\$ 2.2 million). A number of regional agricultural offices were similarly affected, with losses estimated at more than US\$ 4.8 million.<sup>50</sup>

As a result, the supply of food and other requirements in this area is now a major problem, particularly as the majority of producers—smallholders—do not have agricultural insurance nor do they receive any Government aid.<sup>51</sup>

According to preliminary estimates, which do not include Istanbul province, agricultural losses amount to US\$ 380,637,123 million, as follows:<sup>52</sup>

	<i>US dollars</i>
Kocaeli	162 491 040
Sakarya	202 890 680
Yalova	9 212 435
Bolu	5 643 000
Bursa	402 670
<b>Total</b>	<b>380 637 123</b>

The agricultural sector will undoubtedly suffer the after-effects of the earthquake for months to come. According to preliminary studies, samples of water taken in the affected region show that the quality falls far short of recognized safety standards, with quite high levels of colibacilli, and present a threat to human health. Livestock is suffering from acidosis, since, with cattle feed unavailable, it has been fed on other perishable foodstuffs rotted by rain and no longer safe to eat.<sup>53</sup>

Ministry of Agriculture laboratories now need to carry out surveys and analyses, with the aid of FAO and WHO, in order to establish how dangerous chemicals released

after the earthquake may be for health and agricultural production. Food and water quality must also be checked in order to protect human health and fisheries resources from diseases caused by the decomposition of the carcasses of animals killed in the earthquake.

According to statistics drawn up by a World Bank team, the growth rate in the agricultural sector in the last quarter of 1999 is expected to be 1.1 per cent as compared with 14.3 per cent in the third quarter of 1999. Given the tight economic situation, growth in the coming year is not expected to exceed 0.2 per cent.

Nevertheless, the Turkish economy has a number of advantages that will help get it back on track. Owing to its geographical situation, it benefits from trade with the European Union through the European Customs Union. It can also exploit further its economic relations with the emerging economies in the eastern part of Europe.

Rapid growth will also depend on improved resource allocation in order to provide an infrastructure adapted to the particular needs of regions at risk. Such infrastructures involve those sectors where disaster-related damage or loss will usually paralyse agricultural growth, i.e. the agro-food, energy, transport and telecommunications sectors.

### (iv) Effects on the insurance sector

The insurance sector in Turkey includes reinsurance and insurance companies, and insurance intermediaries (brokers and agents). In 1997, 60 insurance companies and four reinsurance companies were operating in Turkey, three of them publicly owned, 45 privately owned and 10 foreign. In all, 10,723 insurance agencies were operating at the end of 1996, with coverage amounting to some US\$ 102 billion, of which US\$ 24 billion went to Turkish insurance companies.<sup>54</sup>

After the earthquake, the insurance sector's preliminary estimate of the total to be paid out for the damage caused was US \$6 billion, of which US\$ 20 million would be paid out by a Turkish company, Halk Sigorka, and US\$ 4 million by other Turkish agencies to cover material damage in, *inter alia*, the industrial, tourism and agricultural sectors.<sup>55</sup>

Turkey's insurance system still has a number of shortcomings that continue to prevent it from operating well. According to European insurance companies, several Turkish insurance companies are on the brink of bankruptcy and unable to cover the earthquake damage. The crisis is due to the fact that these companies had spent the funds set aside to cover earthquake risks on claims for fires and traffic accidents, which accounted for a very small proportion of policies. Fire insurance premiums account for 0.0001 per cent, whereas the average in Eastern Europe is 2 per cent. Thus fire insurance coverage for the Kirikkale factory, where there was an explosion in 1990, cost only US\$ 2. In order to reform the Turkish insurance system, foreign reinsurance companies have offered the fire insurance sector US\$ 5 million to enable it to cover possible damage.<sup>56</sup>

Another difficulty affecting this sector has to do with the fact that most smallholders and small and medium-sized enterprises have no insurance against natural disas-



ters, which have a far from negligible social and economic impact on their business. Such companies employ several thousand people and are subcontracted to supply companies which are totally dependent on them.<sup>57</sup>

In order to protect these essential sectors of the economy, the Turkish Government will have to make every effort to rebuild SMEs by granting them low-interest loans. It must also ensure that construction conforms to the regulations in force and introduce compulsory insurance to cover the risks of earthquake and resulting unemployment. As of 31 December 1998, 665,870 insurance policies had been signed in the 15 earthquake-prone regions of the country, to a value of US\$ 102,524 million,<sup>58</sup> while fire insurance policies amounted to US\$ 1.1 million.

In Istanbul province, 15 per cent of the residents have taken out earthquake insurance, whereas in the rest of the country only 2 per cent of the population have done so. In the affected region, more than 26,000 policies are in effect, to a value of US\$ 7 billion. Nevertheless, this figure is quite small given that only 10 per cent of earthquake-related losses are covered.<sup>59</sup>

The reason for making insurance compulsory is that insurance companies have always recommended damage prevention, because in the long term they will only be prepared to cover the risks if the trend—i.e. the risk—is drastically reduced or even reversed.

Insurance is itself a means of preparing for and protecting against disasters. On the one hand, insurance companies distribute brochures, films and documentaries which raise public awareness and inform people of what they need to do. On the other hand, insurance is a decisive factor in the operation of many economic sectors, since without insurance, tourist projects and oil drilling, for example, in earthquake areas, would be too risky and would end in failure.

Insurance is therefore of fundamental importance in minimizing risk. It can also perform a monitoring function, encouraging the preparation of building regulations to reduce risk and increase reliability.<sup>60</sup>

#### (v) Effects on the tourism sector

This sector is one of the main generators of credit the Turkish Government relies on to reduce the budget deficit. Revenue in the tourism sector between 1993 and 1997 rose from US\$ 4 billion to US\$ 7 billion.

In 1993, the tourism sector directly employed 129,000 people, i.e. 0.7 per cent of the economically active population. In 1995, Turkey's surplus on its tourist account, was seventh highest in the world, with a revenue of US\$ 4,292 billion, and Turkey was ranked 19th in the world as a tourist destination.<sup>61</sup>

Yet tourism in Turkey continues to face major environment-related problems, including natural disasters, which are likely to hamper its economic growth if suitably stringent measures are not taken.

Tourism was another of the sectors affected in the Izmit area, particularly the tourist province of Kocaeli. The

World Bank puts the losses for 1999 at US\$ 200 million and income tax-related losses at around US\$ 32 million.<sup>62</sup>

The fear aroused by repeated earthquakes will undoubtedly have an adverse impact on the tourism sector's future, particularly as on 13 November 1999, the region was hit by another earthquake, which, with a magnitude of 7.2, not only caused material damage (722 buildings destroyed) at Duzce in Bolu province, but also left 600 dead and 2,386 people injured.

The damage includes the poor image that any risk destination presents to tourists, unless the Government concerned initiates disaster-prevention programmes, not only in the affected region, but throughout the country. Investments in the sector will also shrink if the Government fails to implement an efficient disaster-management plan.

Needless to say, such situations create major economic and social problems in other related sectors. Industry and investment in tourist complexes are directly affected, along with employment. Tourists will switch to other destinations that are similar but safer, with the result that tourism may become a perishable commodity in the sense that unsold airline seats and empty hotel rooms and seaside resorts will have no residual value.<sup>63</sup>

Moreover, tour operators in a number of developed countries (Australia, Europe, Japan and the United States) work to strict rules protecting tourists from risk. For example, the European guidelines on package tours require tour operators to ensure their clients' safety whatever their destination. Such operators will never recommend a risk destination to their customers neither do they recognize insurance taken out by tourists travelling alone.

The Turkish Government must therefore review its domestic construction and inspection standards, which the Izmit earthquake showed to be ineffectual. The national authorities must undertake to introduce the highest possible preventive safety and health standards and ensure that entrepreneurs observe building regulations, and particularly the 1998 Act currently in force, because considerable risks are involved. On that basis, it will be possible to improve tourist services and revive consumer (tourist) confidence.

The following table shows the losses from reduced tourism revenues as a result of the Izmit earthquake.<sup>64</sup>

	<i>Millions of US dollars</i>
Forecast tourism revenues, 1999	5 000.0
Share from Istanbul and Marmara region	20%
Estimated regional revenues, August-December	580.0
Assumed decline due to earthquake	35%
Loss in value added due to earthquake	203.0
Loss of value added in Istanbul region	162.4
Tax loss	32.5%

### (vi) Impact on the industrial sector

The affected region contains 46.7 per cent of Turkey's entire industrial capacity. Following the earthquake, several factories closed down and hundreds of small and medium-sized enterprises suffered considerable damage. In Kocaeli province, 46 per cent of the 1,127 large, small and medium-sized enterprises were hit hard. In Istanbul, 15 per cent of manufacturing companies were affected, and 34 per cent in Sakarya. In total, 20,507 industrial structures suffered moderate or severe damage.<sup>65</sup>

As a result of the material and human losses, 1,025 out of 1,186 factories in Bolu, Kocaeli, Sakarya and Yalova provinces temporarily suspended their activities. Of these, 346 were able to resume operations a month after the disaster and 525 others were out of operation for 18 weeks. The enforced stoppage during the first few days after the earthquake entailed a loss of value added estimated at between US\$ 700 million and US\$ 1 billion, equivalent to an industrial sector downturn of 1.7 per cent.

In order to make up for the losses suffered by these companies and help them resume operations, the Turkish Government will need US\$ 247.7 million, distributed as follows:

<i>Companies</i>	<i>Millions of US dollars</i>
Tüpras	115
Tüvasas	80
Igsas	20
Petkim	6.5
Seka	6.5
Turkish sugar Factories	20
TZDK	0.6

Lost output from these companies as a result of the suspension of production is estimated at US \$631.5 million, as follows:<sup>66</sup>

<i>Companies</i>	<i>Millions of US dollars</i>
Tüpras	558.6
Tüvasas	20
Igsas	18.6
Petkim	34.3

The losses sustained by the industrial sector are, in short, enormous. In a report prepared following the disaster, Munich Reinsurance estimates that the majority of these losses, including those relating to the suspension of production and the loss of profit in the market place were foreseeable, since they were caused by the collapse of buildings constructed on sites previously identified by engineers as risk sites. The Tüpras refinery, for example, where the fire occurred, is located on a vulnerable site beside a major plate and the risks were foreseeable. Other

losses were caused by equipment that was not earthquake-resistant.

Munich Reinsurance also considers that the damage could have been avoided if use had been made of plans and materials appropriate to the hazards, rather than building facilities on an active plate without taking into account the seriousness of the danger.<sup>67</sup>

## C. Macroeconomic secondary effects

Secondary effects are a reflection of the impact of direct and indirect damage on the main macroeconomic variables. There is no doubt that the Izmit earthquake is having an adverse effect on the national economy. The Turkish Government estimates the burden on public finance as a result of the earthquake at US\$ 6,212.5 billion and financial requirements to cover construction and repair of temporary and permanent housing at US\$ 5.1 billion.<sup>68</sup>

As a result, the Turkish Government has been obliged to revise its entire economic recovery programme, begun in 1998, in order to try to respond to the critical macroeconomic situation the country faces in the aftermath of the disaster by, inter alia, curbing rising inflation rates, stimulating growth and dealing with the budget deficit.

### (a) Inflation

For 20 years, Turkey has suffered from inflation rates that have remained stubbornly high and prevented the economy from realizing its full growth potential. Moreover, consumer price inflation is the highest in Europe, with a rate of 84.6 per cent. This represents an important hurdle, particularly as per capita GDP is the lowest in Europe, standing at US\$ 2,979.<sup>69</sup>

In 1998, Turkey launched a programme to cut inflation by 10 per cent by 2001. It is set forth in the economic policy memorandum of 26 June 1998, implementation of which was guaranteed by the International Monetary Fund for 18 months. With the programme in place, significant progress was made, with inflation rates falling from 90 per cent to 50 per cent by the beginning of 1999. However, lower tax revenues in 1999 pushed interest rates up, thereby slowing economic activity and resulting in a GDP deficit of 11 per cent.<sup>70</sup>

As a result of the Izmit earthquake, experts expect inflation to increase further. Consumer prices will rise, especially in the affected regions, as a result of tax increases aimed at restoring the State budget and of interest rate rises caused by external shocks such as the Russian crisis.

Although the State bank believes that the reconstruction process will revive economic activity in the steel, iron, transport, furniture and carpet-making sectors, etc. . . . it may, however, accelerate inflation, particularly if external financing proves hard to obtain.<sup>71</sup>

The economy's growth potential will therefore probably not be achieved as long as the public sector borrow-

ing requirement remains high. According to Organisation of Economic Co-operation and Development figures, if the interest rate gradually comes down by 20 per cent, to 25 per cent, and the inflation rate can be brought below 10 per cent, overall output might expand by 15 per cent within six years. That would lead to a 20 per cent growth in domestic demand, which would be stimulated not only by investment but also by consumption and a rapid rise in corporate expenditure that would help create jobs.<sup>72</sup>

As part of the revised programme agreed with IMF, the Turkish Government hopes to embark on structural reforms aimed at achieving low, stable inflation rates. That is the thrust of the letter addressed on 29 September 1999 to the Managing Director of IMF by the Turkish Finance Minister and the Board of the Central Bank. On 23 November 1999, the IMF Representative in Turkey announced that fruitful negotiations had been held with Turkish officials responsible for implementing an ambitious programme under IMF supervision. The programme includes a tight budgetary, monetary and structural policy aimed at cutting inflation to 25 per cent by late 2000 and to below 10 per cent by 2002.

Turkey would also have access to US\$ 3.5 billion of IMF non-emergency resources for the entire three-year duration of the programme.

The Executive Board of IMF should consider the matter before the end of 1999.<sup>73</sup>

### (b) *Balance of payments*

The effects of the earthquake on the balance of payments include losses on current account and capital account and in foreign exchange reserves.

The earnings of the tourism sector, for example, fell by US\$ 200 million in the first week after the earthquake. Furthermore, the interruption of activity in the disaster region led to a drop in exports and to a rise in imports approaching US\$ 500 million.<sup>74</sup> The Turkish Government foresees a decline in the foreign exchange balance in the order of 0.3 to 0.5 per cent of GNP this year relative to the baseline and IMF anticipates a loss of US\$ 900 million in 1999 and US\$ 2.5 billion in 2000.

As regards the capital account (foreign direct investment and investment and credit portfolios), the Turkish Government has indicated that the first week after the earthquake was marked by capital flight abroad totalling some US\$ 1.3 billion.<sup>75</sup>

The table below shows Turkey's balance-of-payments deficit since 1995:<sup>76</sup>

<i>Balance of payments</i>	1995	1996	1997	1998	1999
Trade balance (including shuttle trade)	-5.1	-5.7	-8	-7	-6.1
Current account balance (including shuttle trade)	0.5	-1.3	-1.4	0.9	-0.8
Reserves (US\$ billion)	13 812	17 695	19 575	20 112	..

Despite these difficulties, the Turkish Government still feels able to redress the situation and honour its commitments on structural reform. The Central Bank still holds foreign exchange reserves of US\$ 23 billion, even though it lost US\$ 1 billion of its reserves in the first week after the disaster.

Nevertheless, the Turkish Government remains convinced that external financing is the most appropriate means of covering the cost of reconstruction, relieving the pressure on foreign exchange reserves and meeting its needs, which are estimated at US\$ 3 billion. It is therefore counting on its three million nationals living abroad, particularly in Germany, and on funding from the international financial institutions and international aid. By 20 December 1999, the international community had contributed a total of US\$ 98,019,344.<sup>77</sup>

For their part, the two Bretton Woods institutions (International Monetary Fund and World Bank) have just made financial aid available to the Turkish Government to meet its foreign exchange needs and to support its reconstruction efforts. On 13 October 1999, IMF granted Turkey relief assistance in the order of US\$ 501 million, which represents 37.5 per cent of its quota with the institution, i.e. SDR 361.5 million.<sup>78</sup>

On 7 September 1999, Mr. James D. Wolfensohn, President of the World Bank, announced that he was preparing a credit package for Turkey amounting to US\$ 1 billion, of which US\$ 300 million would be in the form of the reallocation of loans already granted to the country, and US\$ 750 million would be long-term loans.<sup>79</sup> The World Bank estimated that the Turkish Government would need US\$ 3 billion in external financing and US\$ 1.6 billion from domestic sources for reconstruction of the stricken region and for institutional arrangements to reduce the human losses and future costs of natural disasters.<sup>80</sup>

In this connection, the World Bank on 16 November 1999 approved two loans totalling US\$ 757.53 million. The first loan, called the Emergency Earthquake Recovery Loan (EERL), is intended to help the Turkish Government provide social assistance to displaced persons and other vulnerable groups during the winter.

The second loan, called the Marmara Earthquake Emergency Reconstruction (MEER) project, will serve to finance a long-term national emergency management system aimed at reducing the impact of future disasters. The project thus calls for the establishment of a disaster insurance scheme, the improvement of physical planning and the enforcement of building codes, as well as the restoration of normal conditions of life in the provinces affected. It should be pointed out that the Turkish Government and the beneficiaries will make contributions to implementation of the MEER project amounting, respectively, to US\$ 176.18 million and US\$ 55.93 million.<sup>81</sup>

### (c) *Fiscal impact*

Before the Izmit disaster, the Turkish Government had concluded an agreement ("consultation on article IV") with the International Monetary Fund in 1998 to undertake structural reforms at the macroeconomic level. In regard to budgetary policy, it was agreed that priority

should be given to increasing the primary balance surplus to 3 per cent of GNP in 1999, in a country where high population growth could add to the fiscal burden.

In order to attract foreign investors and accelerate privatization in the energy and telecommunications sectors, the Turkish Government submitted a bill to Parliament, which it has recently passed, after the disaster, for the purpose of allowing foreign investors to resort to international arbitration.

Needless to say, after the disaster, the overall impact on the State budget has increasingly made itself felt. The losses for 1999-2000 are estimated at US\$ 3.6 to 4.6 billion, i.e. 1.8 to 2.3 per cent of GNP.

The table below shows the fiscal impact of revenue loss and other costs:<sup>82</sup>

	1999	2000	Total 1999-2000: millions of US dollars
Revenue loss and credit programmes	1057.9	226	1266.3
Housing rehabilitation	155.7	467.1	622.8
Infrastructure rehabilitation	199.1	250.6	449.7
Social assistance costs	375.2	166	541.3
Disaster mitigation	155	455	610
Public borrowing costs	..	130.2	130.2
<b>Total</b>	<b>1 943</b>	<b>1 697.2</b>	<b>3 640</b>

It should be pointed out that the disaster region accounts for half of all income tax revenue and 18 per cent of other receipts. The province of Kocaeli alone accounted for 15 per cent of tax revenue in the first half of the current year.<sup>83</sup>

In order to remedy the situation, the Turkish Government proposed an amendment to the tax law, which Parliament approved on 25 August 1999. The aim of this amendment is to increase revenue to offset tax losses resulting from the earthquake in the stricken region and to boost the State budget by at least 0.4 per cent of GNP.

The series of short-term measures to be undertaken by the Government include the following taxes:

- Increase of at least 25 per cent in the tax on portable telephones;
- Tax on commercial vehicles;
- Payment of a sum of money to the Government in exchange for a reduction in the length of military service. This measure could add approximately 0.3 per cent of GNP to the budget in 1999 and 2000;
- Corporation tax increase of 5 per cent;
- Increase of 300 to 500 per cent in the tax on petrol.<sup>84</sup>

Pursuant to the Agreement with IMF, the Turkish Government has also instituted a social reform with the passing of a law on the social security system. This new law would enable the Government to avoid a probable loss of 20 per cent of GNP over the next half-century. To do so, the law provides, as indicated above,<sup>85</sup> that after a 10-year transitional period, the retirement age will be 58/60 for

new employees and 52/56 for current contributors. This reform will not only prevent a deterioration in the actuarial balance of the pension fund, but will also reduce the deficit over the next 10 years by 1 per cent of GNP.<sup>86</sup>

#### (d) Economic growth

In the report it prepared after the disaster on 23 September 1999, the Turkish Government estimated that the effects of the earthquake on economic growth would result in a growth rate of -1 per cent in 1999 rising to 1.5 per cent in 2000, while GNP growth would be around 1.5 to 2 per cent in 1999. Several factors have affected economic growth. The Government has just lost tax income of around 18 per cent of national revenue and the budget deficit is therefore expected to increase at a rate of 1 per cent of GNP in 1999. There will also be other costs, since imports will increase to meet the needs of the population affected by the earthquake, whereas exports will show a decline because of the economic losses in the region in question.

Nevertheless, the Turkish Government anticipates that, with foreign financial assistance, spending on reconstruction will accelerate economic growth in 2000 with foreseeable investment of US\$ 1.5 billion relative to the baseline. This activity growth rate should contribute to GNP growth of 5 per cent in the year ahead.

The two tables below illustrate the effects of the disasters in question on public finance and their economic impacts on various sectors:

#### Effects of the earthquake on public finance

	Millions of US\$
Budget	4 513.8
Duty losses of public bank	677.8
Small Economic Enterprises/SEB's	428
Social Security Institution	162.2
Local administrations	295.6
Funds	135.1
<b>Total</b>	<b>6 212.5</b>

#### Economic impact of the earthquake

	US\$ billion
Construction of new residential structures	2.5-4.0
Repair of residential structures	1.0
Construction of prefabricated residential structures	0.1
Losses in industrial and services sectors	2.5-4.5
Commercial facilities	0.5-1.0
Infrastructure	2.0-2.5
<b>Total</b>	<b>8.6-13.1</b>

Source: State Planning Organization.

In conclusion, the three categories of losses (direct, indirect and secondary), as estimated by the World Bank following the disaster, may be summarized as follows:

<i>Economic indicators</i>	<i>1999 (US\$ bn.)</i>	<i>Percentage of GNP</i>	<i>2000 (US\$ bn.)</i>	<i>Percentage of GNP</i>	<i>Total (US\$ bn.)</i>	<i>Percentage of GNP</i>
<b>Direct costs</b>	3 to 6.5	1.5 to 3.3			3 to 6.5	1.5 to 3.3
<b>Indirect costs</b>						
Impact on output	-2 to 1.2	-1.0 to	1.4 to 2.4	0.6 to 1.1		
Emergency assistance	-0.4	-0.6	-0.2	-0.1		
		-0.2				
<b>Secondary effects</b>						
Current account balance	-1	-0.5	-2	-1	-3	-1.5
Fiscal impact	1.9 to 2.3	0.9 to 1.1	1.7 to 2.3	0.8 to 1.1	3.6 to 4.6	1.8 to 2.3

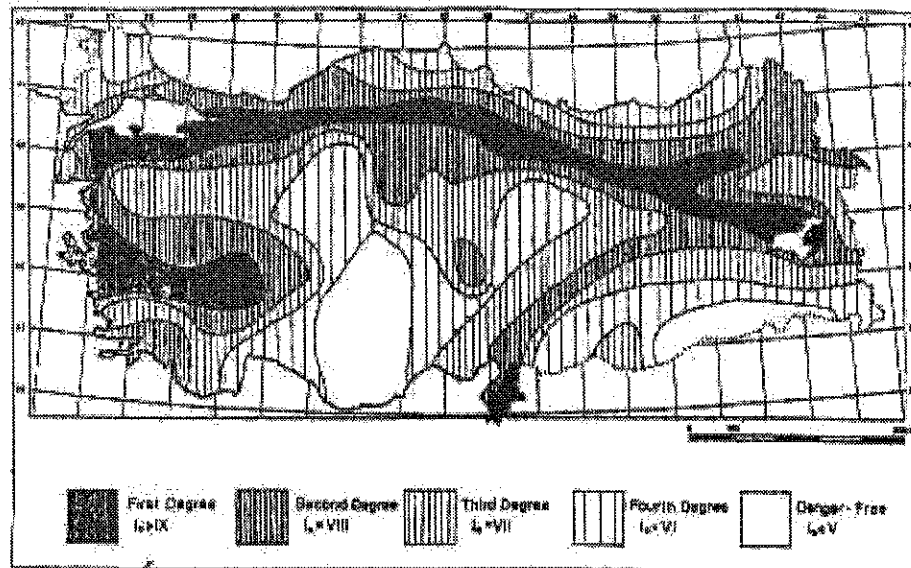
## Chapter Three

# ***POLICY FOR SUSTAINABLE MANAGEMENT OF EARTHQUAKES IN TURKEY***

Turkey's history during the past century has been marked by more than 122 earthquakes, which cost the lives of more than 81,000 people and destroyed over a third of a million dwellings. It has been calculated that an earthquake occurs on average once every nine months in Turkey and every two years there is likely to be a major earthquake that will destroy at least 1,000 homes. About

92 per cent of the country's territory has suffered from quakes reaching a magnitude of at least 6. Annualized data show that nearly 804 people lose their lives and 1,402 are injured because of earthquakes. The losses include damage to 4,712 structures.<sup>87</sup>

The map below illustrates the varying degrees of seismic intensity in five zones of Turkey:<sup>88</sup>



As part of a national risk management policy, the Turkish Government has regularly taken measures to address the problem. After the 1939 earthquake, the Government promoted the enactment of a law in 1944 on measures to be taken before and after an earthquake. This law calls for risk assessment, safe building practices and the preparation of emergency aid and relief programmes. The Government passed a law on public works in 1956 and a law concerning natural disasters in 1959. The latter law (No. 7269) provides for the rehabilitation of dwellings affected by disasters (earthquakes, floods, etc.) and the construction of new housing at the State's expense.<sup>89</sup>

Other building codes have added to the national legal framework in this regard. These are the 1968 and 1975 codes and the more recent 1998 code, under which the municipalities signed a protocol with the Chamber of Civil Engineers and the Chamber of Architects to verify plans before permission is granted for residential construction.<sup>90</sup>

The main problem, however, is that the law is not fully applied. It does not cover a vulnerable segment of the population—squatters living in isolated regions and carrying on activities not recognized by the Government. In addition, builders are not properly supervised by the local

authorities and sometimes come under pressure from owners calling for the original building plans to be modified. This explains why less than 25 per cent of the structures erected in urban areas actually conform to building-code requirements.

Turkey is furthermore confronted with the problem of rapid population growth and the proliferation of urban settlements and industries spreading into vulnerable regions and increasing the risks of human and material losses as well as pollution. This was the background to the Izmit earthquake, where the losses were foreseeable and could have been avoided if preventive measures had been taken to deal with the impending danger.

This conclusion results from a study of the Izmit region in 1995, which found the Marmara coast (Bursa, Kocaeli and Sakarya) to be one of the most vulnerable places in Turkey. The study suggested that, in the event of an earthquake, the risks in the three provinces could be quantified as follows.<sup>91</sup>

420,000 homeless  
35,000 victims

This forecast is quite realistic, since the figures are not too far from the ones announced after the Izmit earthquake. Disaster mitigation in Bursa province was, moreover, the subject of another study undertaken with the aim of developing an area at less risk and reducing damage to infrastructure by 9 per cent and human losses by 17 per cent within 15 years. That initiative might explain why Bursa province recorded the fewest material losses after the latest earthquake (32 buildings destroyed) and relatively low numbers of dead and injured (263 dead and 333 injured) as compared with the other provinces affected.<sup>92</sup>

It is therefore essential, as Professor Mustafa Erdik has rightly pointed out, to **prepare an emergency action plan in advance** for the urban regions of Turkey like the one drawn up by the Kandili observatory for the Istanbul region,<sup>93</sup> bearing in mind that an overall national approach—or plan of action—can provide the framework for addressing all natural disasters and formulating an earthquake risk reduction strategy.

This action plan should place emphasis on careful application of the building code while providing for public awareness-raising, education and capacity-building.

#### (a) *Compliance with the building code and relevant regulations*

The Turkish Government needs more than ever to ensure **compliance with the building code** at the local level through increased timely checks and penalties for any attempted breach of the applicable legislation. In this connection, the Parliamentary Assembly of the Council of Europe notes in its report after the Izmit earthquake that a large proportion of the losses of human life, psychological and physical injury and material damage could have been avoided if the stricter building regulations in force had been fully complied with and applied.<sup>94</sup>

The Government should also draw up better regulations on physical planning and produce a **topographical**

**map of risk zones.** For the time being, Turkey does not have a national micro-zone map, and the geographical maps identifying vulnerable zones in Turkey are not brought up to date. It should, however, be noted that studies on this question are in progress. A pilot micro-zone study of the Istanbul region and a preliminary micro-zone map based on morphology, geology, the distribution of earthquake damage and geophysical and geo-technical data have been prepared.<sup>95</sup>

Furthermore, the **creation of a risk insurance scheme** is one of the most important measures to be taken in order to encourage the construction of more disaster-resistant buildings. The same applies to **partial insurance packages** such as household insurance (televisions, refrigerators, etc.) and life assurance.

The Government and local authorities should share responsibility for implementation of the relevant regulations so that communities are directly involved in natural disaster management. In this regard, it may be recalled that, after the Izmit quake in June 1998, the Prefect of the province had stated that a department of risk management was to be created. This body should coordinate relations between twinned towns, communities and schools to ensure better cooperation in dealing with the risks.<sup>96</sup>

Some people have suggested that the disaster fund set up in 1950 could be decentralized and administered by the municipalities provided they are supervised by the provincial governors. They believe that the fund would function more effectively once it were in the hands of a more aware and better informed public.

#### (b) *Public awareness*

Natural disasters claim more victims in developing countries than in the developed ones, which are well prepared to deal with the risks. The 1994 Los Angeles earthquake, for example, killed only 54 people, whereas the Izmit earthquake resulted in more than 15,000 deaths. Several factors contributed to this disastrous situation, including the poor quality of construction, difficult economic conditions, ignorance of the building codes and of the risks involved, and a somewhat bureaucratic and archaic system of administration.

For these reasons, **public awareness** can be decisive in risk mitigation when the population is well prepared in advance. Experience shows that before an earthquake most people have enough time to take action to protect themselves, but they often do not know what they should do because of ignorance.

**Public awareness-raising programmes** must therefore be put in place. One of the purposes of these programmes is to disseminate information about immediate action that may be taken before or during a disaster and about emergency assistance. Other activities include the dissemination of programmes on basic preventive measures through the mass media (radio, television, newspapers) and the holding of sports and cultural events with the proceeds being used to finance projects to assist the victims of natural disasters (earthquakes).

The development of a culture of prevention should cover all aspects of social life. Some incentives—lower property taxes—could be considered and granted to people meeting the standards concerning prevention. Schools can serve as a remarkable tool for bringing pressure to bear on parents to take preventive measures, including compliance with the building code. A father will never dare to argue with his child when he knows that obstinacy on his own part might jeopardize a whole family. In this connection, UNICEF is working with the Turkish Ministry of Education to set up a programme of intervention in schools, involving the organization of seminars and the preparation of explanatory leaflets on disaster prevention, to familiarize civil society with risk management and prepare it psychologically to deal with the risks.<sup>97</sup>

It is also essential to work with the **religious authorities** in order to encourage people to take steps to prevent risk. Efforts by the authorities to work through the scientific (engineering) community to convince local people to observe earthquake standards are not always successful. Some people believe natural disasters are a punishment from God or their inescapable fate. It is therefore important to involve religious authorities in the prevention process, since their voice is more likely to be listened to in certain societies and they are therefore more likely to be able to save human lives from imminent danger.

The **economic factor** remains one of several obstacles to be overcome because lack of resources obliges owners to build their houses themselves. In the Izmir region, for example, thousands of people, most of whom are émigrés from other regions of the country, live in modest housing that does not meet the required building standards. In order to deal with the problem, the municipal authorities in the province recently signed a contract with Bogazici University and Istanbul Technical University to prepare an earthquake-management plan for the entire region. A contract has also been signed with the Chamber of Civil Engineers and the Chamber of Architects to identify the weak points in the major elements of infrastructure and in 215,000 dwellings.

The same Chambers have also signed a protocol with the local authorities to inspect engineering and architectural plans before issuing construction permits. This is an example of **cooperation** that will develop a culture of disaster prevention among the political actors and other groups in society and should be generalized throughout the country.<sup>98</sup>

In addition, awareness-raising should centre on environmental education, with the emphasis on **voluntary observance of prevention measures**, which may be effective where rules are not. Squatters and small business people would then be prepared to change their attitude once they are convinced that an error on their part might endanger their lives and their modest savings.<sup>99</sup>

This attitude could also be developed at the national, local and regional levels in the form of a **voluntary insurance scheme** or a financial contribution to protect against disasters and the resulting economic problems. Such models would strengthen the long-term economic and financial capacity of communities at risk, by helping them

to meet the immediate costs of reconstruction and lost production when disaster strikes.<sup>100</sup>

Lastly, the Turkish Government should give priority to **building relevant staff's disaster-related skills and sensitivity to technical considerations**. Turkish town planners are not well qualified in the area of natural disaster management and do not always pay serious attention to the impact of environmental degradation and other threats to land-use planning, particularly in coastal zones.

In order to remedy this situation, it has been suggested that an **institute for specialist training** should be established to study disaster-prone regions. The suggestion is that the Ministry of Public Works should take steps to establish such an institute, in cooperation with provincial banks (İller Bank) or with the Public Administration Institute for Turkey and the Middle East.<sup>101</sup>

### (c) *International cooperation*

Continuing urban development in risk zones remains a major problem that Turkey will have to overcome. However, the Turkish Government cannot make its cities safe by itself. Local communities must be involved in risk management through education and individual protective measures.

At the international level, Turkey should develop **partnerships** with countries with wide experience in disaster prevention, with a view to improving the skills of its officials, acquiring know-how and encouraging its people to set up civil risk-prevention structures.

Such cooperation has already been successful in programmes set up with European countries to reduce earthquake risk in the Izmir region. The **German Government** is cooperating as regards rescue organization, prevention equipment and crisis-management training. The **United Kingdom** has provided help in assessing the risks affecting schools and hospitals.

This cooperation can only intensify in the future, following the European Union decision to grant Turkey EU candidate status. The importance of bilateral cooperation in coping with disasters was the subject of a joint resolution (Emergency response to disasters) submitted to the fifty-fourth session of the United Nations General Assembly by **Turkey and Greece** under agenda item 20a on 25 October 1999. This resolution welcomed the establishment of a disaster-response unit made up of representatives of governmental and non-governmental bodies from the two countries.

Turkey could also begin working with NGOs such as GeoHazards International (GHI), which is involved with risk management in developing countries. This is a non-profit organization dedicated to reducing the suffering caused by natural disasters in communities at risk. It has developed a risk-management methodology aimed, *inter alia*, at:

- Optimizing the time and procedures used to prepare effective risk-management plans;



- Involving representatives from various sectors of society in project assessment;
- Creating conditions conducive to the implementation of risk management ;
- Making sound use of the information available and of the knowledge of local scientific experts in the region concerned.<sup>102</sup>

This methodology has been used in two towns at risk: Quito, capital of Ecuador, and Kathmandu, capital of Nepal.

(d) ***Role of the United Nations secretariat for the International Strategy for Disaster Reduction***

The secretariat for the International Strategy for Disaster Reduction was established on 1 January 2000 to replace the secretariat of the International Decade for Natural Disaster Reduction (IDNDR). The new secretariat has wide-ranging expertise that may be of use in the process of adopting a national strategy in Turkey to reduce the impact of natural disasters, and in particular earthquakes, and can bring all its assistance and experience to bear to guarantee a multidisciplinary study of the subject.

The secretariat's experience has grown out of the preventive work done during the last ten years. As long ago as 1995, the IDNDR secretariat and the World Bank jointly produced a case study devoted exclusively to the risk to Turkish cities that is still valid today. The study pointed out a number of problems and drew attention to the imminent risk to the Izmit region, where the earthquake hit on 17 August 1999. It put forward suggestions for an emergency action plan in urban areas and discussed the Government's institutional policy and the role of investment in reducing risk in urban areas.<sup>103</sup>

In the same vein, the IDNDR secretariat launched a risk-management programme in 1996, entitled "RADIUS" (Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters). The aim of this initiative is to help countries, and developing countries in particular, to reduce the effects of seismic disasters in urban areas. Working with local communities, RADIUS has assessed the risk in nine cities around the world, including Izmit province in Turkey. It has drawn up risk-management plans and raised awareness among the general public of the dangers of earthquakes.<sup>104</sup>

In April 1998, the IDNDR secretariat and GeoHazards International launched another project under the RADIUS scheme to study seismic risk in urban areas surrounding 20 cities around the world (Understanding Urban Seismic Risk around the World). This project has, *inter alia*, developed partnerships among cities in risk zones and has contributed to an exchange of information on natural disaster prevention.

The IDNDR secretariat has also launched an **early warning system** to prevent losses and protect economic resources and property. It is based on a system of communication and dissemination of information among the members of a community. In 1998, the secretariat brought together six groups of international experts who studied all aspects of early warning and prepared reports summarizing international experience on the subject. In September 1998, the secretariat also organized an international conference on the subject in Potsdam, Germany; its recommendations served as a platform for the IDNDR Programme Forum (Geneva, 5-9 July 1999). The Forum drew up a plan of action incorporating all this experience, with a view to improving early warning measures during the first five years of the twenty-first century and including disaster-prevention policies in national development plans.

The new secretariat for the **International Strategy for Disaster Reduction** will continue to work along the same lines, with a strategy based on four objectives, one of which is to make people more aware of the natural, tech-

## CONCLUSION

The extent of Turkey's economic and human losses in last August's Izmit earthquake suggests that, despite its advanced legislation, the country remains vulnerable to natural disasters.

This vulnerability is attributable to a number of factors, including:

- The population growth and crowding in the urban areas in earthquake zones. The risk to the population is expected to be substantial throughout the next few decades;
- The failure to apply existing building regulations consistently, and the local population's lack of awareness of the resulting risks. The technical and scientific knowledge needed to build safely is available. The crux of the problem is ignorance and flouting of the law by all parts of civil society;
- The siting of industrial facilities wherever space is available and in proximity to human settlements, with no regard for environmental protection rules, increases the risk of pollution in the event of a disaster.<sup>106</sup>

As a result of the Izmit disaster, Turkey lost half of its income **tax receipts** and, when its imports rose to meet the needs of the stricken population, 18 per cent of its other tax receipts too. Even allowing for the additional fiscal measures adopted to increase tax revenue by 0.4 per cent of GDP, it seems unlikely that the situation can be restored without recourse to direct foreign investment and external financing (international assistance).

The Turkish Government is relying on rebuilding after the earthquake to revive economic activity in a number of related sectors (carpet-making, domestic appliances, furniture, steel, iron, transport, etc.). Achievement of this objective is likely to be delayed by the rate of consumer price inflation, which, at 84.6 per cent in 1999, is higher than anywhere else in Europe.

Regarding **social impact**, the earthquake put an end to the jobs of 321,000 people and caused the loss of an estimated one billion dollars' worth of output. The costs of caring for the homeless (600,000 people) and compensating for damage have added to the already heavy load on the State budget.

All the losses were foreseeable, for the statistics show that 804 people lose their lives, a further 1,204 people are injured and 4,712 human settlements are damaged because of earthquakes every year. Experts are agreed that another earthquake is imminent in the Istanbul region.

Consequently, if the impact of future natural disasters is to be reduced, the Turkish Government must try harder to improve the **legislative and technical aspects of disaster management**. The measures required can be summed up as follows:

- Elaboration of a national risk management plan;
- Education of the population for sound risk management through the media and cultural and sporting events, etc.;
- Involvement of the local authorities, so that disaster reduction becomes one of the priorities in their regional development programmes;
- Surveying for the purposes of establishing topographical maps of vulnerable regions and a national micro-zone map;
- Stricter application of the building regulations, particularly in the seismic regions, through permanent advance checking of building projects and sanctioning of violators;<sup>107</sup>
- Introduction of compulsory disaster insurance in order to protect the population, stimulate direct investment and foster tourism;
- Development of partnerships and international cooperation for the purposes of capacity-building and acquisition of know-how;
- Systematic use of the RADIUS methodology or early warning system as a basic component of an overall risk-management strategy. Better use of remote sensing, improved scientific understanding of disasters and greater public awareness are effective means of minimizing the damage from natural disasters.

No one disputes that prevention is better and costs less than spending after a disaster. Turkey, which the World Bank estimates lost the equivalent of US\$ 13 billion, could, for example, have invested that amount in other national development projects, some of them devoted to prevention.

Turkey's experience as a result of the disaster should serve as a **lesson to other earthquake-stricken countries**. Disaster-prevention policies should henceforward take fully into account, in the context of sustainable development, the possible economic and social consequences of catastrophes. Such policies could draw on the conclusions of relevant international meetings, especially the Potsdam Early Warning Conference (11-17 September 1998) and the International Decade for Natural Disaster

Reduction Programme Forum at Geneva (5-9 July 1999), with a view to implementing coordinated, sustainable strategies for ensuring a safer twenty-first century. There can be no prevention unless decision makers are willing to draw on the know-how and international practical experience accumulated in this sphere in order to promote measures and elaborate policies that will reduce as far as possible the losses associated with disasters.<sup>108</sup>

Ideally, a **coordinated, multidisciplinary national risk-management policy** should be established in Turkey on the above basis. It should involve not only the Government, but also civil society, the media and the private sector so as to ensure that it is more prevention-oriented. That type of policy has always been recommended as an effective means of reducing the losses from natural disasters. The philosopher Jean-Jacques Rousseau alluded to it in the letter he sent to Voltaire on 18 August 1756 regarding

the Lisbon earthquake of 1755, which cost 40,000 lives: "If there was a catastrophe, it was not the fault of Nature, for it was not she who grouped 20,000 buildings six or seven storeys high there. If the people had distributed or housed themselves differently, we would have found them the next morning 20 leagues away, as happy as if nothing had happened."<sup>109</sup>

As **Kofi Annan, Secretary-General of the United Nations**, said only a short while ago, when, in his speech to the IDNDR Programme Forum, he reminded the entire international community of the importance of natural disaster prevention: "We must, above all, shift from a culture of reaction to a culture of prevention. The humanitarian community does a remarkable job in responding to disasters. But the most important task in the medium and long term is to strengthen and broaden programmes which reduce the number and cost of disasters in the first place."<sup>110</sup>

## Notes

<sup>1</sup> Türkiye is Bankası, Economic Report, Economic Research and Planning Department, 1998, p. 8.

<sup>2</sup> The French daily *Le Monde* listed the Turkish earthquakes since 1986 in its electronic edition of 3 September 1999:

19 August 1966:	2,396 deaths at Varto (east), 6.9 on Richter scale
28 March 1970:	1,086 deaths at Gediz (west), 7.2
6 September 1975:	2,385 deaths at Lice (south-east), 6.6
24 January 1976:	3,840 deaths at Muradive (east), 7.5
30 October 1983:	1,155 deaths at Erzurum and Kars (east), 6.9
13 March 1992:	653 deaths in the Erzincan region (east), 6.8
1 October 1995:	Some 100 deaths at Dinar (west), 6
27 June 1998:	140 deaths in Adana province, including 74 in Ceyhan, the worst-affected town, 70 km from Adana, on the Mediterranean coast, 6.3.

Earthquakes in Turkey have been the subject of several studies, including one by the World Bank and the secretariat of the International Decade for Natural Disaster Reduction, "Informal Settlements, Environmental Degradation and Disaster Vulnerability—The Turkey Case Study 1995". See also Mustafa Erdik and Jennifer Smith, "Solution for Cities at Risk", IDNDR 1998, pp. 46-83.

<sup>3</sup> Caroline Finkel, "Earthquake in Turkey", *The Times*, 18 August 1999 and Rüchan Yılmaz and Ramazan Demirtas, 1999, Izmit Bay Earthquake, NW Turkey, p. 1.

<sup>4</sup> UNICEF Report, Technical Assessment of the Disaster and Recovery Plan for Turkish Children, UNFPA, UNDP and OCHA, 23-26 August, p. 2. International Federation of Red Cross and Red Crescent Societies, Situation Report, 14 September 1999, p. 1.

<sup>5</sup> Office for the Coordination of Humanitarian Affairs, New Press Briefing on Earthquake in Turkey, Geneva, 23 August 1999.

<sup>6</sup> International Federation of Red Cross and Red Crescent Societies, Situation Report No. 18, 28 September 1999. OCHA, Relief Web, Turkey earthquake—News Transcript No. 13, 1 September 1999. AFP, 31 August 1999.

<sup>7</sup> UNICEF report, 15 September 1999, op.cit., p. 1.

<sup>8</sup> For more information, see the OECD 1999 Report on Turkey, pp. 10 and 11. See also "Concluding Remarks for Article IV Consultations for 1999; IMF and Turkey", 2 July 1999.

<sup>9</sup> Turkish Government's Report to WTO for the Review of its Trade Policy, 14 September 1998, p. 1.

<sup>10</sup> WTO Secretariat, Trade Policy Review on Turkey 1998, p.1.

<sup>11</sup> See OECD Economic Surveys 1999—Turkey, p. 27.

<sup>12</sup> "Shuttle Trade", which does not appear in balance-of-payments data, accounts for a large part of Turkey's trade with Eastern Europe. It is unrecorded and concerns mainly exports of textiles, leather goods and household products. Its total value in 1997 amounted to almost US\$ 9 billion. Some observers say it may account for as much as 25-50 per cent of Turkey's total exports of goods. See the WTO secretariat report on Turkey, op. cit., pp. 11-12.

<sup>13</sup> See OECD Report, op. cit., p. 41.

<sup>14</sup> OECD Economic Surveys, op. cit., p. 28. Concluding Statement, International Monetary Fund, 2 July 1999.

<sup>15</sup> WTO Report on Turkey, op. cit., p. 11.

<sup>16</sup> See OECD Report, op. cit., p. 33. See WTO Report on Turkey, op. cit., p. 13.

<sup>17</sup> WTO Secretariat Report on Turkey, WT/TPR/S44, op. cit., p. 3.

<sup>18</sup> See OECD Report, op. cit., pp. 12 and 35.

<sup>19</sup> Türkiye is Bankası, Economic Report, Economic Research and Planning Department, 1998, op. cit., p. 38. WTO Secretariat Report, op. cit., pp. 6 and 14-16. OECD report, op. cit., p. 23.

<sup>20</sup> OECD Report, op. cit., p. 183.

<sup>21</sup> Source: UNSD, Comtrade database (SITC Rev. 1). See also WTO secretariat report on Turkey, op. cit., p. 15.

<sup>22</sup> See WTO Report, op. cit., p. 18; OECD Report, op. cit., p. 180, and Türkiye is Bankası report 1998, op. cit., p. 8.

<sup>23</sup> WTO Report on Turkey, op. cit., p. 14.

<sup>24</sup> WTO Report on Turkey, op. cit., p. 37.

<sup>25</sup> Türkiye is Bankası, Economic Report, Economic Research and Planning Department, 1998, op. cit., p. 8.

<sup>26</sup> Munich Re report, 29 October 1999. *Le Monde*, electronic edition, 23 August 1999.

<sup>27</sup> Vladimir Sakharov, Chief, UNEP/OCHA Joint Unit in Geneva. See also Osman Senkel, Reuters, 26 August 1998.

<sup>28</sup> In this connection, see the studies made by Charlotte Benson on the economic impact of the natural disasters in Fiji, March 1997, in Viet Nam, April 1997, and in the Philippines, June 1997, Overseas Development Institute, London. See also Roy Gilbert, Alcira Kreimer, "Learning from the World Bank's Experience of Disaster Related Assistance", World Bank, Washington, D.C., May 1999, p. 32.

<sup>29</sup> Manual on Assessing the Socio-Economic Effects of Natural Disasters. Joint study made by the IDNDR secretariat and the Economic Commission for Latin America and the Caribbean (ECLAC), p. 12. In general, human losses are not treated as direct effects in studies on this question. However, since they are quantifiable, it seems obvious to us that they should be included in this category, especially as this is a decisive factor directly retarding the recovery of economic activity and production in the disaster region.

<sup>30</sup> OCHA Situation Report No. 21, of 15 September 1999. WHO, for its part, using the information provided by the Turkish Prime Minister's Crisis Management Centre on 24 September 1999, puts the number of dead at 15,756 and the number of injured

at 24,940. See also the report of the Turkish Government, T.R. Prime Ministry—State Planning Organization, 23 September 1999, p. 1.

<sup>31</sup> See the Report by J. Matthews Information Services, EMAP Business International, 15 October 1999. Source: Turkey Earthquake—OCHA Situation Report No. 21.

<sup>32</sup> UNICEF's Turkey Earthquake Recovery Plan. Report of the Turkish Government and SPO—"The Economic and Social Effects of the Earthquake", 21 September 1999, p. 5.

<sup>33</sup> EMAP Business International Middle East Digest, Turkey after the Quake, report of 15 October 1999.

<sup>34</sup> Statistics supplied by EMAP Business International Middle East Economic Digest, World Bank News Release of 1 September 1999.

<sup>35</sup> Managing Disaster Risk in Mexico, World Bank, 1999, pp. 13-15. Roy Gilbert, Alcira Kreimer, "Learning from the World Bank's Experience of Natural Disaster Related Assistance", May 1999, p. 32.

<sup>36</sup> Turkey Marmara Earthquake Assessment. World Bank Report of 4 September 1999, p. 27.

<sup>37</sup> For further information, see the World Bank Report, op. cit., pp. 39 et seq.

<sup>38</sup> World Bank Report, op. cit., p. 43.

<sup>39</sup> "Letter of Intent of Turkish Government" addressed to the Director-General of IMF on 29 September 1999.

<sup>40</sup> Ibrahim Ilbegi, "The Impact of the Earthquake on the Agriculture and Environment in Marmara region", FAO Report, 1999, p. 7. World Bank Report, op. cit., pp. 48 and 54. Reuters/News Edge/LAN of 26 August 1999.

<sup>41</sup> Reuters, 23 August 1999.

<sup>42</sup> FAO Report, op. cit., p. 2.

<sup>43</sup> OECD Report, op. cit., pp. 95-96.

<sup>44</sup> Munich Reinsurance Report of 29 October 1999 on Turkey. World Bank Report, op. cit., p. 38.

<sup>45</sup> See Janet Matthews—Information Services, "Turkey Steady after the Down-Draught", 15 October 1999.

<sup>46</sup> See World Bank report, op. cit., p. 28, and letter addressed by the Turkish Government to the Director-General of IMF on 29 September 1999.

<sup>47</sup> State Bank source, cited on page 34 of the World Bank Report.

<sup>48</sup> World Bank Report, p. 32 and 35. "Letter of Intent of Turkish Government" sent to the Director of IMF on 29 September 1999, p. 3.

<sup>49</sup> Ercan-Ersoy, Ankara, News Room, 17 August 1999, and OECD Report, op. cit., p. 23.

<sup>50</sup> Turkish Government Report, op. cit., p. 5.

<sup>51</sup> FAO Report, op. cit., pp. 10 and 11.

<sup>52</sup> FAO Figures, op. cit., p. 7.

<sup>53</sup> FAO Report, op. cit. p. 7. World Bank report, op. cit., annex, table 2.

<sup>54</sup> Munich Re, Report of 29 October 1999, and Halk Sigorta Insurance, 17 October 1999. World Bank Report, op. cit., pp. 28-30, and WTO report WT/TPR/S/44, p. 158.

<sup>55</sup> Munich Re, Report of 20 October 1999.

<sup>56</sup> See Eigener Bericht, Türkische Versicherer in Schieflage, *Süddeutsche Zeitung*, December 1999.

<sup>57</sup> On page 30 of its report, the World Bank states that each of the 6,000 small shops employed fewer than five persons and that each of the 1,500 businesses procuring services employed 5-10 persons. Their losses as a result of the earthquake were estimated at US\$ 30 and 53 million respectively.

<sup>58</sup> Source: Table of Turkish Treasury Secretariat. World Bank Report, table 14, p. 9.

<sup>59</sup> Munich Re, Report on the 17 August Izmit Earthquake, pp. 6 and 7.

<sup>60</sup> For more information, see Gerhard Berz, Munich Re. IDNDR, "Common Interests and Tasks", *IDNDR Newsletter*, No. 15, September/October 1993, pp. 8-10.

<sup>61</sup> See WTO document S/C/W/5 of 23 September 1998 on Tourism Services, pp. 19 and 20.

<sup>62</sup> World Bank Report, op. cit., p. 18. Oxford Analytica Ltd., 27 August 1999.

<sup>63</sup> "The Effects of Natural Disasters on the Development of Tourism", Roger Withers, May 1999, UNCTAD, paras. 26-31.

<sup>64</sup> Source: World Bank. Report, Annex.

<sup>65</sup> Figures from the Turkish Government's Evaluation Report, 23 September 1999, p. 1.

<sup>66</sup> Report by Turkish Government, op. cit., pp. 4-5.

<sup>67</sup> Munich Re, op. cit., p. 7.

<sup>68</sup> Figures from the State Planning Organization.

<sup>69</sup> OECD Report, op. cit., p. 200. The Economist Intelligence Unit Estimates, National Sources, Turkey, 1999-2000, Foreword.

<sup>70</sup> World Bank Report, p. 17. Servet Yildirim, Reuters, 23 August 1999.

<sup>71</sup> Deborah, Oxford Analytica, 31 August 1999.

<sup>72</sup> See OECD Report, op. cit., p. 53.

<sup>73</sup> New Brief/IMF, 23 November 1999.

<sup>74</sup> World Bank Report, op. cit., pp. 18 et seq.

<sup>75</sup> Letter of the Turkish Government to IMF, 29 September 1999.

<sup>76</sup> Letter of the Turkish Government to IMF, 29 September 1999.

<sup>77</sup> OCHA, Geneva, Report of 5 November 1999, Turkey earthquake, August 1999.

<sup>78</sup> International Monetary Fund, IMF, Press Release No. 99/49 of 13 October 1999.

<sup>79</sup> World Bank, News Release No. 99/034/ECA, 7 September 1999.

<sup>80</sup> World Bank, News Release No. 2000/045/ECA of 14 September 1999.

<sup>81</sup> World Bank, News Release No. 2000/094/ECA of 16 November 1999.

<sup>82</sup> Source: World Bank Report, p. 22.

<sup>83</sup> Deborah Hicks, "Turkey Earthquake Costs", *Oxford Analytica*, 27 August 1999.

<sup>84</sup> Deborah Hicks, op. cit.

- <sup>85</sup> See chapter II, section II.A (ii), of this study.
- <sup>86</sup> Letter of the Turkish Government to IMF, op. cit., pp. 4/14. See also chapter II, section B (a) (ii), of this study.
- <sup>87</sup> Ronald Steven Parker, *Informal Settlements, Environmental Degradation and Disaster Vulnerability—The Turkey Case Study, Lessons from Four Turkish Urban Areas*, pp. 30-31.
- <sup>88</sup> See Andrew Coburn, *Informal Settlements, Environmental Degradation and Disaster Vulnerability, Disaster Prevention and Mitigation in Metropolitan Areas: Reducing Urban Vulnerability in Turkey*, p. 68.
- <sup>89</sup> Ronald Steven Parker, *Lessons from Four Turkish Urban Areas, Informal Settlements, Environmental Degradation and Disaster Vulnerability—The Turkey Case Study*, prepared jointly by the World Bank and the IDNDR Secretariat, 1995, pp. 30-33.
- <sup>90</sup> RADIUS Initiative, IDNDR secretariat, OCHA, United Nations, Geneva, p. 12.
- <sup>91</sup> Andrew Coburn, *Disaster Prevention and Mitigation in Metropolitan Areas (Reducing Urban Vulnerability in Turkey)*, joint study by the IDNDR Secretariat and the World Bank, op. cit., p. 73.
- <sup>92</sup> Ronald Steven Parker, op. cit., p. 32. Munich Reinsurance Report, op. cit., p. 73.
- <sup>93</sup> Ronald Steven Parker, op. cit., pp. 12, 35 and 37.
- <sup>94</sup> Council of Europe, doc. 8594, 13 December 1999, p. 2.
- <sup>95</sup> M. Erdik and Jennifer Swift Avci, "Solutions for Cities at Risk", pp. 51-52.
- <sup>96</sup> RADIUS Initiative, IDNDR, 1999-2000, p. 14.
- <sup>97</sup> UNICEF's Turkey earthquake Recovery Plan for the Six Months after the Earthquake, 10 September 1999.
- <sup>98</sup> RADIUS initiative, pp. 12-13. I
- <sup>99</sup> Ronald Parker, op. cit., p. 38.
- <sup>100</sup> *Solutions for Cities at Risk*, IDNDR secretariat, 1997/1998, p. 229.
- <sup>101</sup> Ronald Parker, op. cit., p. 39.
- <sup>102</sup> RADIUS initiative, op. cit., p. 17.
- <sup>103</sup> *Informal Settlements, Environmental Degradation and Disaster Vulnerability, the Turkey Case Study*, World Bank/IDNDR secretariat, 1995.
- <sup>104</sup> The other cities participating in RADIUS are: Antofagasta (Chile); Guayaquil (Ecuador); Tijuana (Mexico); Bandung (Indonesia); Tashkent (Uzbekistan); Zigong (China); Addis Ababa (Ethiopia); Skopje (Macedonia).
- <sup>105</sup> The other three objectives are to obtain the commitment of the authorities to mitigating disaster risk, to involve residents in the action taken and to reduce economic and social damage.
- <sup>106</sup> Gerhard Putnam-Cramer, Deputy Director, OCHA, Geneva, *Operational and Political Implications of the Turkey Earthquake*, p. 5, 1999/IDER/IPEC International Conference, 12-14 October 1999, The Hague.
- <sup>107</sup> William A. Mitchell, *Report on the Socio-Economic Impact of Erzincan, Turkey, earthquake of 13 March 1992*, p. 15, University of Colorado.
- <sup>108</sup> *Report of the Secretary-General of the United Nations to the Economic and Social Council on the work of the IDNDR Scientific and Technical Committee*, July 1999, p. 1.
- <sup>109</sup> See Hervé Kempf, "Il n'y a pas de catastrophes naturelles", *Le Monde*, 21 August 1999.
- <sup>110</sup> See speech by Kofi Annan, Secretary-General of the United Nations, at the opening of the IDNDR Programme Forum, Geneva, 5-9 July 1999.



# Annex

TABLE I

The share of highly qualified and qualified technical employees working in the manufacturing sector in total of wage earners

City	Total technical employee (%)	Highly qualified technical employee (%)	Qualified technical employee (%)
Bolu	1	1.18	0.83
Bursa	7.31	7.97	6.64
Eskisehir	1.63	32.96	1.45
Istanbul	32.64	32.96	32.32
Kocaeli	6.07	6.59	5.54
Sakarya	1.44	1.37	1.51
Zonguldak	0.99	0.33	1.65
Yalova	0.57	0.64	0.5
Other cities (%)	48.36	47.16	49.58

Highly qualified technical employee: a person organizing production and responsible for it.

Qualified technical employee: a person working with highly qualified technical employee and also responsible for production and having technical education.

Source: State Institute of Statistics.

TABLE 2

Basic Indicators of regional economy\*

	Population	% of GNP	% of industrial value added	Per capita GNP (Thousand dollars)	% of budgetary tax revenues	% of total bank deposits	% of total bank credits	The share in total of bankpayers			The share in Insured person	
								Income	Corporate	Value added	SSI**	Bag-Kur***
Kocaeli	1 177 379	4.6	11.3	7.845	15.6	1.4	0.9	1.9	1.8	1.9	3	1.6
Sakarya	731 600	1.1	1.1	2,734	0.4	0.5	0.2	1.5	0.9	1.3	1.1	2.1
Yalova	163 916	0.4	0.7	4,986	0.1	0.2	0.1	0.4	0.2	0.4	0.3	0.2
Bolu	553 022	0.8	0.7	3,104	0.3	0.3	0.2	1	0.7	0.9	0.7	0.6
Bursa	1 958 529	3.5	5	3434	3	2.4	3.2	3.5	3.6	3.4	5.1	3.2
Eskisehir	560 843	1.2	1.1	3305	0.8	0.7	0.7	1	0.8	1	1.5	1.5
Istanbul	9 198 809	22.6	26.6	4728	37.5	44.1	41	21.6	37.1	24.6	28	10.9
Kocaeli +Sakarya +Yalova	2 073 095	6.3	13.1	5813	16.4	2.1	1.1	3.8	2.8	3.6	4.4	3.9
Total of 7 cities	14 444 298	34.7	46.7	4581	58	49.6	46.3	30.6	44.9	33.5	39.7	20.3
Turkey	62 885 574	100	100	3031	10 0	100	100	100	100	100	100	100

Source: State Planning Organization.

\* Based on 1997 or 1998.

\*\* The Social Security Institution.

\*\*\* The Social Security Organization of craftsmen and tradesmen and other self-employed people.



TABLE 3

## The effects of the earthquake and the damage caused to manufacturing industry in Bolu, Kocaeli, Sakarya and Yalova

Cities	With the earthquake				The share of the insured part in total loss (bn LT)	Insurance rate (%)	Damaged workplaces (%)	Workplaces whose production stopped (%)
	Total number of workplaces	The number of workplaces (production stopped)	The number of damaged workplaces	Total loss (bn LT)				
Total	1 186	1 025	749	295 952.6	146 046.3	49	63	86
Bolu	233	185	109	18 754.6	11 198.8	60	47	79
Kocaeli	690	590	420	167 453.5	115 279.3	69	61	86
Sakarya	218	208	185	97 031.7	12 011.8	12	85	95
Yalova	45	42	35	12 712.8	7 574.4	60	78	93

Source: State Institute of Statistics.

TABLE 4

## Capacity utilization rates in manufacturing industry in the earthquake area before and after the earthquake

Cities	Total number of workplaces	Number of workplaces	Average capacity utilization before earthquake (%)	Average capacity utilization after earthquake (%)	Returning to normal production capacity within a month		Returning to normal production capacity more than a month	
					Number of workplaces	Number of days	Number of workplaces	Number of weeks
Total	1 186	889	87	51	364	16	525	18
Bolu	233	168	90	55	81	18	87	14
Kocaeli	690	487	87	50	238	14	249	19
Sakarya	218	192	77	44	39	20	153	20
Yalova	45	42	98	68	6	15	36	19

Source: State Institute of Statistics.

TABLE 5

## Manufacturing industry after the earthquake (firms employing 10 or more staff)

Cities	Total number of workplaces	Number of workplaces (production affected)	Number of workplaces (damaged)	Predicted amount of physical damage (bn LT)	Total production loss (bn LT)	Total loss (bn LT)	Number of work-force injured	Loss of qualified staff
Total	1 186	1 025	749	295 952.6	355 446.2	651 398.8	3 491	1 314
Bolu	233	185	109	18 754.6	18 372.5	37 127.1	308	85
Kocaeli	690	590	420	167 453.5	234 959.8	402 413.3	1 398	496
Sakarya	218	208	185	97 031.7	84 586.9	181 618.6	1 134	271
Yalova	45	42	35	12 712.8	17 527.0	30 239.8	651	462

NOTE: Information about totally damaged workplaces is not included.

Source: State Institute of Statistics.

TABLE 6  
Assessment of workplaces in manufacturing industry after the earthquake

Cities	Capacity utilization before earthquake	Capacity utilization after earthquake	Number of workplaces reaching normal capacity utilization within a month		Number of workplaces that will reach normal capacity utilization within more than a month		Loss in exports (million LT)	Loss in imports (million LT)	Number of workplaces plan to move to other places
			Workplace	Day	Workplace	Day			
Total	87	51	364	16	525	18	103.9	77.9	17
Bolu	90	55	81	18	87	14	14.8	0.6	1
Kocaeli	87	50	238	14	249	19	61.9	59.5	13
Sakarya	77	44	39	20	153	20	16.1	12.8	2
Yalova	98	68	6	15	36	19	11.0	5.0	1

Source: State Institute of Statistics.

TABLE 7  
Numbers of firms, employment and value added in the earthquake region as percentages of national totals

City	Number of firms %	Employment %	Value added %
Bolu	1.26	1.07	0.96
Bursa	6.51	8.53	6.4
Eskisehir	1.51	1.69	1.32
Istanbul	33.53	28.44	24.8
Kocaeli	3.84	5.07	15.27
Sakarya	1.09	1.17	0.53
Zonguldak	0.41	0.84	2.38
Yalova	0.18	0.55	0.3
Earthquake region	48.34	47.36	52.75
Other cities	51.86	52.64	47.25
Turkey	100	100	100

Source: State institute of Statistics.

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