

5 Food



Location of city studies covered in this chapter

Facts and figures

- Food, along with housing and transportation, is one of those household consumption categories which cause the highest environmental impacts over the life-cycle from the household sector.
- Access to food is a fundamental quality-of-life issue, and yet availability and access to food varies a great deal within each country and across countries. Although the rate of undernourishment has declined in most countries, some still face serious problems of under-nutrition for their citizens.
- Production of food is intrinsically associated with the use of water and land, and agriculture accounts for most of the environmental impact of the food production and consumption chain. Other significant impacts originate from processing, packaging and storage of food, and its transport and waste disposal.
- Food production in SEE and EECCA countries has been affected by a relative stagnation of the agricultural sector during the 1990s and early 2000s. Total production volume declined in half of the countries. Fish production declined by more than a third between 1992 and 2005, as a result of overfishing and collapsing stocks. Some species are on the verge of extinction.
- The sharp reduction in agriculture and food production in most EECCA countries was accompanied by a strong drop in the use of fertilisers and pesticides until the mid-1990s. The use of pesticides and fertilisers began to increase again after the year 2000.
- There is good potential for the expansion of organic food in SEE and EECCA countries that saw a reduction in the use of mineral fertilisers and pesticides during the 1990s. Many farms, although not officially classified as organic, are clean of chemicals and could potentially produce certified organic products. The availability of agricultural labour also constitutes a great competitive advantage.

5.1 Introduction

Detailed analysis carried out in Western Europe has shown that food, together with housing and transportation, is one of those consumption categories which causes the highest environmental impacts when viewed across the whole life cycle (European Commission, 2006; Moll *et al.*, 2006). While similar life-time economy-scale analyses have yet to be carried out in EECCA and SEE, food would be expected to emerge as a key consumption category with respect to energy use and environmental impacts.

Production of food is intrinsically associated with the use of water and land, and agriculture —

encompassing both crop production and animal husbandry — accounts for most of the environmental impact of the food production and consumption cycle. For example, agriculture consumes on average 70 % of the total water used globally. However, there are other significant effects of the food production and consumption chain, including impacts from transportation, processing, packaging and retailing of food, and food wastes generated at the point of consumption.

Food consumption is also a fundamental quality-of-life issue, and yet availability and access to food varies a great deal within each country and across countries. In the more affluent sections of society, high food consumption combined with

sedentary lifestyles leads to a growing incidence of obesity, diabetes and cardiovascular diseases. Conversely, a significant proportion of the population in many SEE and EECCA countries lives below the poverty line and often suffers from food deprivation.

With respect to the environmental pillar of SCP, environmental impacts related to the food sector should be analysed across the entire life-cycle chain, as they occur at different stages of production — from crop and livestock production to transportation, storage and distribution, through food consumption and generation of waste (Figure 5.1).

This chapter first investigates historical and current trends in food production. It then turns to the question of supply and consumption of food in EECCA and SEE, and considers the economic, environmental and social implications of these trends. Finally, it discusses policies, and opportunities and barriers to improvements.

Analysis in this chapter is based on data and information available from international

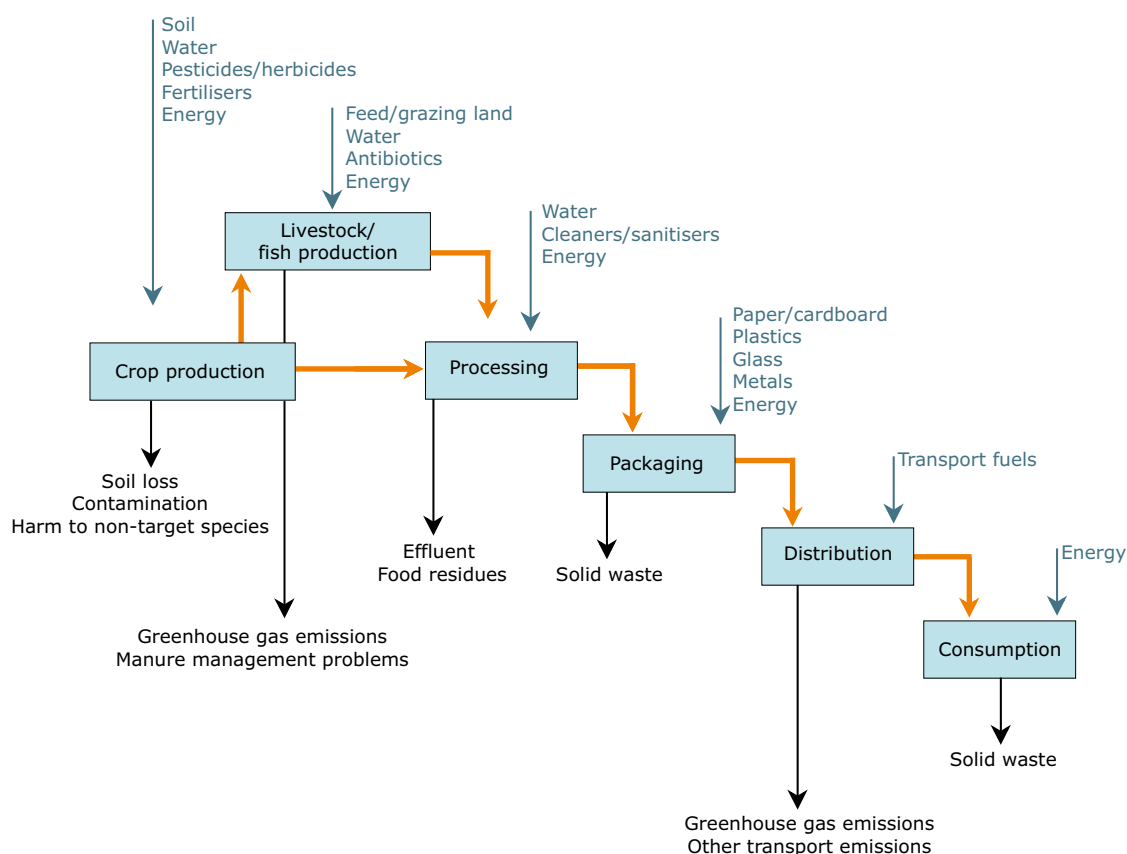
organisations and the published literature on the topic. Information on consumption trends and consumption behaviour in the SEE and EECCA countries was limited by the lack of appropriate statistics at the country level. Therefore, most of the analysis on food consumption behaviour is based upon the results of three city studies carried out for this report in Ramenskoye (Russia), Belgrade (Serbia) and Kosiv (Ukraine). These case studies were conducted by local experts using focus groups and questionnaire surveys.

5.2 Trends, driving forces and impacts

5.2.1 Historical background of food consumption and production

The structure of consumption and production of food in SEE and EECCA countries was dramatically affected by the Soviet and Yugoslav legacies as well as by transition experiences during the 1990s. Agriculture in the Soviet Union was relatively specialised with some regions dedicated to the production of cereals, others to livestock or

Figure 5.1 Food life-cycle chain and related use of resources and environmental effects



Source: UNEP Forum on Sustainable Agri-Food Production and Consumption. <http://www.agrifood-forum.net/issues/index.asp>.

vegetable production. In some EECCA countries agricultural production was structured around large-scale collective farms, producing in many cases monoculture crops. The agriculture industry had centrally-established norms for food production that were imposed on state farms. Farm machinery, fertilisers and pesticides were distributed to farms to meet these norms.

At the same time, those people who had plots of land or *dachas* (summer houses for urban dwellers) grew various kinds of food for home consumption and small-scale trading to supplement the family budget. Where food was bought, purchases were mainly made in state-run shops and farmers' markets.

The state run system was highly centralised and allowed the distribution of staple foods at guaranteed low prices throughout the country. At the same time significant quantities of food were wasted or traded on the black market and serious inadequacies in food provision occurred. Centrally planned agricultural production often took little account of resource efficiencies or the suitability of production of a particular crop to the local environmental conditions. Arable land was expanded at the expense of forests, and the drive to increase production relied heavily on extensive irrigation and drainage schemes and the intensive use of fertilisers and pesticides (EEA, 2007). Not surprisingly, the environmental consequences were highly negative. There is a significant legacy of environmental damage linked to agriculture from the Soviet period, often associated with intensive exploitation of resources (such as freshwater for irrigation) close to or within unique ecosystems (EEA, 2003).

Fisheries, which in terms of tonnage and catch were dominated by Russian and Ukrainian fishing fleets, were also centrally controlled during the Soviet period. Fishing companies were allocated vessels and catches were regulated according to resource assessments by research institutes located at some of the main fishing ports (for example, Murmansk and Kaliningrad in Russia) (Shotton, 2003). From the mid-1950s onwards, the Russian fleet was expanded and became the largest in the world with catches reaching their peak in the mid-1970s. Fish became an important part of diet in Eastern Europe countries, with far lower consumption elsewhere in the regions.

The splitting up of the Soviet Union and Yugoslavia had fundamental effects both on food production (agriculture and fisheries) and on incomes and

food consumption. With respect to agriculture, the transition towards market economies in EECCA and in former Yugoslavia and the resulting economic recession led to reduced levels of subsidies, increasing competition from abroad, and in SEE in particular, widespread privatisation of the state-owned farms. In some instances privatisation was accompanied by partition into smaller farms. Privatisation imposed financial pressures on small-farm owners, and in many cases the result was an increase in subsistence farming, a decline in the cultivation of less productive land, and a reduction in employment and incomes for agricultural workers (EEA, 2007). A few countries (e.g. Armenia), responded by trying to convert from specialised to more diversified agriculture to reduce dependence on imports from the other newly independent states. Elsewhere, there was a sharp reduction in food production, extensive land abandonment in some regions (e.g. Kazakhstan), much reduced input of fertilisers, pesticides and energy (e.g. for irrigation pumps), and deterioration of infrastructures such as irrigation channels and pumps.

The transition period hit the livestock sector especially hard. Prior to transition, countries of the former Soviet block had considerably expanded this sector. By 1990 livestock herds and meat production were 50 % higher than in 1970 (EEA, 2003) and livestock products were heavily subsidised (Rask and Rask, 2004). The diets of Central Asia and Eastern Europe were rich in meat products during this period. For livestock producers transition meant price and trade liberalisation, accompanied by the removal of subsidies for producers and consequently higher prices for consumers.

Fisheries were also affected by the transition. Commercialisation of the fisheries led to the almost complete loss of control by the EECCA countries over levels of catches and sizes of fleets. Economic interests began to take precedence over any encompassing strategy for sustainable long-term exploitation. In addition a significant part of the Russian fishing fleet withdrew from international waters and relocated to Russian seas, leading to increasing pressure on fish stocks in those fisheries. Catches soon exceeded the biological potential of the stocks of the most valuable species. Subsequent reductions in catches led to a decline in commercial interest and the number of people working in the sector dropped by a third, leading to general impoverishment in coastal areas (Matishov *et al.*, 2004).

During the recession which accompanied the transition and conflicts of the mid-1990s,

consumption of high cost foods (e.g. meat and dairy products) fell while consumption of staple foods (e.g. bread and potatoes) remained stable in EECCA and increased in SEE (FAOSTAT, 2007). In general, the recession of the mid-1990s saw an increase in the percentage of populations across the regions who were unable to secure an adequate diet. Under-nourishment became prevalent, particularly in the less wealthy countries.

At the same time there was a general reduction in environmental pressures arising from agriculture. However, abandoned land, undergrazing and lack of capital to improve farm infrastructure also resulted in shrub encroachment on flower-rich grasslands and a consequent loss in biodiversity.

As described in Chapter 2, economic growth has been rapid in most countries since the late 1990s. In all sub-regions, except Central Asia, expenditure on household consumption is higher now than it was prior to transition. This has led to a general reduction in poverty and under-nourishment, and the diets of some regions are beginning to turn towards meat products again (for relevance of this point, see Box 5.2). The agricultural sector has not recovered to the same extent as the rest of the economy, and rising demand for food is being increasingly met by imports. The consumption of food is becoming more complex, with a more diverse range of products, including non-seasonal imports from abroad, an increasing use of supermarkets in urban areas, and a longer distribution chain between producers and consumers. All these developments will have environmental, social and economic implications.

5.2.2 Food production

Ecosystems and productive constraints

To understand the current levels and the evolution of food production in SEE and EECCA countries, it is first necessary to appreciate the diverse range of climatic and geographical conditions and the variety of eco-systems across the vast area covered by this report.

Within Eastern Europe, Belarus, a mainly flat country, has generally good conditions for the production of food, although large stretches of the country require drainage to support agriculture. About one-fourth of its agricultural land is also contaminated by the radioactive fallout from the Chernobyl disaster. Moldova is one of the most productive agricultural areas of EECCA as a result of rich soils and a temperate continental climate. Russia

has a wide variety of habitats, but much of its area contains agricultural land and pastures favourable to food production. Ukraine is made up mostly of fertile plains, steppes and plateaux crossed by rivers, with one-quarter of the country being classified as 'very productive'. The country suffers from a lack of water in the south.

Within the Caucasus, Armenia has many high-rolling plateaus and wide river valleys, with sharp mountains from the southern edge of the Caucasus. Food production is constrained by limited agricultural resources. Azerbaijan is also a mountainous country characterised by a great variety of landscapes and climate zones. Georgia also has a variety of landscapes, with forests covering around 40 % of its territory. Around 75 % of the summer pastures lie in sub-alpine and alpine regions, favouring certain types of livestock.

In Central Asia, Kazakhstan has favourable conditions for agricultural production, and grain and livestock are the most important agricultural commodities. However, the country has been affected by two well-known ecological disasters, namely, the reduction of the Aral Sea and the radioactive disaster of Semipalatinsk. Farming was restricted, due to salinisation and radioactive contamination in these areas. The food sector in Kyrgyzstan is shaped by the Tien Shan Mountains that divide the country; and inadequate precipitation prevents most crop production without irrigation. Due to its limited arable land, livestock represents a large food production activity in the country. Tajikistan is one of the most mountainous countries in the region — 93 % of its territory is mountainous with peaks reaching over 7 000 meters. Agriculture is dominated by cotton production on irrigated lands with food production taking second place. Turkmenistan is predominantly dry with most of its arable land and pastures being subject to desertification. Uzbekistan is also a dry country, with 60 % of its land characterised by arid landscapes. These are focused on cotton production around the Aral Sea in the north of the country with less land dedicated to food (De Rijck and Kazakova, 2006).

A high diversity of ecosystems and habitats are found in SEE countries. This is the case for Albania which produces most of its food in its lowland region. In Bosnia and Herzegovina food production is still shaped by the conflicts of the 1990s: the percentage of uncultivated land was 42.8 % in 1997. Bosnia and Herzegovina is a heavily forested mountainous country. Croatia has many different climatic conditions: alpine in the northwest,

Mediterranean in the west and southwest and continental on its northern and eastern plains, supporting a variety of agricultural production. The former Yugoslav Republic of Macedonia is a country rich in water resources due to its great lakes Ohrid, Prespa and Dorjan, but uneven precipitation and supplies of surface waters means that water demand for food production is not totally met. Montenegro is a mountainous country with some of the most rugged terrain in Europe and it does not have favourable conditions for agriculture. Finally, Serbia with fertile plains in the north, an abundance of rivers, and various types of climates has excellent conditions for diverse agricultural production.

All in all, the general conditions for agriculture in EECCA and SEE are less favourable than in Western Europe although there are some outstanding productive areas. Many ecosystems are very vulnerable (e.g. arid steppes, tundra and mountains) and cannot sustain significant agricultural activity.

Trends in food production and supply

The response to the dismantling of the system of state-controlled agricultural production was determined by how financial constraints and lack of managerial capacity were overcome in each case (Swinnen and Maertens, 2006). Those countries with better managerial capacity, especially for the production and distribution chain, and with easier access to funding, fared better in overcoming the difficulties imposed by economic transition.

Food production became crucial for some former Soviet Republics during the transition period's economic crisis. This was, for instance, the case of Armenia which before the transition was a relatively industrialised country relying heavily

on imports for its food. Transition and the collapse of much of the industrial sector saw Armenia transforming itself into an agrarian economy, with agricultural employment evolving from 15 % during the early 1990s to more than 40 % by the end of the decade. This transformation was, however, not widespread across EECCA and SEE and most countries saw agricultural outputs decrease following transition.

Trends in the output of the agricultural sector between 1992 and 2003 are shown in Figure 5.2. Agricultural production dropped significantly in most of EECCA between 1992 and the bottom of the economic recession in 1998. Economic recovery since 1998 has generally been accompanied by relatively small increases in agricultural output (Box 5.1).

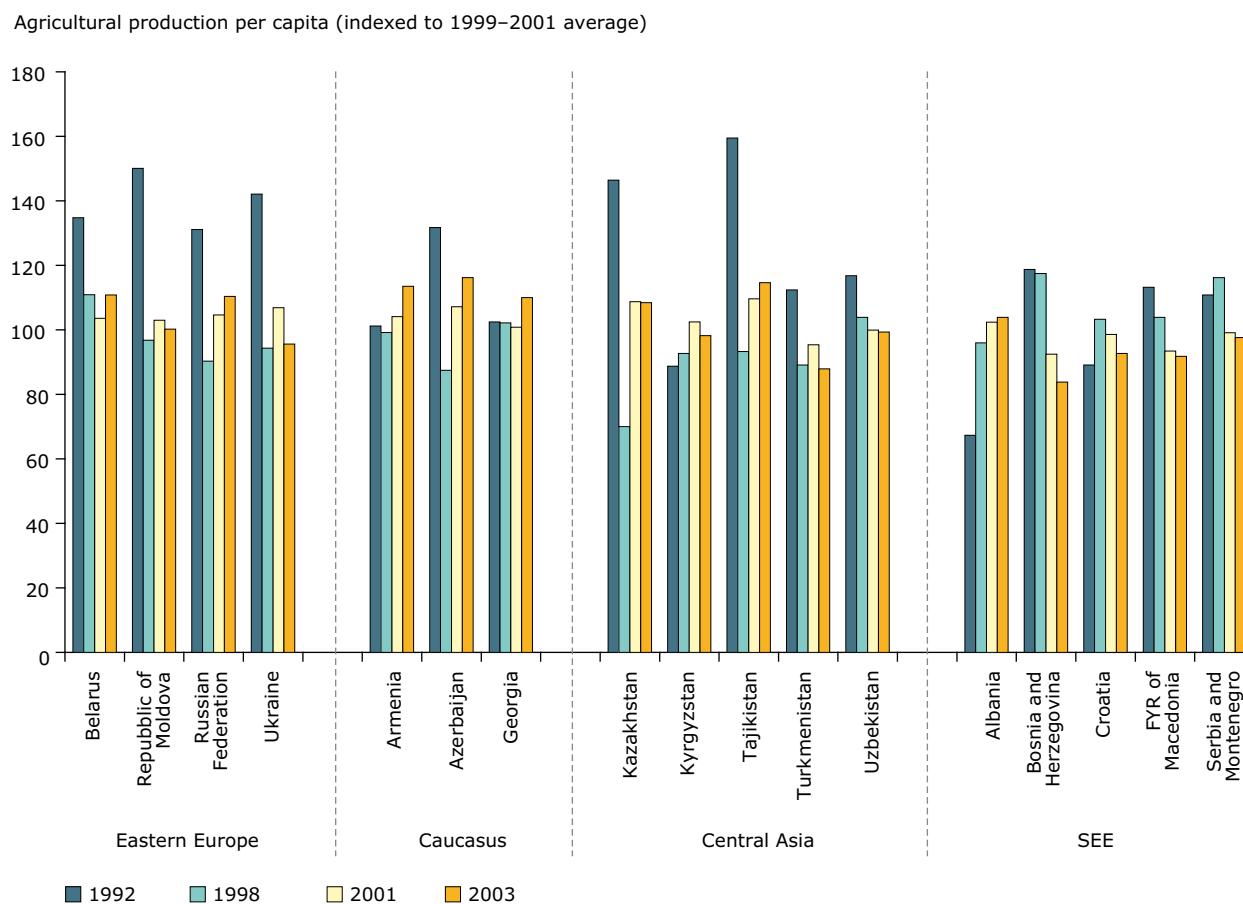
In most of SEE, meanwhile, economic growth has actually been accompanied by reductions in agricultural output. As shown in Figure 2.2 in Chapter 2, economic growth across SEE and EECCA has been led by growth in industry and the service sector, rather than in agriculture, and few countries have achieved the same level of production as they had prior to the transition period. Exceptions to this are Albania, Armenia, Croatia, Georgia and Kyrgyzstan.

Shortfalls between national production and food demands of the population can be met by imports, but only when prices and incomes as well as trade structures allow. During the worst years of the recession following transition, falling incomes and worsening exchange rates led to reductions in imports despite simultaneous declines in national production (see Figure 5.3). The result was reduced consumption of food and critical levels of

Box 5.1 Food production in Ukraine

Prior to transition, food production in Ukraine was mainly organised in collective farms called *kolkhozes*. Reforms in 1992 aimed to improve the economic efficiency of agricultural enterprises, but they failed to fully meet expectations. Most agricultural products today have lower levels of production than in the past. The situation with livestock is no better: cattle decreased 3.9 times, pig livestock declined 2.8 times, while poultry decreased 1.6 times, sheep and goats 5.5 times.

However, during recent years the food processing industry in Ukraine achieved high growth rates, amounting today to 1/5 of total industrial production. The most developed food sectors are: sugar, oil, meat, milk, alcohol, wine, baking and brewing. The case study in the Ivano-Frankivsk region revealed a fragile trade infrastructure in which producers do not effectively participate in the determination of prices. Food supply and demand mechanisms are not fully operative (based on the case study for Ukraine by Green Dossier).

Figure 5.2 Agricultural production per capita (indexed to 1999–2001 average)

Source: UNEP, 2007.

under-nourishment in many countries of the regions (see Section 5.2.4).

Other factors also drive imports. These include an increasing demand for non-seasonal foods, or foods which cannot be produced domestically due to climatic and/or soil conditions. The market place for food is increasingly global and EECCA and SEE countries are no exception. Imports have been increasing relatively steadily along with increasing incomes since the beginning of this decade and are now significantly higher than pre-transition levels in all sub-regions except Central Asia.

Increasing globalisation has also stimulated exports from EECCA and SEE (see Figure 5.3). Exports of agricultural food products have increased from all sub-regions except Central Asia since the end of the 1990s, with growth in exports exceeding growth in imports in Eastern Europe and the Caucasus. This may indicate a future increase in foreign investment and growth in irrigated areas and intensification of agriculture in EECCA and SEE with consequent

economic benefits, but also with simultaneous increases in environmental pressures.

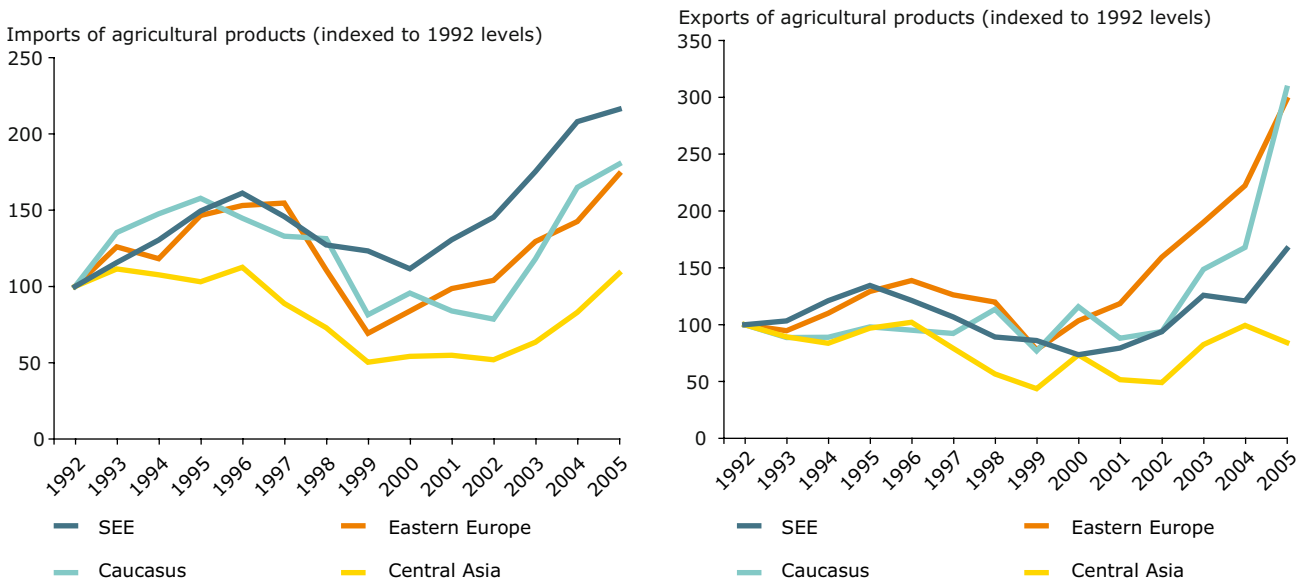
Despite the high growth in exports from Eastern Europe and the Caucasus, all countries in SEE and EECCA with the exception of Moldova, Ukraine and Uzbekistan are net importers of food. This situation has changed little since 1992 (FAOSTAT, 2007).

The fact that many of the same crops and food products are being imported and exported to and from the same countries (for example, all sub-regions are large importers and exporters of cereals) demonstrates typical energy inefficiencies in the dynamics of global food markets. This issue is discussed further under Section 5.2.4.

Use of fertilisers, pesticides and energy

The removal or reduction in agricultural subsidies, privatisation, changes in size and structure of farms, and the opening of EECCA and SEE to global agricultural markets have had profound effects

Figure 5.3 Imports and exports of agricultural food products (1992–2005)



Source: FAOSTAT, 2007.

on the level of agricultural inputs per hectare of agricultural land.

The use of fertilisers decreased significantly during the first half of the 1990s in Eastern Europe, the Caucasus and, to a lesser extent, in Central Asia (see Figure 5.4). There have been more gradual declines in the first two sub-regions since then. In SEE, meanwhile, fertiliser use has increased rapidly since 1993 and is now nearly 50 % higher than pre-transition levels. Despite this growth fertiliser consumption per hectare in SEE is still less than half that of the EU.

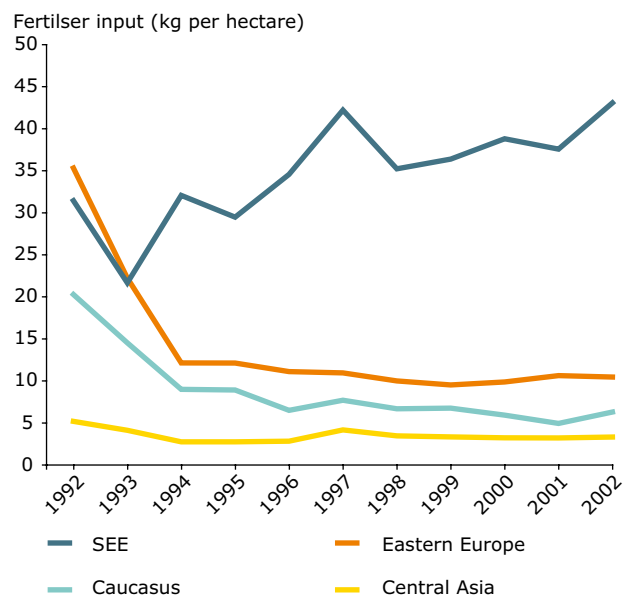
The sub-regional averages hide significant variation at country level. More than three-quarters of total fertiliser used in Central Asia is in Uzbekistan and a large part of this is for the cotton industry (Uzbekistan is the world's second largest exporter of cotton and government subsidies are available for fertilisers) rather than for food production. In all other countries of Central Asia, fertiliser input was very low by 2002 at between 0.6 and 6 kg/ha. In Kazakhstan and Tajikistan fertiliser use fell by a factor of 6 and 4 respectively between 1992 and 2002.

There are also large differences in fertiliser consumption in Eastern Europe. Belarus has the highest fertiliser consumption across the whole of the SEE and EECCA regions at 84 kg/ha, though down from 148 kg/ha in 1992. The fertiliser consumption in Belarus is close to the levels of the EU. Moldova's fertiliser consumption, meanwhile, is

20 times lower at just 4 kg/ha, dramatically reduced from the high consumption rate of 53 kg/ha prior to the transition, when the country was one of the chief food producers for the Soviet Union.

Data are lacking on pesticide inputs, but the data that do exist suggest reductions in pesticide inputs in much of EECCA and possible increases in parts

Figure 5.4 Trends in fertiliser input per hectare (1992–2002)



Source: FAOSTAT, 2007.

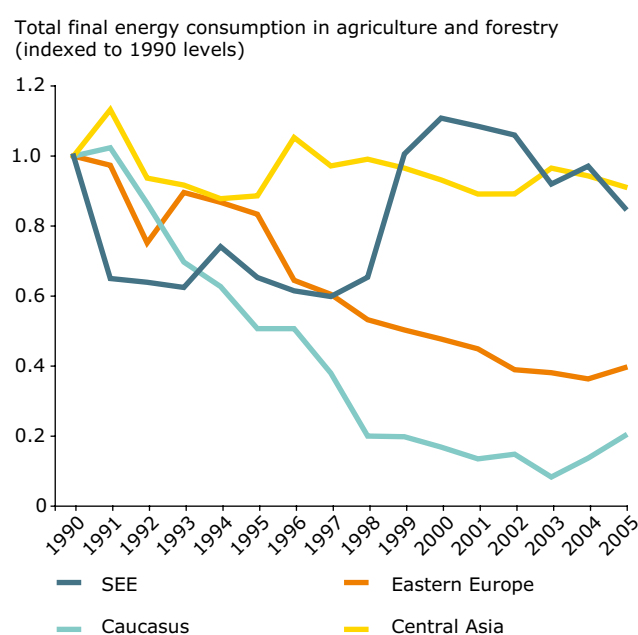
of SEE during the 1990s. Levels of pesticide input per hectare in SEE are approximately the same as in the new EU Member States and about three or four times lower than in Western Europe (EEA, 2007).

Meanwhile energy inputs to agriculture (i.e. for agricultural machinery, irrigation pumps, etc.) fell significantly after 1990 in Eastern Europe and the Caucasus (Figure 5.5) but not in Central Asia. Again, Uzbekistan dominates energy consumption for agriculture in Central Asia, using more than half of all agricultural energy inputs, mostly for cotton production.

Organic farming

According to the International Federation of Organic Agriculture Movements, organic farming is a form of agriculture which is based on sustainability principles of health, protection of ecosystems, and social equity. While voluntary, it is supported by certification systems for farms, and labelling of their products for consumers. Certification systems differ from country to country but common elements are the avoidance of use of artificial fertilisers and pesticides, plant growth regulators, livestock feed additives, the existence of minimum indoor space, and access to pastures for animals (IFOAM, 2005).

Figure 5.5 Energy consumed by agriculture and forestry (1990–2005)



Source: IEA, 2006.

(¹) As defined in this report, SEE does not include Bulgaria and Romania.

Prospects for organic food production were improved in SEE and EECCA countries during the 1990s due to the reduction in the use of mineral fertilisers and pesticides during the transition years. The availability of agricultural labour and areas with good soils unsaturated with artificial fertilisers also lent itself to organic agriculture in SEE and EECCA.

However, organic production has not been supported by widespread government-led certification schemes in EECCA and SEE and has mostly grown under foreign certification labels and export schemes. There is little awareness of, or demand for, organic food amongst populations of EECCA or SEE. Despite this Ukraine, with the 8th largest area of organically farmed land within Europe, has over 240 000 hectares dedicated to organic farming representing 0.5 % of total agricultural land. Most of the production is for export to the EU (Stoll, 2006). The only other countries within EECCA and SEE with more than 10,000 hectares of organically farmed land are Kazakhstan, Russia and Azerbaijan. Organic farming represents 0.4 % of agricultural land use in Azerbaijan but an insignificant proportion in Russia and Kazakhstan (IFOAM, 2006).

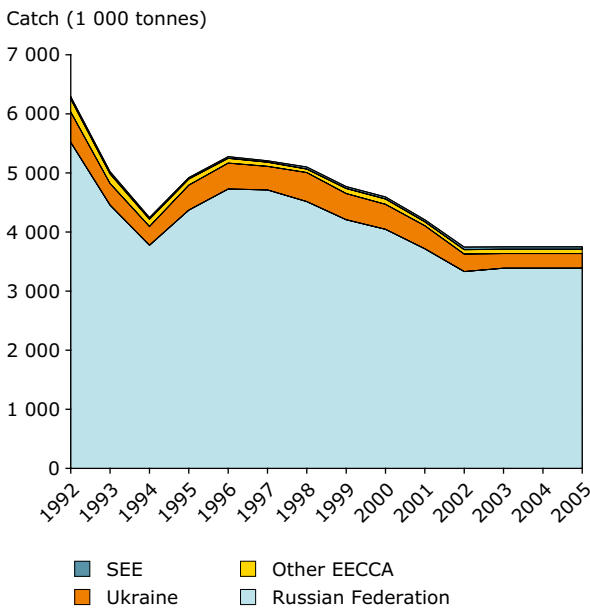
In general, the development of certified organic farming in EECCA and SEE countries lags significantly behind that in the EU. Nevertheless, there is great potential for organic food production in these countries. It is likely that for some years to come the market will continue to be driven by demand for exports to the EU, rather than by demand at home.

Fisheries

In terms of tonnage and catch, the fisheries of the EECCA and SEE (¹) regions are dominated by the Russian Federation, and to a lesser extent, Ukraine. Fish, mollusc and shellfish catches in these two countries made up 97 % of total catches by countries of the regions in 2005 (see Figure 5.6). Of the other countries the catches of Croatia, Kazakhstan, Turkmenistan and Belarus are currently the greatest in size. At the beginning of the 1990s, Azerbaijan and Georgia were among the most productive countries other than Ukraine and Russia, but they have since seen significant declines. Catches shown in Figure 5.6 show registered catches only, but illegal catches may also be significant (EEA, 2007).

Much of the Russian fish catch takes place in the economic zones of foreign states and in international

Figure 5.6 Production by the fishing fleets of EECCA and SEE (1992–2005)



Source: FAOSTAT, 2007.

waters of the world's oceans, but this catch diminished by around 50–60 % during the 1990s, as the Russian fleet largely relocated to areas within the country's economic zone (Matishov *et al.*, 2004). Main fisheries within the economic zones of SEE and EECCA countries comprise: atlantic cod (the largest remaining cod stock in the world), haddock, cat-fishes, red-fishes, halibut, plaice, herring and polar cod in the Barents Sea; anchovy, bluefin tuna, mackerel, sprat, whiting in the Black Sea; sturgeon, sander, carp and bream in the Azov Sea; and sturgeon and salmonids in the Caspian Sea (EEA, 2007; Matishov *et al.*, 2004).

Many of these fisheries have been overfished and catches have been declining in recent years as a result. One of the most dramatic examples has been the decline in the catch of sturgeon. The Caspian Sea supports 85 % of the world's sturgeon which are fished principally for caviar for export. The catch has fallen from close to 30 000 tonnes in 1975 to just 800 tonnes in 2005. This is partly due to the regulation of water flow, invasive species and a decrease in natural spawning sites, and also due to illegal fishing and trade. For example, illegal fishing is estimated to exceed legal catches by more than 500 % (EEA, 2007).

Within the Barents Sea, catches increased during the early- to mid-1990s due to an increase in an abundance of cod, but these stocks have since declined. Nevertheless, their exploitation has

remained high and since 1998 cod stocks and fishing pressure has exceeded safe biological limits (Matishov *et al.*, 2004).

Meanwhile, in the Black Sea, fish stocks have been affected by overfishing, but also by pollution. Phosphates and nitrates flowing into the sea from the Danube basin have led to high levels of eutrophication, with substantial effects on ecosystems and food chains (EEA, 2005a).

5.2.3 Food consumption

Figure 2.11 in Chapter 2 shows trends in household consumption expenditure in the various sub-regions between 1990 and 2005.

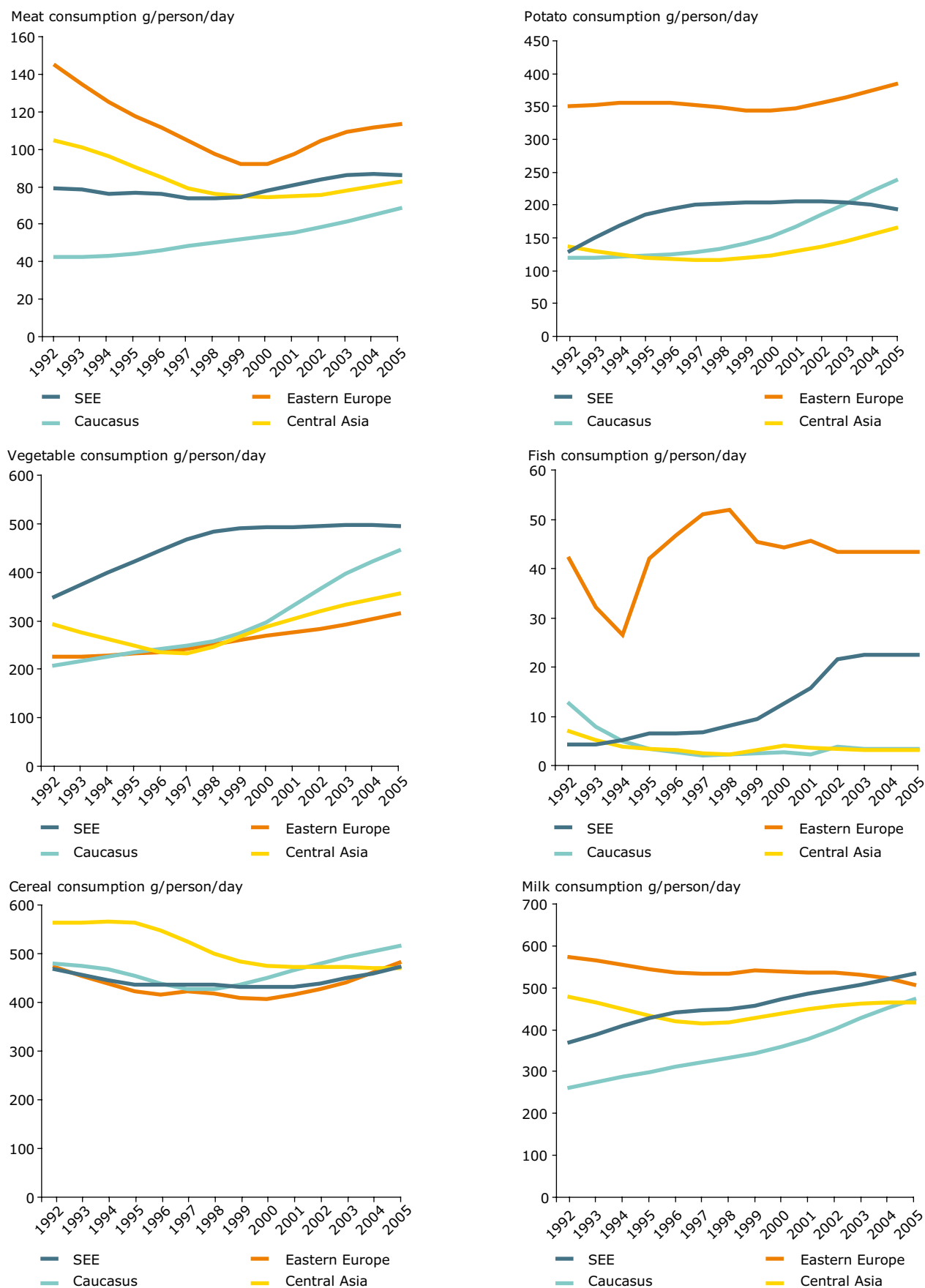
Expenditure on food, along with clothing, was the most stable element of household expenditure during the shrinkage in household incomes during the 1990s and the subsequent recovery (see Figure 2.12 in Chapter 2). During the worst economic years of the late 1990s, expenditure on food comprised more than half of total household expenditure, although this had reduced to 38 % of consumption expenditure by 2005. However, there are big differences between individual countries of EECCA and SEE. In Croatia, with the highest GDP per capita, expenditure on food represents 33 % while in Tajikistan, at the other extreme, food accounts for 64 % of household expenditure.

While household spending on food declined and recovered again over the past 15 years, there were also significant changes in the kinds of food being consumed (Figure 5.7).

The graphs show some underlying differences between the diets of the various sub-regions which are likely to reflect the long-term availability and affordability of types of food. They are also affected by cultural differences and varying energy requirements due to climate. Eastern Europeans in general eat more meat, fish and potatoes than people in the other regions, while the populations of SEE have a high consumption of vegetables.

The graphs also show how food consumption changed during and following the transition. One clear trend is that the consumption of meat and cereals dropped during the economic recession (except for meat in the Caucasus), but has been rising again as incomes have gone up. In Central Asia and Eastern Europe meat consumption has yet to recover to pre-transition levels. Trends in SEE clearly show that the consumption of staples such as vegetables and potatoes increased during

Figure 5.7 Regional developments in food consumption (1992–2005)



Source: FAOSTAT, 2007.

the recession, as a result of comparatively lower prices and/or greater production on householders' own land in response to lower incomes (Figure 5.7). Similar trends might be expected in other regions, but they are not visible, possibly due to difficulties in collecting data on householders' own production.

A study of households carried out in Velikiy Novgorod in Russia (Ekström, *et al.*, 2003) suggest that at least here similar changes in patterns of consumption occurred as in SEE. Households reported less consumption of meat and/or fruit, citing the rise in food prices and the decline of income as the reason. Many households in Russia were self-sufficient in the provision of vegetables and potatoes (Table 5.1), relying on their own production at their *dachas* (country houses).

Consumption of fish in Eastern Europe (Figure 5.7) closely followed developments in the catch (Figure 5.6), rather than being dependent on income or macro-economic changes.

Food consumption and life styles

Only limited data on lifestyles and their impacts on food choices and habits are readily available. To support this report, three case studies were carried out in the regions of Ramenskoye (Russia), Belgrade (Serbia) and Kosiv (Ukraine). Some of the findings show positive implications for SCP while other trends present challenges for future sustainability.

Food purchases versus own production

Figure 2.12 in Chapter 2 illustrated important national differences in the choices of food within household budgets. However, the proportion of income spent on food also differs widely within countries and within communities. In Dagestan (southwest of Russia) it accounts for 60 % while in Western Siberia it is around 30 %. In the city study of Ramenskoye, the average proportion of household expenditure spent on food is more than 50 % but was found to be as high as 90 % for retired persons with low incomes.

However, income is not the only influencing factor in the proportion of income used to buy food – lifestyle, tradition, and preferences all play a role. Another important factor is access to land where householders can grow their own food. As can be seen from Table 5.1, Russian householders produce significant quantities of their own food.

In rural areas, home production accounts for a large share of consumed foods, ranging from 38 %

Table 5.1 Food sources in Russia in 2004 (%)

Products	Urban area	Rural area
Bakery foods		
Bought	99.9	96.9
Own production	0.1	3.1
Potatoes		
Bought	56.0	13.6
Own production	44.0	86.4
Vegetables		
Bought	66.8	31.9
Own production	33.2	68.1
Fruit and berries		
Bought	76.6	49.8
Own production	23.4	50.2
Meat and meat products		
Bought	97.8	62.5
Own production	2.2	37.5
Dairy products		
Bought	97.9	55.8
Own production	2.1	44.2
Eggs		
Bought	96.7	48.9
Own production	3.3	51.1
Fish and fish products		
Bought	97.3	79
Own production	2.7	21

Source: Экономика сельского хозяйства России №10'05, стр.17 (Agricultural economics in Russia, 10/2005).

for meat, to 86 % for potatoes. City dwellers, while purchasing most meat and dairy products, produce 44 % and 33 % of their potatoes and vegetables, respectively.

This high level of self-sufficiency in food production is a good example of sustainable living which, due to its large scale, is likely to bring about important environmental and social benefits. These include reducing energy consumption in the production and transportation of food, as well as increased food security. The tradition of home production has its origins in necessity, but has become so much a part of Russian culture that it may continue long after the economic necessity has disappeared. The concept of *dachas* also spread to other parts of the Soviet Union during the 20th century, particularly in Eastern Europe.

Place of food purchase

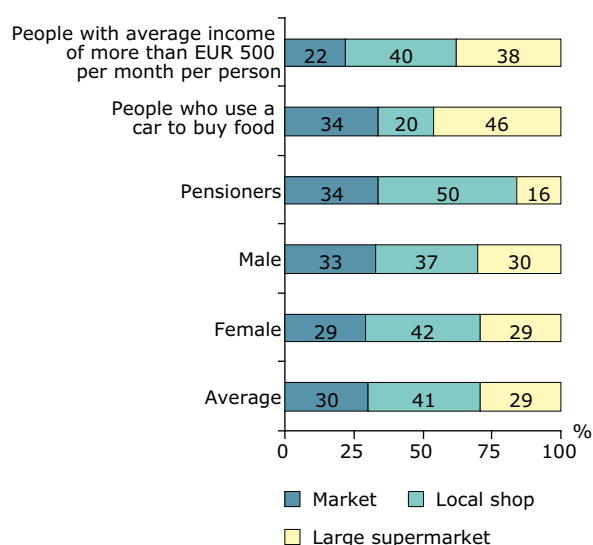
As shown in Figure 5.8, the most popular places to buy food in Ramenskoye are still local markets (40 %), but with an increasing presence of large

supermarkets (30 %). In particular, those with private cars buy 44 % of their food in supermarkets. While supermarkets in themselves are not necessarily less sustainable, the combination of cars and supermarkets can potentially lead to a spiral in environmental and social effects in suburban and rural areas, such as closure of local shops and difficulties for people without a car to purchase their food conveniently, and increasing environmental pressures from fuel use and air emissions. As described in Chapter 7, car ownership remains low in EECCA and most of SEE, but is increasing rapidly. Use of the car for shopping is therefore likely to grow unless accompanied by integrated urban and transport planning in towns and cities.

In Belgrade, the use of cars for shopping remains low. The large majority of those contacted walk to local shops (Figure 5.9) and more than half shop for food within 200 meters of their home. Shopping for food is usually done in small local shops (42 %), followed by large supermarkets (33 %) and traditional vegetable markets (25 %) (Figure 5.10).

Price remains the most common factor that affects customers' decisions on where to purchase their food, but most people take into consideration other factors. In Kosiv, Ukraine, preference for buying food in supermarkets appeared to be related not only to price and marketing but also to buyers' perceptions that supermarkets exercise stricter quality and hygienic control than local shops.

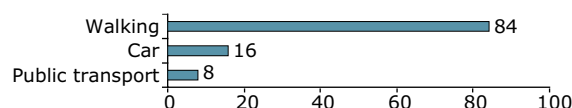
Figure 5.8 Food purchase by place of sale in Ramenskoye



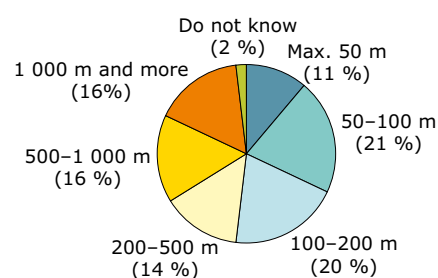
Source: Ramenskoye city study.

Figure 5.9 Food shopping preferences, by distance and mode of transport, Belgrade

Mode of transport for shopping trips



Distance to place of food purchase



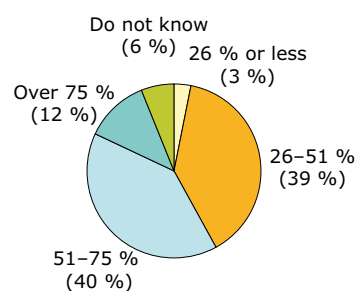
Source: Belgrade city study.

Attitudes to food labelling

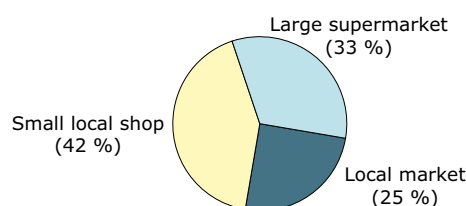
The concept of organic food is little known among consumers in Belgrade. Nevertheless, when explained to them what it was, 88 % of respondents claimed that they would probably buy certified organic food because they believe it to be healthier. However,

Figure 5.10 Food as a share of household budget, and place of purchase, Belgrade

What percentage of your household budget is spent on food?



How much of your food do you buy from



Source: Belgrade city study.

there is a general distrust in current certification schemes. In Kosiv in Ukraine, 91 % respondents claim to verify whether the food they buy is organic, but there was a similar widespread distrust about information on organic products.

Sales of organic food remain very low in Serbia and Ukraine. While this may partially be a result of a lack of trust in certification schemes, it may also represent a typical gap between stated willingness and concrete action. All the same, the high stated awareness of organic food in Ukraine and a willingness to pay extra in Belgrade are positive signs which could be nurtured by governments and retailers through support of certification schemes and provision of information. In Armenia a market study carried out by Urutyán (2006) concluded that a lack of knowledge and information is crucial in defining the consumption of organic products in that country, where the organic movement already began in 1988.

Householders in both Belgrade and Kosiv stated a strong preference for food produced in their own country. In Belgrade this is due to the belief that they have a higher level of quality than foreign goods. In Kosiv the purchase of domestic food products is more motivated by 'buy local product' sentiments than by ecological awareness. However, these stated preferences for nationally produced food may have

positive environmental effects by slowing down the increase in the transportation of food products from the producer to the consumer.

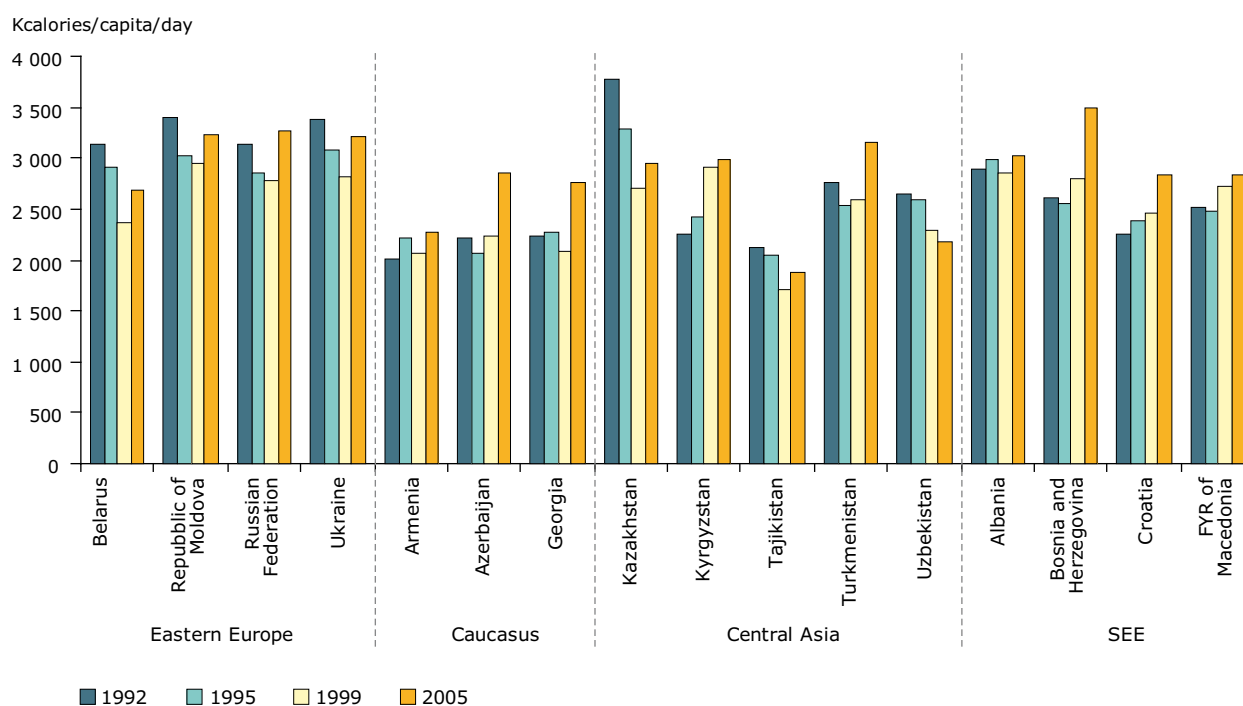
5.2.4 Social and environmental implications

Food consumption and health

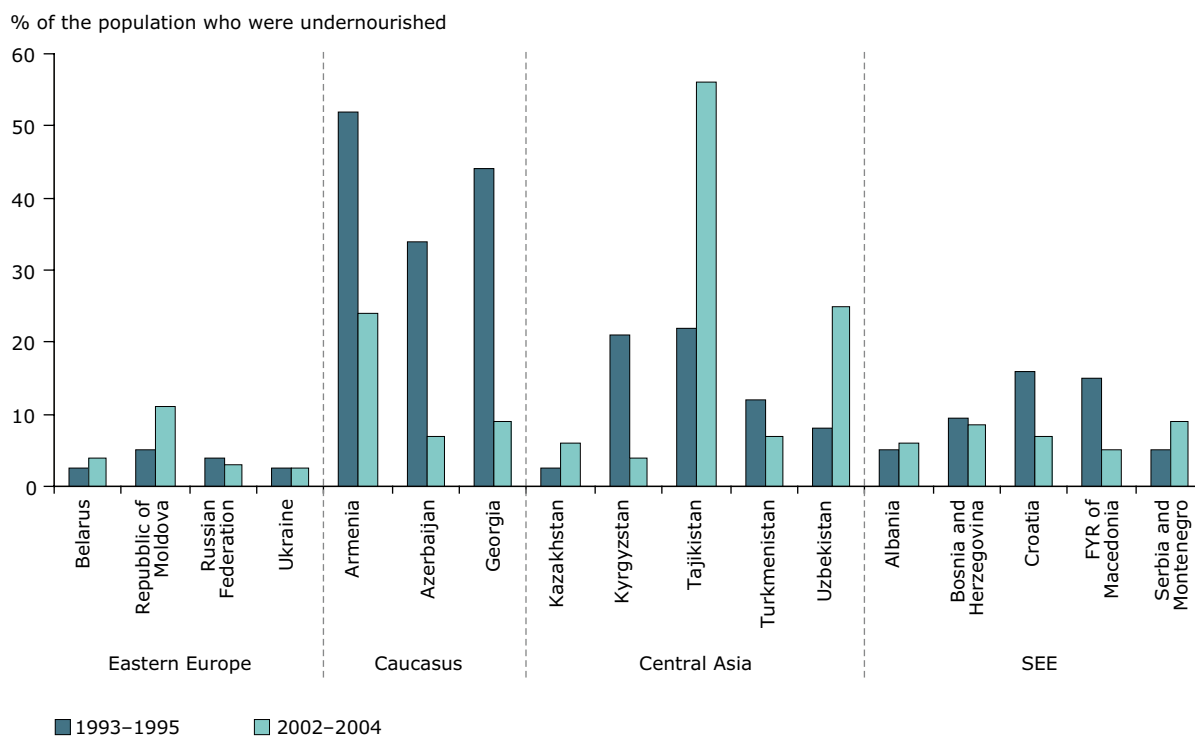
Trends in calorie intake between 1992 and 2005 in EECCA and SEE are shown in Figure 5.11. Calorie intake decreased in most of EECCA during the recession of the mid- to late-1990s, but has partially recovered since then in all countries except Uzbekistan. Only in four out of the 12 EECCA countries, however, was calorie intake in 2005 higher than pre-transition levels. Average calorie consumption in Armenia, Tajikistan and Uzbekistan remains below or close to the WHO average recommended levels for men and women.

Under-nourishment was a critical problem in the Caucasus and parts of Central Asia during the mid-1990s, but was also high in parts of SEE. Most countries have seen progress since then (Figure 5.12). Of most cause for concern are developments in Tajikistan and Uzbekistan, and to a lesser extent Moldova, where under-nourishment has increased. Under-nourishment also remains a significant problem in Armenia, in spite of striking improvements.

Figure 5.11 Dietary energy consumption (kcal/person/day)



Source: FAOSTAT, 2007.

Figure 5.12 Prevalence of under-nourishment in EECCA and SEE

Source: FAOSTAT, 2007.

At the other extreme, in the more affluent sections of society, high food consumption combined with sedentary lifestyles leads to a growing incidence of obesity, diabetes and cardiovascular diseases. EECCA, followed by SEE countries, already have the highest mortality rates from cardio-vascular disease in Pan-Europe, with 17 out of the 18 countries of EECCA and SEE lying within the top 20 places (WHOSTAT, 2007). However the main reasons for this are probably inadequate resources for medical care rather than diet and life-style choices.

Impacts from agriculture

As shown in Figure 5.1 at the beginning of the chapter, environmental pressures arise at many points during food production, transportation, retailing and consumption. The majority of impacts occur during agricultural (and fishery) production and food processing (EEA, 2005b). With the growing global market for food, transportation and refrigeration are increasingly adding to these impacts through the use of energy and resulting air emissions. Within households, transportation to and from shops, energy used for refrigerators and cooking, and finally the generation of food waste all lead to increased environmental impacts.

In the EECCA and SEE regions, food production has led to a number of environmental problems:

- salinisation;
- desertification;
- erosion of soils in mountain and foothill areas;
- contamination of ground and surface waters with pesticides;
- overfishing and collapse of fishstocks;
- eutrophication of surface water from fertiliser and manure run-off;
- loss of soil fertility from the application of agricultural chemicals;
- biodiversity loss due to both expanding agriculture and abandoned grazing.

Desertification can be a result of insufficient crop rotation in agriculture, overgrazing, irrigation, drainage, and soil erosion. In addition, excessive use of mineral fertilisers and pesticides in agriculture can affect the quality of groundwater and lead to land degradation.

The percentage of land under irrigation is high in the Caucasus, Albania, and parts of Central Asia. At approximately 3.5 %, averages across the regions are still low in comparison to Western Europe (9 %) and have changed little since the early 1990s. Nevertheless at current levels, irrigation in Central Asia and the Caucasus is causing declines in local water resources and quality, falling groundwater tables, salinisation and degradation of land as well as impacts on ecosystems (EEA, 2007).

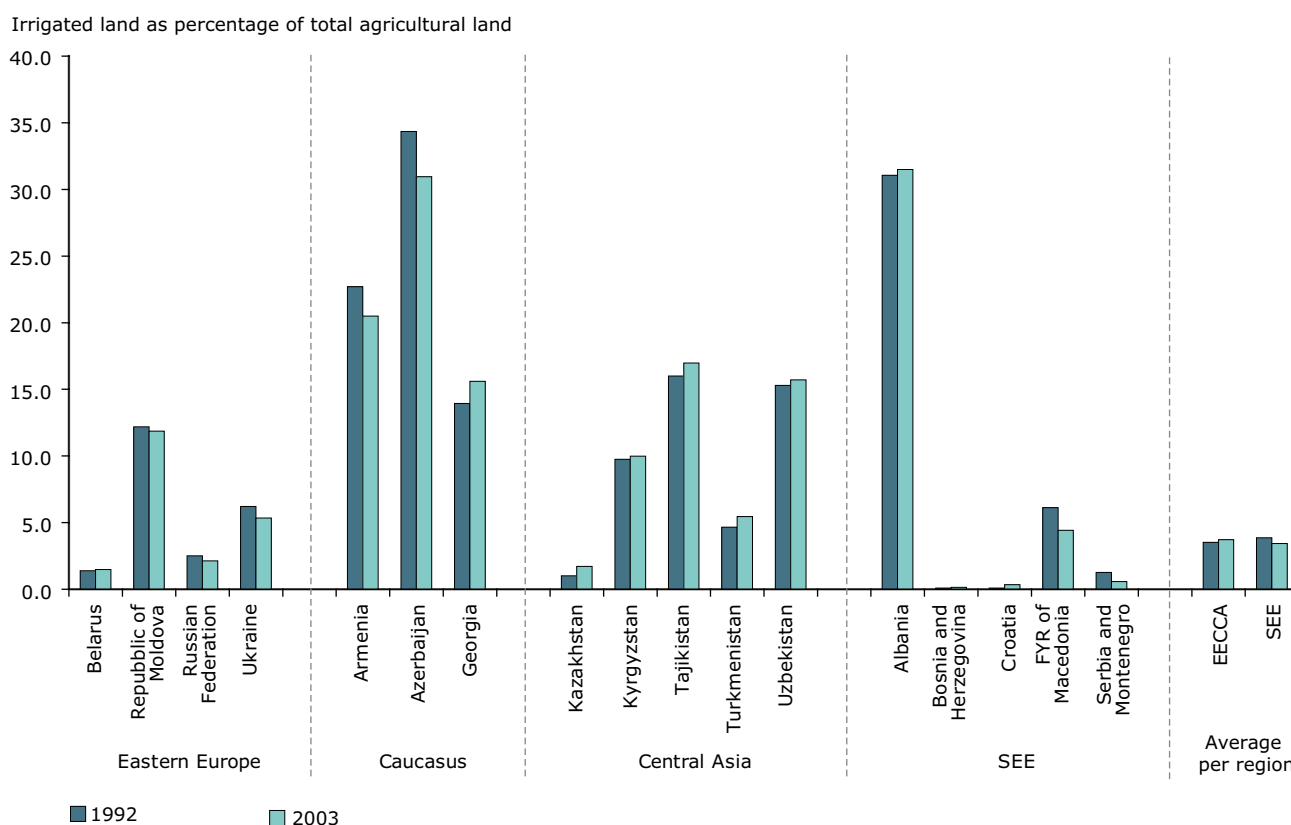
In Central Asia 78 % of the water is polluted due to irrigated agriculture. Discharge from irrigated lands, excessive mineralisation and pesticide and chemical fertiliser pollution have been pointed out as 'the acute problem of Central Asia' (UNEP, 2006). In the south of Kazakhstan untreated drainage waters from irrigated fields affect an area of 900 000 ha. In Kyrgyzstan pollution by irrigation systems and inadequate methods of watering lead to leakage and pollution discharges from irrigated fields and these result in contamination of surface water by fertilisers and pesticides. Similar problems are seen in Uzbekistan. Increasing water contamination in Central Asia is not so much

due to an increase in food production or growth of arable land, but rather due to the reduced effectiveness in the management of irrigation (UNEP, 2006).

Livestock is also responsible for a considerable amount of pollution of surface and ground waters. In many mountain ecosystems livestock provide the principal food production activity, but there are generally poor or non-existing systems for the collection, storage and treatment of manure. Livestock farming can have other impacts. In many EECCA countries, overgrazing by sheep has also produced erosion and desertification.

Soil erosion due to overgrazing, land use conversion and tilling also presents a problem in parts of SEE. The problem of erosion and the washing-away of soil is most serious in Albania, where there is an annual loss of 20 to 70 tonnes of soil per hectare. It is estimated that as a direct result of intensive agriculture, around 20 % of the territory of Serbia and Montenegro (20 000 km²) is classified as 'degraded by water and wind erosion' (Marczin, 2005).

Figure 5.13 Irrigated area as a percentage of agricultural land area



Source: FAOSTAT, 2007.

As shown earlier in Figure 5.4, fertiliser use in SEE is growing and eutrophication and water pollution from high nutrient loads and from manure discharges from animal farms (especially pig farms) is a growing problem. The most affected regions in SEE are the Pannonian parts of Croatia, the western and eastern parts of Kosovo as well as northern and central Serbia, the area around Shkoder lake in Montenegro, and the lower regions of the former Yugoslav Republic of Macedonia (Marczin, 2005).

The use of fertilisers per hectare of agricultural land meanwhile declined dramatically in EECCA during the 1990s and in most countries it is an order of magnitude below averages in Western Europe. However, while the decline in fertiliser use and livestock numbers in EECCA have reduced pollution problems, practices in the use of fertilisers and the treatment of manure in these countries are not environmentally sound (EEA, 2003). Moreover, inorganic fertiliser consumption is expected to increase in many EECCA countries in response to new market and export opportunities as has been seen in SEE. Fertiliser and manure treatment may be an area that calls for policy attention (EEA, 2007).

The use of pesticides can lead to pollution of drinking water, surface and ground waters and of soils with persistent substances which are harmful to ecosystems and humans. Although available data are fragmentary, there is some evidence that pesticide use decreased in EECCA and SEE countries during the 1990s and early 2000s. It certainly remains at very low levels compared to those in the EU. However, significant pesticide concentrations can be found in surface water bodies in parts of EECCA (UNECE, 2000 and 2003) and some local situations deserve attention. For example, recent efforts in Armenia to increase food production have led to an increase in pesticide use. In the agricultural regions of Ararat and Oktemberian agrochemicals are found in high concentrations in soil, water and food and have accumulated in mothers' breast milk (Huijben *et al.*, 2005).

Some areas of EECCA remain affected by the high use of fertilisers and pesticides during the Soviet period. For example, in some parts of Moldova, the large use of pesticides (up to 14 kg per ha before 1990) and fertilisers, combined with other environmental risks like landslides, salinisation, erosion, flooding, have resulted in pollution of rural wells (60 %) by nitrates and other nitrogen compounds. Another problem in Moldova is the big stockpiles of pesticides left over from the

collective farming period (UNECE, 2005). They present potential environmental and health risks from leakage. Often, no one is willing to take responsibility for the removal and disposal of these stockpiles (EEA, 2007).

Water pollution from pesticide use and pesticide run-off has also been a problem in parts of SEE. The most severely affected water systems are those of the Danube, Drava and Sava rivers (Marczin, 2005).

As higher incomes lead to increased meat consumption, the demands on water will intensify with the expected increase in livestock numbers and the production of animal feed. As Box 5.2 shows, the production of meat and beef in particular puts a very high demand on water resources.

Biodiversity has been affected by both the expansion of agriculture in some areas and the abandoning of land in others. With respect to the former, high levels of rural poverty and extreme dependence on land resources for food have led the poor to use land for agriculture within the boundaries of national parks and protected areas, particularly in Serbia and Montenegro and Kosovo (Marczin, 2005). Land abandonment or reduced grazing, on the other hand, affects more semi-natural areas, especially species-rich grasslands.

Energy used in agriculture also has environmental impacts mostly resulting from emissions to the air from the combustion of fuels. These emissions lead to climate change, acid rain and eutrophication. Agriculture is a reasonably important consumer of energy within the national total, accounting for between 2 % of total final energy consumption in SEE to 5 % in Central Asia. However, as shown in Figure 5.5, energy use for agriculture fell during the 1990s in Eastern Europe and the Caucasus, and the contribution to final energy consumption went down accordingly from 4.1–2.6 % in Eastern Europe and from 5.4–2.7 % in the Caucasus between 1990 and 2005 (IEA, 2006).

Again, the increasing consumption of meat and milk in all regions, but particularly in Eastern Europe, has implications for energy consumption of the agricultural and food sectors, as meat and dairy products have generally much higher fossil fuel energy inputs than those required to produce an equivalent quantity of vegetable protein (see Box 5.2).

Box 5.2 Choice of diet matters

Food products vary widely in terms of the environmental pressures they create along their full production chain. The full production chain for beef, for example, includes all inputs invested in the growing of grain for animal feed, energy used in producing artificial fertilisers and pesticides which are applied to the grain during its growth, energy used for transporting animal feed to the livestock farms, fertiliser and water inputs into pastures, and energy and water used in farms and during the slaughter and processing of the cows.

Studies, albeit mostly based on intensive agriculture in Western Europe and North America, have consistently found that meat and dairy products require considerably higher inputs of energy, water and land and lead to greater environmental pressures than equivalent amounts of vegetables, cereals and other crops (European Commission, 2006). This is particularly true where animals are fed with processed vegetable feeds rather than put to pasture. On average, 10 g of vegetable protein are needed to generate 1 g of animal protein (Reinjders and Soret, 2003).

Inputs of fossil fuels are also much higher for meat than vegetables and are highest for beef. Comparisons in the US found the following:

- 3.3 kcal of fossil fuel required for 1 kcal of vegetable protein from grain
- 4.1 kcal of fossil fuel required to produce 1 kcal of chicken protein
- 50 kcal of fossil fuel required to produce 1 kcal of lamb protein
- 54 kcal of fossil fuel required to produce 1 kcal of beef protein

The amount of water consumed in the production of foods is also significantly greater for meat than for vegetables or cereals. The World Water Council (2004) and Pimentel (1997) found the following differences:

- 500 litres of water to produce 1 kg of potatoes
- 1 000 litres of water to produce 1 kg of wheat
- 2 700 litres of water to produce 1 kg of eggs
- 13 500 litres of water to produce 1 kg of beef.

Another study found that 26 times more water was required to produce the same amount of meat protein as compared with vegetable protein, although in areas where intensive irrigation is necessary (as in large parts of the Caucasus and Central Asia) the difference is reduced to a factor of 4 (Reinjders, 2001).

All in all, the choice of diet has significant — if perhaps surprising — environmental implications, especially concerning energy and water use.

Impacts from fisheries

Fisheries can cause significant pressure on marine and coastal eco-systems through a number of direct and indirect mechanisms. Direct impacts of fishing occurring in EECCA and SEE countries have included:

- ***Fishing of the target species beyond sustainable limits and their effects on other species.*** This leads to a drop in the stocks of the target species, but the ecosystem disruptions affect the rest of the food chain. As stated earlier, much of the fisheries of the seas around EECCA and SEE have shown strong signs of over-fishing
- ***Mortality of non-target species due to by-catch and discards.*** Discards of commercial species were estimated to be as high as 5–12 % in the Barents Sea during the 1990s (Matishov *et al.*, 2004). By-catch of non-commercial fish is

combined with other environmental changes over the past two decades and dramatic declines in target fish populations. Examples include Atlantic cod and whiting in the Barents Sea and Russian Arctic; the virtual disappearance of swordfish, tuna and mackerel, a decline in anchovies in the Black Sea and the dramatic decline of sturgeon stocks in the Caspian Sea (EEA, 2005a; EEA, 2007; Matishov *et al.*, 2004).

higher, up to approximately 30 % by weight in the Northeast Atlantic including the Barents Sea (EEA, 2007). Discard is lower in the Black Sea at approximately 4.9 % (FAO, 2005). Some species, for example sharks, are particularly vulnerable.

- ***Destruction of the sea bed and benthic life through trawling.*** Bottom trawling in high-intensity fishing areas can cause long-term damage to the structure of the sea bed and to benthic life. Data on the extent of this in trawling areas in EECCA, such as the Barents Sea, are limited, however.

Overfishing and the resulting loss of catch have led to decreased investments in fishing fleets during the 1990s in the main northern Russia fishing ports. Employment in the fishing sector in these areas dropped by a third, causing impoverishment within coastal communities already suffering from the effects of the recession (Matishov *et al.*, 2004). This has also been the case in the coastal communities of the Black and Azov Seas (EEA, 2005a).

Impacts from transportation

Long distance trade in food is no new phenomenon in the EECCA region. For example, during the Soviet period Russia's northern regions imported food from a large part of the Soviet Union (Kuo

et al., 2006). Imports and exports of food products to and from EECCA countries decreased during the late-1990s, but have generally been on the increase since the beginning of this decade (see Figure 5.3). The same is true of SEE countries. This growing international trade in food is likely to have led to an increase in environmental impacts from transportation. Besides transportation, deep-freezing of vegetables and other products has increased, resulting in additional energy use (see Box 5.3).

It is typical of global food markets that much of this transportation of food appears repetitive and unsustainable. In many cases EECCA and SEE countries are importing and exporting similar quantities of the same food products. For example, cereals are one of the top three import and export products in all four sub-regions and this is not only due to trade within the sub-regions. For example, Russia exported 2.1 billion dollars worth of cereals and imported 2.3 billion dollars worth of cereals in 2005. Similarly, Croatia exported 96 million dollars worth of milk and milk products and imported 50 million dollars worth (FAOSTAT, 2007). Such practices are encouraged by low transport costs which do not include the full costs of environmental and social impacts.

With respect to transport use by consumers, anecdotal evidence from case studies suggests that increasing car ownership (see Chapter 7) may be

Box 5.3 Choice of food origin matters

Box 5.2 described how meat and dairy production is much more energy and water intensive than vegetable and cereal production. The choice of a diet is therefore a key in determining the environmental pressures resulting from food consumption. However, the origin of the food is also critical.

Impacts from food produced by intensive agriculture can be greater than food produced using organic methods. Meat and vegetables from organic and intensive production were evaluated according to a set of environmental factors. Meat from intensive agriculture was found to have twice the environmental pressure score as organic meat, while the difference between vegetables from intensive agriculture and organic agriculture differed by a factor of more than three (Reinjders and Soret, 2003). Other studies have shown that organic milk production is almost five times more energy efficient on a per animal basis and three-and-a-half times more energy efficient per litre of milk than intensive milk production (ADAS Consulting, 2001).

The country of origin is also critical. The energy used to transport food between countries can be high when compared to the energy content of the food itself. For example, 97 calories of transport energy are needed to import one calorie of asparagus by plane from Chile to Europe, and 66 units of energy are consumed when flying 1 unit of carrot energy from South Africa to Europe (Church, 2005). Energy consumed when transporting food by ship or lorry is lower but in many cases requires additional cooling or freezing.

If organic food is not available locally, in some cases buying local non-organic food may have lower overall environmental implications than buying organic food imported from another continent.

leading to greater use of the car for shopping trips and expanded frequenting of large supermarkets. Impacts from transportation further increase with big supermarkets since they are more likely than local shops to stock imported foods. Changing the place of shopping from local shops to supermarkets also has socio-economic impacts on local producers, and if local shops are forced out of business, it can have impacts on local communities and residents without cars.

On the other hand, householders' own production of food appears, at least in Russia, to be significant. Together with preferences for local and national food products (albeit not on environmental grounds), this may be having a positive social effect and reduce demand for transportation of food. Its positive implications for transport are dependent on how urban householders travel to their plots of land and dachas. Traditionally, transport to dachas, which lie anything from a few km to 100 km from city centres, was via electric trains and buses, but, increasingly, it now relies on private cars. This leads to traffic congestion at weekends moving in and out of the larger cities, especially during the summer period.

Food-related wastes from households

As described in Chapter 8, the average generation of municipal waste per capita in the EECCA and SEE countries (250–280 kilos) is still much lower than the average level in the EU of 550 kilos per capita. However, municipal waste collection has been growing rapidly in the EECCA countries since the late 1990s, as much as 8–10 % annually in several countries. Growth has been much slower in SEE where on average municipal waste collection increased by 3 % between 1999 and 2005. At least some of these increases may be due to improved collection systems, rather than to increased generation.

A large part of household waste in these countries is related to the consumption of food, both organic wastes and, increasingly, plastic, paper and cardboard from food packaging. Organic food wastes represented at least 30 % of total municipal wastes in all four cities with composition data available (see Figure 8.7 in Chapter 8).

Environmental impacts from these wastes result primarily from their improper management. Almost all municipal waste generated in SEE and EECCA ends up in a landfill resulting in a loss of potential resources, i.e. compost and/or biogas for energy from organic food waste, and recycled

paper, plastic and cardboard or alternatively energy from packaging waste. In addition, placing organic food waste in landfill leads to the generation of methane, which is a potent greenhouse gas. There is practically no capture of methane at landfills across SEE and EECCA (see Chapter 8).

5.3 Policies for sustainable food production and consumption

This section of the Chapter draws heavily on the responses provided by countries to the SCP survey carried out by UNEP in 2007, in support of this report (see Table 5.2).

Agro-environmental strategies

Although an increased environmental awareness and recognition of the complexity of rural socio-economic problems are apparent, agro-environmental policy development is still at an early stage (EEA, 2007). This needs to be carried through to implementation if the often interlinked problems of rural poverty and environmental degradation are to be tackled.

Under-developed programmes and lack of legislative enforcement, together with inadequate agricultural practices, were identified as the main causes of localised environmental problems in *Europe's Environment – The third assessment* (the Kiev Report) (EEA, 2003). The report advocated the development of an agro-environmental policy framework, strengthening of the agricultural advisory services, the provision of agro-environmental advice and training materials, and the provision of grants for animal waste storage units.

EECCA and SEE countries have committed themselves to the principles in the Convention of Biological Diversity (CBD) and the Regional Environmental Reconstruction Programme for Southeast Europe (REReP). The Pan-European Biological and Landscape Diversity Strategy (PEBLDS) has worked as an instrument for regional implementation of the provisions of the CBD in the pan-European region, for example, by stimulating better land-use planning in order to preserve biological and landscape diversity. The Kiev Resolution on Biodiversity adopted by Environment Ministers in 2003 includes resolutions on agriculture and biodiversity, which seek to discourage the intensification of agricultural activities in areas to be designated as high nature

Table 5.2 Summary of UNEP policy questionnaire response in area of food

		Sustainable consumption and production: policies, strategies and initiatives ⁽¹⁾																	
		Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	Croatia	FYR of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	Republic of Moldova	Montenegro	Romania ⁽²⁾	Russia	Serbia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
Food production and consumption	Policies and strategies	Food and food safety	+			+	+		+	+		+	+		+	+		+	+
		Animal nutrition	-			-	+		+	+	-	+	-	+		+		-	+
		Labeling and nutrition	+			+	+		-	+	-	+	-	+		+	+	+	+
		Chemical safety	-			-	+		+	+	-	+	-	+		+		-	+
		Biosafety	-			+	+		+	+	-	+	-	+		+		-	+
		Food/feed controls	-			-	-		-	+	-	+	-	+		+	+	-	+
	Restrictions on fertilisers and pesticides in agriculture	+			+	+		+	+	+	+	-	+		+	+	-	+	
	Measures for promoting sustainable food production and organic products	+			+	+		+	-	-	+	+	+		+	-	-	-	+
	Information on food production and consumption initiatives	+				+		*	+		*	+	+		+	*		+	+

Note: ⁽¹⁾ Azerbaijan and the former Yugoslav Republic of Macedonia did not respond to the questionnaire whereas responses from Belarus, Russia, Serbia, Turkmenistan and Ukraine are incomplete.
⁽²⁾ A response to the questionnaire from Romania was received in November 2006 before Romania joined the EU.

value farmland. However, it is important to note that the lack of implementation of general conventions or legal resolutions is widespread. Even some basic prohibitions agreed during the 1970s and 1980s on the use of the most hazardous pesticides have not always been respected (Huijben *et al.*, 2005).

In the SEE countries the most important driving forces for facilitating food policy development are the Stabilisation and Approximation Process (SAP), institutional support from international organisations, and in some countries the drive for closer integration with the EU.

Some individual countries have also adopted strategies which integrate agricultural policy with goals of environmental protection and reduction of rural poverty. For example, the Armenian Strategic Programme for Poverty Reduction includes provisions relating to: prevention of soil degradation and human factors that lead to desertification; improved management, use and recovery of Lake Sevan and its ecosystems including its fish stocks; improving the quality and safety of agricultural activities; and increasing the wealth and quality of life of rural communities.

Similarly, from 2005 the Serbian Strategy of Agricultural Development has sought to build a sustainable and efficient agricultural sector which provides good quality food to satisfy consumer

needs; to improve the standard of living of those within or depending on the agricultural sector; to provide support for sustainable rural development; and to protect the environment from agricultural pressures.

Some national agricultural development strategies are still under preparation. In July 2002 the Croatian Parliament approved the National Agriculture and Fisheries Development Strategy. It provides long-term guidelines for food production within a rural development context. It focuses on food safety and organic farming in order to achieve a more sustainable management of land resources.

While it appears that progress has been made in a few countries in developing integrated strategies and frameworks since the Kiev Report, these need to be implemented by concrete measures. Other countries have yet to begin the development of such integrated policies.

Control on the use of pesticides and hazardous chemicals

Eleven out of the 18 countries of EECCA and SEE are parties to the 2004 Stockholm Convention on persistent organic pollutants (largely comprising pesticides). Of these only five have until now submitted National Implementation Plans (see Table 8.9 in Chapter 8).

Laws and regulations on the use of these and other pesticides and chemicals exist within most countries of the region. The majority of countries have regulations controlling the production, trade and import of pesticides. As an example, Ukraine's law on Pesticides and Agricultural Chemicals requires public registration of all chemicals to be used in agriculture and in 2006 a list of prohibited chemicals was adopted. In Bosnia and Herzegovina, on the other hand, a framework law exists for the control of pesticides but has yet to be supported by a list of preferred or banned chemicals, except for those covered by the Stockholm Convention (although the country is not party to the convention).

Fewer countries have laws regulating how permitted pesticides should be applied. Such laws exist among others, in Albania ⁽²⁾, Armenia ⁽³⁾, Bosnia and Herzegovina ⁽⁴⁾ and Croatia ⁽⁵⁾. Required application methods are variously aimed at protecting consumers and the surrounding environment, i.e. specifying waiting times between application and harvesting or grazing, maximum concentrations to be used, protection zones for watercourses and lakes, restrictions on airborne applications etc.

Organic farming

In SEE the legal basis for the development of organic agriculture was established by Croatia in 2001 ⁽⁶⁾, the former Yugoslav Republic of Macedonia in 2004 ⁽⁷⁾, Bosnia and Herzegovina in 2004 ⁽⁸⁾ and Serbia and Montenegro in 2005. In these countries laws on organic farming were adopted to promote rules for the production of crops and animal products with certified organic methods. Policies have been adopted for the introduction of labelling or the development of pilot projects for organic agriculture (as in Montenegro) or direct support to farmers (as in the former Yugoslav Republic of Macedonia and Serbia). In addition to the creation of a certification scheme for organic food Croatia has also included economic incentives to organic farmers in the Act of State Incentives in Agriculture, Fisheries and Forestry and is also promoting organic food at the national and local level.

Policies and legislation have not yet been established for organic food in EECCA countries, although

Kazakhstan is in the process of developing a framework for environmental labelling of food products

Another approach to diminishing the impact of agriculture is to support 'traditional agricultural systems'. As mentioned earlier, at the Fifth Environment for Europe Conference in Kiev (2003); ministers and heads of delegation put forward an agenda for the identification and promotion of high nature value areas in agricultural systems. This has created a culture of biodiversity-sensitive ecosystem management in the pan-European region. However, in most EECCA countries there are no administrative units able to deal with the interaction between agriculture and the environment and environmental considerations are not yet part of food sector policies.

Sustainable fishery strategies

Recognition of the poor state of fish stocks and marine resources in Russian seas led in 2002 to a far-reaching strategy for sustainable fishery development. The strategy was aimed at tackling the main problems identified in the management of Russian seas during the 1990s. The first immediate stage of implementation (2003–2005) aimed at developing government mechanisms for managing fisheries and defining commercial quotas. The second stage (2006–2010) will focus on widening Russian participation in international fisheries and fisheries management, and the final stage of implementation (2011–2013) will develop mechanisms to ensure sustainable exploitation (Matishov *et al.*, 2004).

In the Black Sea the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, amended in 2002, includes a commitment to the development of a fisheries management system containing the following elements: regular regionally-coordinated stock assessments; national fishing authorisations and regional licensing systems for vessels; and a catch quota system. The management system will have as its principle aim the development of more sustainable fisheries in the Black Sea.

⁽²⁾ Law on Plant Protection Service issued in Albania in 1993 (regulating quality control of imported pesticides) has been amended in 1999 under the influence of EU regulation 91/414/EEC.

⁽³⁾ Technical Procedures for Fertilisers 18.11.2004 N 1692-H and for Toxic Chemicals 03.11.2005 N 1899-H and Draft Regulation on Maximum Allowable Concentrations of Pesticides and Nitrates.

⁽⁴⁾ In Bosnia and Herzegovina, the state Law on Plant Health Protection (that regulates pesticide application) and the Law on Phyto-Pharmaceutical Remedies were influenced by WTO agreement and EU advice.

⁽⁵⁾ In Croatia, the Act on Plant Protection provides a regulatory framework for the use of pesticides.

⁽⁶⁾ Act on Organic Production of Agricultural and Food Products (OG 12/2001, 14/2001).

⁽⁷⁾ Law on Organic Agricultural Production (OG no. 16/04).

⁽⁸⁾ Law on Organic Food Production (2004, SG RS No. 75 (7-21)).

For the Caspian Sea, the five littoral states ratified the Framework Convention for the Protection of the Marine Environment of the Caspian Sea. Furthermore, the 2003 Strategic Action Plan for the Caspian Sea includes objectives such as ensuring sustainable use of commercial fisheries resources, rehabilitation of fishstocks of migratory species (sturgeon, inconnu, herring) and improvement of livelihoods in coastal communities to reduce dependency on unsustainable fishing practices.

Currently, Russia is in the process of taking more stringent measures to stop illegal fishing and trading in endangered fish species, responding to the request by CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). The initiative covers such species as sturgeon, salmon, crabs and craboids, sea comb shrimps, sea-urchins and their products, e.g. caviar. It is expected that this measure would help crack down on the caviar black market.

Protection and information for consumers

Legislation and technical documents on food quality, controls of inputs and handling of food products exist at various levels in all countries of the regions. Implementation of food quality control remains an issue in some countries, however. For example, illegal sales of livestock products, vegetables, fruits, etc., are a major income-generator for many families, but this has in some cases led to the spread of diseases. Animals are often butchered without veterinary control, there are few slaughterhouses with appropriate hygienic and sanitary conditions. Albania has experienced an increase in brucellosis, transmitted through contact with animal tissue or contaminated milk. Implementation of food controls is especially a problem at the municipal level where the responsibility of different inspectors is often not well-defined.

Most countries have some mandatory labelling of products although the extent of information provided varies. Croatia's labelling system for food products is completely harmonised with the European Union, including information on ingredients, food additives, nutritional value, and origin of various food types. Ukraine's labelling system covers the same information. Serbia's labelling system also includes information on any ingredients from genetically modified organisms (GMO). Kazakhstan has a similar law requiring labelling of GMO products along with ingredients and their nutritional value. Mandatory labelling systems, elsewhere, for example, in Bosnia and Herzegovina are less comprehensive.

Rules and legislation on the labelling of foodstuffs with respect to environmental information are much more restricted. For example, only a handful of countries (all located in SEE) have implemented certification systems for organic farms and the labelling of their products for consumers.

5.4 Conclusions

Food presents a complex challenge for achieving sustainable consumption and production. Significant environmental impacts arise along the entire food production and use chain, from agriculture and fisheries, transportation, food processing and refrigeration and waste. Food is also a fundamental quality-of-life issue, one which still has not yet been resolved. In some countries access to and availability of foodstuffs remains a challenge for some social groups. In others, unhealthy eating habits lead to health problems. It is also a major economic issue in those countries which rely heavily on agriculture for their economic growth.

Food production in SEE and EECCA countries has been affected by a relative stagnation of the agricultural sector during the 1990s and early 2000s. The total production volume declined in half of the countries, and there were mismatches between food demand and production levels in many countries. This and reductions in household incomes in most countries led to a drop in the consumption of cereals and meat. While consumption of staples such as potatoes remained relatively stable, supplemented in many cases by householders' own production of food, significant proportions of the population in a number of countries became undernourished.

The economic recovery that began in the late 1990s has improved the economic situation for many households and the consumption of almost all categories of food grew steadily during this decade. This has resulted in significant reductions in under-nourishment in all countries with the exception of Tajikistan and Uzbekistan.

The transition to market economies has been accompanied by an increase both in subsistence farming and in large-scale, commercially oriented farms. The latter, with the intensification of agricultural practices, may prove to constitute a challenge for fragile ecosystems in the region. It is expected that livestock numbers will increase following the very significant decline they suffered during the 1990s, and this in turn will result in

a further intensification of agriculture to meet the demand for grain for animal feed. Livestock is currently an important source of pollution of surface and ground waters.

In EECCA, transition was accompanied by a dramatic decline in inputs of fertilisers, pesticides and energy, and current agricultural inputs in EECCA remain significantly lower than pre-transition levels. While this may have led to some reductions in environmental impacts, agro-environmental problems of salinisation, soil erosion, and contamination of surface water persist. Many of these problems are exacerbated by poor management of irrigation, the lack of collection and treatment of manure from livestock, and other agricultural practices conducted with little knowledge of their environmental implications. Countries in SEE, where agricultural inputs are higher now than they were before transition, also experience similar problems. This situation could be improved through the establishment of advisory and training services to spread knowledge on good agro-environmental practice.

International conventions on biodiversity, and legal resolutions, for instance, affecting trade with the EU, are important drivers for the formulation of environmental policies that concern the food sector in SEE and EECCA countries. However, the lack of institutional capacity and funding mechanisms are a barrier to the implementation of these treaties and resolutions. The challenge ahead consists in strengthening institutional capacity for delivering sustainable food consumption and production policies, including legislative enforcement mechanisms. This should ideally lead to an integration of environmental considerations into agricultural policy and consumer legislation, but it is already clear that many countries in SEE and EECCA will require continued external support to develop sound agro-environmental policy frameworks.

Consumption of prepared and processed food as well as food imports have been increasing steadily since the end of the recession. This may be linked to growing customer preference for buying food in supermarkets instead of local shops and markets. Local studies in Russia, Serbia and Ukraine, carried out for this report, identified emerging environmental challenges related to affluent consumption patterns that result from increased incomes in the richer sections of the population. These challenges are associated with the preference of young urban dwellers and wealthier people to buy their food with more packaging in large

supermarkets. This also involves the need to use private cars for shopping. These developments are increasing transport-related pressures, and the trends are likely to continue in the future as the demand for non-seasonal food increases. At the other end of the spectrum, poorer groups are pushed into diets rich in carbohydrates and poor in proteins and in a number of countries food security is an urgent concern.

Household waste generation is increasing rapidly across EECCA countries and rising more gradually in SEE. Food-related wastes — organic food waste and food packaging — comprise a large part of household waste. There is also some evidence that packaging waste is on the increase. Almost all municipal waste generated in SEE and EECCA ends up in landfills, which leads to the generation of methane, a potent greenhouse gas. Environmental impacts from food-related wastes would be reduced by reducing the generation of waste at source — i.e. through reductions in food packaging — and by waste treatment aimed at extracting resources and energy from the waste prior to disposal.

There is evidence of a number of positive household practices with respect to the sustainability of food. Firstly, at least in Eastern Europe, it would appear that households satisfy a significant proportion of their food demand through their own production. In Russia even urban households grow more than a third of their vegetable and potato needs at their summer dachas. While this was a necessity during the economic hardships of the 1990s, higher incomes do not appear to have affected this tradition. Home production can reduce the demand for products from intensive commercial agriculture and the related impacts from pesticides, fertiliser use and energy for machinery and transportation. A second potentially positive sign is the continuing preference of many householders for locally and nationally produced foods due to perceptions of better quality and national sympathies. This can also have positive environmental effects by slowing down the increasing transportation of food.

There is a significant opportunity for the expansion of organic food production in SEE and EECCA countries. Thanks to the continuing low use of fertilisers and pesticides, many farms, although not officially classified as organic, are 'clean of chemicals' and could produce certified organic products without the need to wait years normally necessary to clean the soil. The availability of agricultural labour constitutes also a great competitive advantage for many of these countries for the production of organic food.

The opportunities to export organic food to meet the demand of EU markets are enormous, and some countries are already addressing this issue. National markets for organic food will also offer opportunities as the awareness and purchasing capacity of consumers increase. Consumers interviewed in the case studies expressed preference for local production and concern with quality, preferences that could be further cultivated through consumer education campaigns promoting sustainably grown food. Yet, strong challenges remain for the development of organic farming in SEE and EECCA countries, and organic certification schemes still need to be adopted in most of EECCA.

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