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## EXECUTIVE SUMMARY

The Government of the Republic of Serbia has conducted a post-disaster needs assessment after the floods and landslides that occurred at the end of May 2014. The European Union, the United Nations and the World Bank – on the basis of an inter-agency agreement subscribed in 2008 – provided financial and expert support to conduct the assessment.

The assessment enabled to estimate disaster effects – damages and losses – and impacts as well as the financial requirements to undertake recovery and reconstruction. More than 14 sectors of social and economic activity and cross-cutting issues were analysed during the assessment. The process of assessment was initiated on 9 June and was completed by July 10, 2014, thus lasting a total of 5 weeks.

### ***Assessment methodology***

The methodology for assessment that was utilised involves collecting available secondary information from different Government and private sources, verified and supplemented by field visits by the assessment teams, to estimate the value and extent of physical assets destroyed and the changes in production flows of all affected activities. A total of 24 municipalities were included in the assessment, which represent the most affected geopolitical subdivisions, as defined by the Government and extrapolations were later on conducted to expand the estimations to other, less affected localities. In addition to the field visits, special sample surveys of formal and informal industrial and commercial establishments were conducted to obtain first-hand information on damage, losses and needs, as well as to estimate the possible impact of the disaster on livelihoods, employment and income losses of the labour force.

### ***Assessment of disaster effects***

The assessment revealed that the total effects of the disaster in the 24 affected municipalities amounts to EUR 1,525 million, of which EUR 885 million (57% of the total effects) represent the value of destroyed physical assets, and EUR 640 million (43% of the total) refer to losses in production (See Table ES-1). When considering the additional affected municipalities, the total value of disaster effects would rise to EUR 1.7 billion.

It was found that total disaster effects were concentrated mostly in productive activities (EUR 1,070 million and 70% of the total), social services (EUR 242 million and 16%), and infrastructure (EUR 192 million and 12%); thus, disaster impact was highest in terms of production and access to social services, than in regard to destruction of infrastructures. In regard to individual sectors of economic and social activity, the most affected sector was the one of mining/energy (EUR 494 million and 32% of the total), followed by housing (EUR 231 million and 15%), agriculture (EUR 228 million and 15%), trade (EUR 225 million and 15%) and transport (EUR 167 million and 11%).

Table ES-1. Summary of estimated damages and losses

		Disaster Effects, million EUR		
		Damage	Losses	Total*
<b>Social</b>		<b>234.6</b>	<b>7.1</b>	<b>241.7</b>
	Housing	227.3	3.7	230.9
	Education	3.4	0.1	3.5
	Health	3.0	2.7	5.7
	Culture	1.0	0.6	1.6
<b>Productive</b>		<b>516.1</b>	<b>547.6</b>	<b>1,063.6</b>
	Agriculture	107.9	120.1	228.0
	Manufacturing	56.1	64.9	121.0
	Trade	169.6	55.2	224.8
	Tourism	0.6	1.6	2.2
	Mining and energy	181.9	305.8	487.7
<b>Infrastructure</b>		<b>117.3</b>	<b>74.8</b>	<b>192.1</b>
	Transport	96.0	70.4	166.5
	Communications	8.9	1.1	10.0
	Water and sanitation	12.4	3.2	15.7
<b>Cross cutting</b>		<b>17.2</b>	<b>10.6</b>	<b>27.9</b>
	Environment	10.6	10.1	20.6
	Governance	6.7	0.6	7.2
<b>Total</b>		<b>885.2</b>	<b>640.1</b>	<b>1,525.3</b>

\*Due to rounding up some totals do not exactly add up.

It is to be noted that ownership of total disaster effects lies almost equally between the public and private sectors. However, it was found that the private sector sustained higher values of destroyed assets than the public sector, and that production losses were higher in the public sector domain because of the impact on the mining and energy sector. Undoubtedly, this fact will have a bearing on the relative efforts that public and private sectors will have to assume in post-disaster recovery and reconstruction.

The concentration of disaster effects on productive activities of agriculture, trade and industry and of damages to housing will generate a negative bearing on economic growth with a corresponding subsequent impact on livelihoods, income and employment, plus a significant decline in living conditions of the population. In addition, the high destruction that occurred in the mining sector will demand the search for alternative sources of energy and electricity. Fortunately, damages to education facilities were not extensive, and the disaster occurred at the end of the school year so that disruption in the education sector would not be high. In the health sector, partial destruction of a number of clinics occurred, together with damages to medical equipment and supplies, but no increase in morbidity rates of flood-related disease has occurred.

### ***Estimation of disaster impact***

An analysis of the macro-economic impact reveals that the disaster will lead Serbia into an economic recession; real economic growth will decline by 0.5% in 2014, instead of the

expected 0.5% positive growth forecasted before the disaster. In addition, the disaster will bring about a worsening of the current account of the balance of payments in view of the need to import construction materials and to reduce some agricultural exports, to the tune of about 1% of the gross domestic product (GDP). Furthermore, the fiscal position will deteriorate further by about 1% of GDP as a result of lower tax revenues and higher expenditures to meet unexpected post-disaster demands.

At the personal level, it has been estimated that about 51,800 jobs would be temporarily lost because of interruption of productive activities in the affected municipalities, and the income of households would decline proportionally. This negative impact on livelihoods and employment would be more acute in the case of poor families, including Roma and persons with disabilities, who are more vulnerable to disasters. Women are doubly affected: in addition to sustaining livelihood losses, they have had to increase the non-paid time they devote to take care of their family.

The human development index (HDI) in Serbia would sustain a decline in 2014 because of the combination of income decline and of access to education and health services, losing about two years' worth of growth. Furthermore, it has been estimated that the disaster have led 125,000 persons to fall below the poverty line, an increase of nearly 7% over last year's number of people living under poverty conditions.

### ***Post-disaster needs for recovery and reconstruction***

The disaster has made evident a number of vulnerabilities of the Serbian population and economy that – in view of climate change – deserve special attention and require the reduction of disaster risks. Improved strengthening and expansion of floods control systems, flood-forecasting and prevention activities, and physical planning to avoid locating homes and production activities in flood-prone areas, are some of the required activities to be carried out in the near future.

Financial requirements have been estimated for all sectors of social and economic activities, under both public and private domains, to ensure the recovery of personal income, access to basic services, production levels in agriculture, industry, trade and mining, as well as of the environment, together with the needs to rebuild destroyed assets following disaster-resilient standards. Post-disaster needs were valued at EUR 1,346 million, of which EUR 403 million (30% of the total) refers to recovery activities, and EUR 943 million (70%) are reconstruction needs (See Table ES-2).

Recovery needs refer to financing required to assist affected people to recover the pre-disaster level of household income, to restore the supply and access to basic services of health, education, water and sanitation, etc.; and to ensure recovery of production in sectors of agriculture, industry, commerce, tourism, etc. Reconstruction requirements are the financial resources needed to repair and rebuild destroyed or damaged assets and infrastructure under disaster-resilient standards and conditions. It is expected that financing of these post-disaster needs would come from a combination of Government funds, private sector resources (that include personal and enterprise savings, family remittances from abroad, limited insurance proceeds), soft-term credit from local banking institutions, as well

as cash grants and donations from the international community, and fresh and rescheduled loans from international financial institutions.

Table ES-2. Summary of estimated recovery and reconstruction needs

Sector	Post-Disaster Needs, million EUR		
	Recovery	Reconstruction	Total*
Agriculture	40.8	111.4	152.1
Manufacturing	16.6	53.3	69.8
Trade	12.9	144.0	157.0
Tourism	0.5	0.7	1.2
Mining and energy	211.8	202.0	413.8
Housing	58.8	204.5	263.3
Education	2.0	4.3	6.3
Health	2.7	4.4	7.1
Culture	0.1	1.2	1.3
Transport	-	128.2	128.2
Communications	-	12.6	12.6
Water and sanitation	3.5	24.0	27.5
Environment	2.8	38.7	41.5
Governance	2.3	14.1	16.4
Employment	46.4		46.4
Gender	2.0		2.0
<b>Totals</b>	<b>403.0</b>	<b>943.5</b>	<b>1,346.4</b>

\*Due to rounding up some totals do not exactly add up.

The time distribution of recovery and reconstruction needs is shown in Table ES-3. Needs would be EUR 829 million in 2014, 437 million in 2015, and 81 million in 2016. Such time distribution reflects the urgency of restoring pre-disaster conditions at the earliest possible time.

Table ES-3. Time schedule of recovery and reconstruction requirements

Needs	2014	2015	2016	Total*
	Million EUR			
Recovery	236.1	146.4	20.5	403.0
Reconstruction	592.7	290.5	60.3	943.5
<b>Totals</b>	<b>828.9</b>	<b>436.8</b>	<b>80.8</b>	<b>1,346.5</b>

\*Due to rounding up some totals do not exactly add up.

### ***Recovery and reconstruction as part of overall socio-economic development***

In looking into the future, Serbia should consider the occurrence of the disaster as an opportunity to solve longstanding deficiencies and the recovery and reconstruction program should be viewed as an integral part of socio-economic development plans. In that respect, issues such as identification and reduction of risk should be made part of the development agenda, since they negatively affect the most vulnerable groups (the poor, the lower income, people with disabilities, women, Roma population, etc.).

Investments to be made in recovery and reconstruction should also be seen as part of risk reduction and not only as unexpected expenditures. Infrastructures and productive activities would be less vulnerable after completion of recovery and reconstruction. Targeting assistance to the most disaster affected people would also help to reduce existing differences in development, and reduce the number of marginalised people living under poverty line. New job creation during the reconstruction and diversification of skills envisaged under the recovery program would also have a positive bearing on opportunities for such families, and have a similar impact on GDP growth in the years to come. Furthermore, disaster risk reduction will increase Serbian competitiveness in the regional and international markets.

Essential to risk reduction are the repair, reconstruction, expansion and improvement of floods control works as well as the improved disposal of waste from mining and other productive activities. In addition, improvement of floods forecasting systems is another prerequisite to reduce disaster risks, which may be approached on a regional basis through cooperation with neighbouring countries and obtain economies of scale.



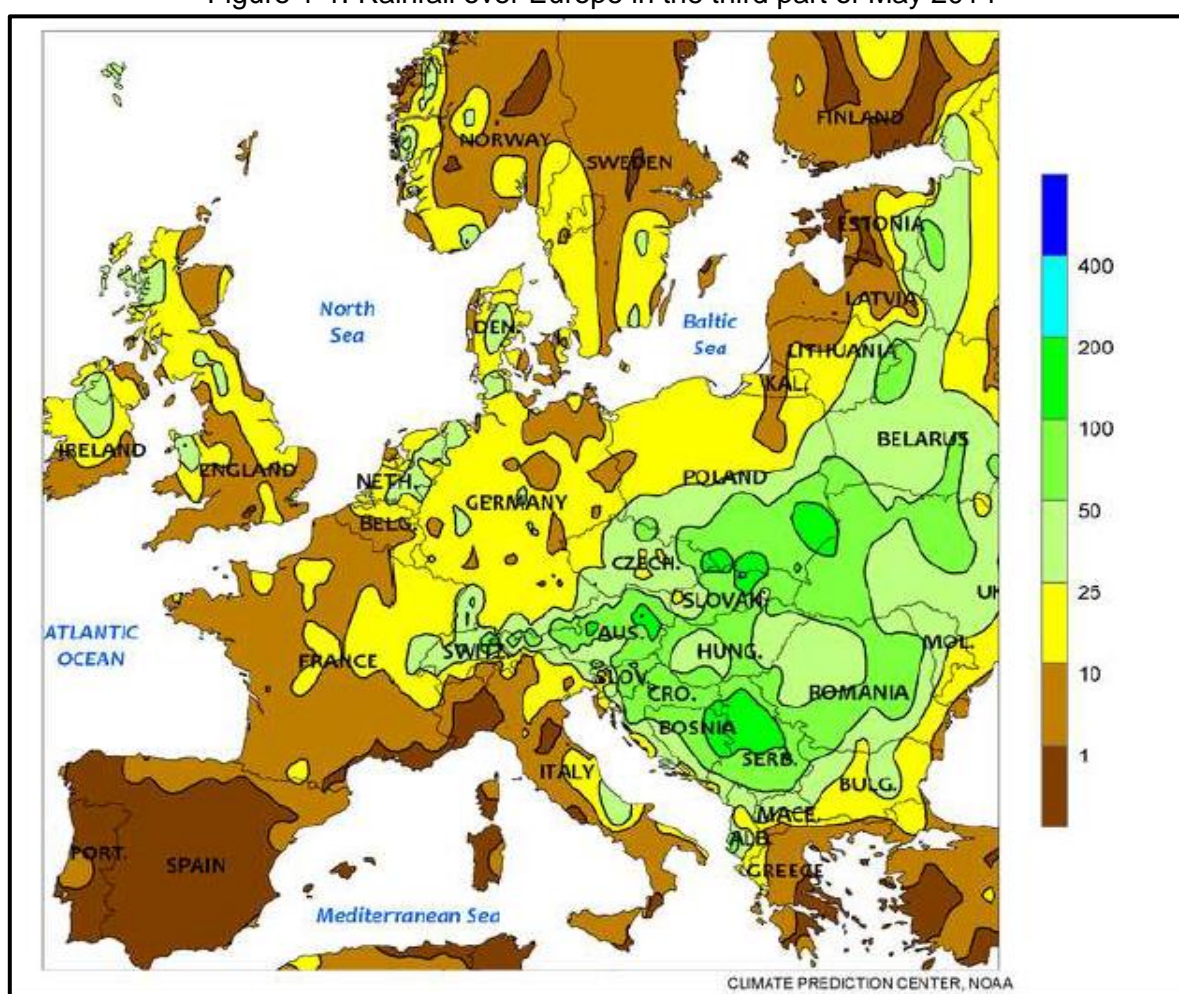
# PART 1 - EFFECTS OF THE DISASTER

## 1. INTRODUCTION

### 1.1. Brief description of the disaster

During the third week of May, exceptionally heavy rains fell on Serbia which were caused by a low-pressure system ('Yvette') that formed over the Adriatic. Record-breaking amounts of rainfall were recorded more than 200 mm of rain fell in western Serbia in a week's time, which is the equivalent of 3 months of rain under normal conditions (See Figure 1-1).

Figure 1-1. Rainfall over Europe in the third part of May 2014



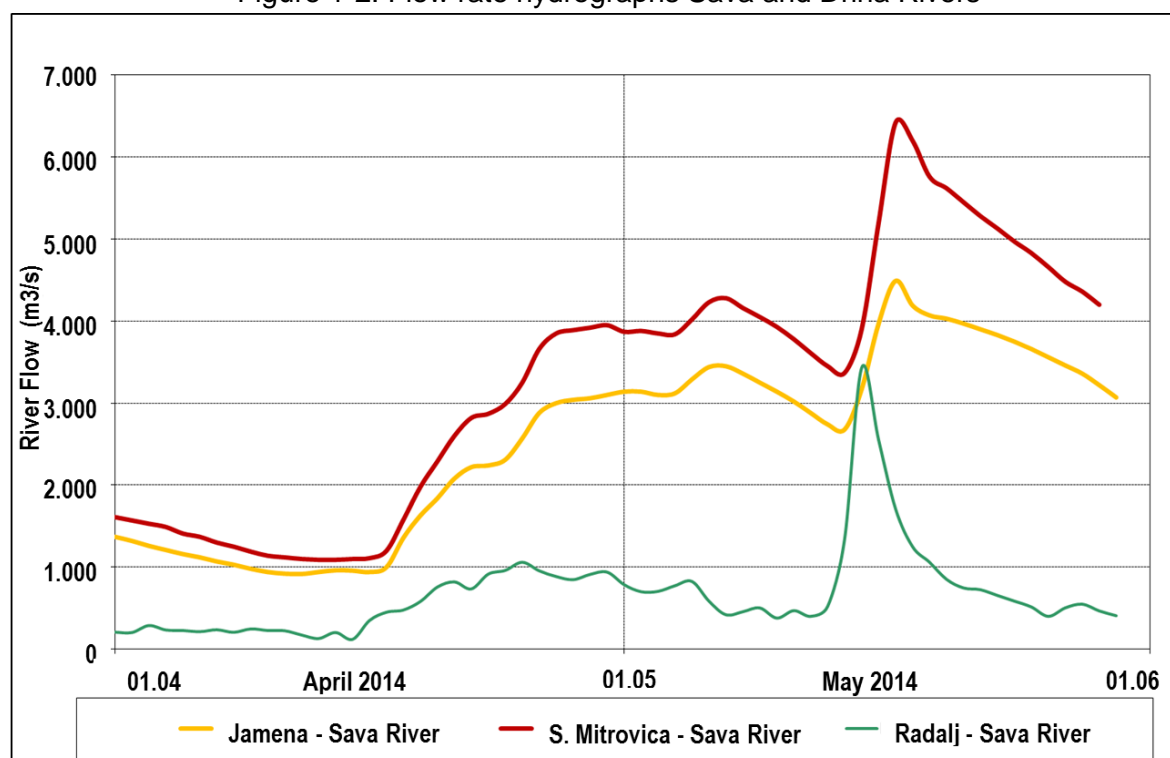
Source: NOAA

The heavy rainfalls led to a rapid and substantial increase of water levels in the main rivers in western, south-western, central and eastern Serbia: Sava, Tamnava, Kolubara, Jadar, Zapadna Morava, Velika Morava, Mlava and Pek (Map of river basins in Serbia in Figure 1-2). In the Sava river basins where most of the rainfall was received, the consequences were two-fold. In the first place, flash floods occurred in the tributaries where water levels rose almost immediately after the onset of the rains and then dropped quickly back to normal levels when the rains stopped. In this regard, the water level at Beli Brod on the tributary

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river Kolubara rose by 7 meters between 14-16 May but was back to normal levels by 18-19 May. The second consequence was that the level of the river Sava itself rose at a more gradual rate, with an increase of 3.5 meters recorded over the period 14-20 May. In contrast to its tributaries, the water level on the Sava peaked after the rains had stopped and decreased much more slowly after the peak (by some 20-30 centimeters per day). This delay in response time is due to the travelling time of the water through the entire river catchment including the upstream reaches of the Sava. (Flow rate hydrographs Sava and Drina Rivers are shown in Figure 1-2).

Figure 1-2. Flow rate hydrographs Sava and Drina Rivers



Source: Republic Hydrometeorological Service

The heavy rainfall and rising water levels had three immediate and direct effects:

- High intensity flash floods resulting in the total destruction of houses, bridges and sections of roads (in Krupanj and areas around Sabac);
- Rising water levels resulting in the widespread flooding of both urban areas (particularly in Obrenovac) and rural areas (around Sabac); and,
- Increased flow of underground waters leading to widespread landslides (around Krupanj and Bajina Basta).

Overall the floods affected some 1.6 million people living in 38 municipalities /cities mostly located in central and western Serbia. Two cities<sup>1</sup> and 17 municipalities<sup>2</sup> were severely impacted.

<sup>1</sup> The cities of Šabac and Sremska Mitrovica

<sup>2</sup> The municipalities of: Obrenovac, Mali Zvornik, Krupanj, Ljubovija, Vladimirci, Koceljeva, Šid, Svilajnac, Paraćin, Ub, Lajkovac, Ljig, Osečina, Mionica, Smederevska Palanka, Trstenik, Bajina Bašta



Figure 1-3: Flood-affected area in Obrenovac



Source: Republic Geodetic authority

In addition to the above, the combination of heavy rainfall, high soil saturation before the intense rains began, and the presence of unstable soils in hilly areas, caused the subsequent occurrence of landslides. These landslides occurred in both inhabited and uninhabited areas and generated destruction of houses, roads, bridges and other infrastructure works.

Because of the flooding, some 32,000 people were evacuated from their homes, out of which 25,000 were from Obrenovac. The majority of evacuees found accommodation with relatives, but some 5,000 required temporary shelters in camps established by the Government and the Serbian Red Cross. The disaster resulted in 51 casualties, of which 23 were due to drowning.

In addition to the negative direct effects of the floods and landslides over the population, the disaster brought about additional problems related to living and environmental conditions. Due to the flooding, several health facilities sustained damages and had to be temporarily closed, and health care to the population had to be suspended; many schools were also damaged and/or were used as temporary shelters for evacuees, and classes were suspended, with an early closing of the school year. Floods waters and rising groundwater levels covered some industrial zones and threatened to release hazardous waste (See image on



the right) with potential negative impact on health conditions of the population. Mine disposal sites were also flooded and the waste material was discharged into rivers that were used as sources for drinking water supply. Fortunately, these threats to health did not materialise as indicated by chemical analyses of the water sources.

Agricultural lands received relatively large amounts of sediment and other materials, in some cases rendering the flooded areas unusable for farming. Removal of such sediments will be required in the near future in order to restore those lands into production. Two coal mines were flooded whose production is essential for the generation of electricity, and their operation have been suspended.

## 1.2. The response to the disaster

In reaction to the severe flooding and ensuing landslides, on 15 May the Government of Serbia declared a state of emergency for its entire territory. At the same time, in order to maximize the effectiveness of the response to the emergency, a request for assistance was sent to the international community, notably to the Governments of the European Union (EU) Member States, EU Candidate Countries in the region, the Russian Federation, the European Commission (EC) and the United Nations (UN). In response the European Commission activated immediately the EU Civil Protection Mechanism to call on Member States resources and staff.

The government established a “Floods Emergency Headquarters” within the Sector for Emergency Situations in the Ministry of Interior, together with crisis centres in each of the flood-affected municipalities/districts/cities. The headquarters office was staffed by central and municipality operational crisis management teams made up of staff from the sector, the fire and rescue services, the police and gendarmerie, and the military. Crisis management teams were in regular contact with the variously established local centres (these reported every 24 hours to HQ), coordinated the calls for urgent assistance, responded to immediate life threatening situations and provided focal points for reaching affected and remotely settled populations. In addition, the crisis management teams coordinated the work of the 16 Government ministries<sup>3</sup> and agencies involved in the national response to the disaster; with each ministry establishing a “Crisis Response Team”. Sector staff coordinated the work of the crisis management teams with the activities of the Serbian Red Cross and with incoming foreign assistance. They worked in close cooperation with the EU Civil Protection (EUCP) and the UN Disaster Assessment and Coordination (UNDAC) teams, both of which were co-located in the HQ office.

On 16 May 2014, the Ministry of Foreign Affairs established its Crisis Response Team, tasked with coordinating the activities related to relief and donations from abroad. The Crisis Response Team appealed to all diplomatic missions and international organisations

<sup>3</sup> Ministry of Interior; Ministry of Defense; Ministry of Mining and Energy; Ministry of Construction, Traffic and Infrastructure; Ministry of Health; Ministry of Agriculture and Environmental Protection; Ministry of Labor, Employment, Veterans and Social Affairs; Ministry of Justice; Ministry of Education, Science and Technological Development; Ministry of Youth and Sport; Ministry of Culture and Information; Ministry of Finance; Ministry of Economy; Ministry of Trade, Tourism and Telecommunications; Ministry of Public Administration and Local Government; Ministry of Foreign Affairs.

accredited in Serbia, as well as all Serbian diplomatic and consular missions abroad (hereinafter: RS DCMs) and organisations of the Serbian diaspora to collect and dispatch humanitarian, financial and technical assistance. At the same time, the EU Civil Protection Mechanism was activated and operational and the necessary steps were taken to provide assistance through all available EU mechanisms and funds to which Serbia has access as an EU Candidate Country.

The Government of the Republic of Serbia established the Office for the Assistance to and Recovery of Flooded Areas on 22 May 2014. The Office is headed by the Director, appointed for the period of five years. The Director is reporting to the Government of Serbia and the Prime Minister. The Office is tasked with expert and operational assignments on behalf of the Government.

### 1.3. The Recovery Needs Assessment

On 3 June the Government of Serbia presented an official request for assistance to the EU, the UN, and the World Bank for the purpose of conducting an assessment of disaster effects and impacts and of recovery and reconstruction needs, to be used to develop a national plan for recovery and reconstruction after the disaster. The three Partners, on the basis of the 2008 EU, UN and World Bank Joint Declaration to respond to crisis and assessment requests from Governments, immediately responded to this request by deploying required expertise and assigning financing required for conducting a post-disaster recovery needs assessment.

The purpose of the needs assessment was to carry out a thorough analysis of disaster effects, impacts and needs, including the estimation of the socio-economic impact of the disaster, the cost of damages on physical structures, the disruption of essential public services, the alteration of community processes, the decline in the production of goods and services, the disruption of the governance process; and to establish the costing of the identified needs in all sectors of economic and social activity to formulate a strategy for recovery and reconstruction in the short to the long term.

An assessment team was formed under the leadership of the Serbian Government and with the support from the three Partners, to conduct the recovery needs assessment. The composition of the assessment team is described in Annex 1.

The recovery needs assessment concentrated efforts in the analysis of disaster effects, impact and needs of the 24 most-affected municipalities as defined by the Government, whose results would later on be expanded to cover the entire affected areas (See Figure 1-4 that shows the location of the selected municipalities). These 24 municipalities were selected as the geographical scope only for the purpose of conducting the assessment in a timely manner, and other affected municipalities and their residents should not be disqualified from recovery and reconstruction assistance.

The Recovery needs Assessment was undertaken as per the following calendar of activities:

- Collection of quantitative baseline information      9-17 June



- |   |                |
|---|----------------|
| - Training of team on methodology for assessment  | 16-17 June     |
| - Field visits to affected areas                  | 18-23 June     |
| - Estimation of damages and losses                | 24-27 June     |
| - Estimation of disaster impact                   | 27 June-1 July |
| - Estimation of recovery and reconstruction needs | 27 June-4 July |
| - Presentation of assessment results              | 7 July         |

Results of the recovery needs assessment are described in this report. The Part 1 provides a description of disaster effects on a sector-by-sector basis; Part 2 describes the impact of the disaster at macro-economic and household levels; and Part 3 summarises the recommended strategy for recovery and reconstruction.

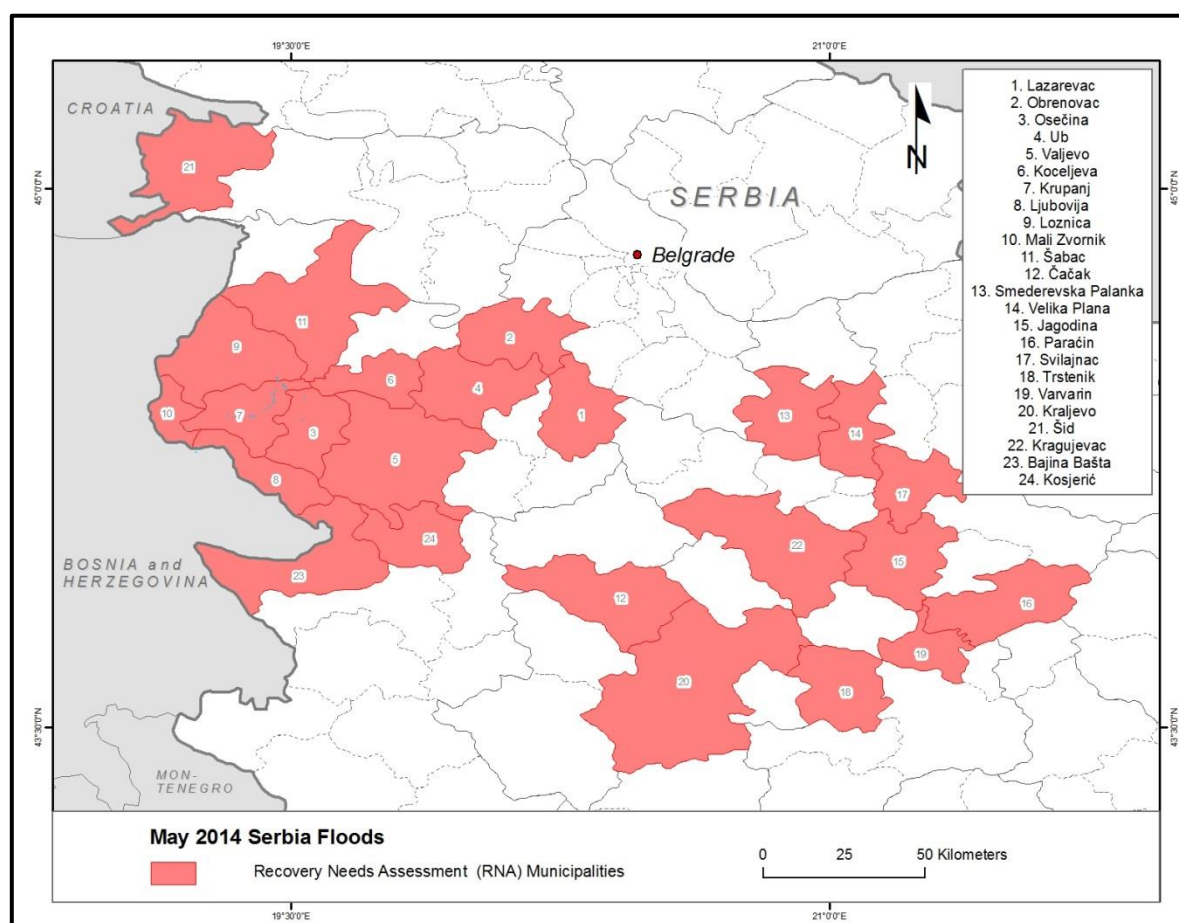


Figure 1-4. Location of 24 municipalities included in the recovery needs assessment

It should be noted that the assessment carried out provides an analytical and quantitative basis for defining a recovery and reconstruction strategy and plans that will restore to normal levels the functioning of the society and economy of Serbia and at the same time reduce disaster risk under a “building-back-better” scheme. Furthermore, the assessment provides the evidences required for the mobilisation and coordination of resources for recovery and reconstruction, including those of the European Union, the World Bank, the United Nations system and the international community in general. Lastly, it will provide the Government of Serbia with a clear course of action for ensuring recovery and reconstruction.

## 2. ESTIMATION OF DISASTER EFFECTS

### 2.1. Population Affected

As a result of the disaster a total of 1.6 million persons were directly or indirectly affected in the country. Since detailed surveys by the country's Statistical Office in that regard are still underway, no account can be shown of the primary, secondary and tertiary affected population at the time of this report.

The floods and landslides caused 51 casualties, 23 of which were by drowning. In addition, an additional 31,879 persons were temporarily evacuated from their flooded and destroyed homes, 24,000 of which were from Obrenovac alone<sup>4</sup>. Most of the evacuees moved into relatives' homes but about 5,000 were placed into temporary shelter camps, organised by the Red Cross and the Government. This fact resulted in doubling the number of internally displaced persons (IDPs) in the country that prevailed before the disaster occurred.

It is to be noted that according to the 2011 Population Census, an estimated 8 % of the total population are persons with working disabilities (PWDs), and heavily depend on public and private assistance for their daily lives. Thus, it can be inferred that some 2,500 of the evacuees were PWDs and their living conditions have worsened due to the disaster.

The Roma population ranges from 2.3 to up to 11 % of the total population in the disaster-affected municipalities. About 93 % of the Roma own their dwellings although construction standards are very low and have no insurance on their home and property. Only about 40 % of Roma men about 13 % of women are employed. Roma faced destruction of their homes and vegetable garden plots; furthermore, vegetables and fruits from affected areas were believed to be unsafe after the floods and the income of the Roma population suffered accordingly.

In the absence of sufficient information on sex disaggregation on asset ownership and production, it is only possible at this time to indicate that the disaster impacted women on a different manner when compared to men. Women sustained the destruction of their vegetable garden plots that they use to supplement family income and food supplies. In addition, women have been conducting considerable non-paid activities after the disaster, such as cleaning their homes from the sediments and mud, making minor home repairs, taking care of children that are not able to attend day-care centres, and many other chores.

### 2.2. Description and Valuation of Damages and Losses

Damages are identified as the value of destroyed physical durable assets, which is estimated as the cost to repair or rebuild the assets to the same characteristics they had prior to the disaster. Losses are the changes in the value of production of goods and

<sup>4</sup> UNDAC Report, Serbia Floods, May 2014

services as well as changes in the costs of production of same, and usually include decline in production and higher-than-normal costs of production.

In the following sections of the report, description and valuation of the values of damages and losses are made: first, the total estimated value of damages and losses is described for the affected areas, and later on, the individual damages and losses sustained by each of the sectors of economic and social activities are presented in detail.

### 2.2.1. Summary of damages and losses

It has been estimated that the total value of destroyed assets in the 24 affected municipalities that were included in the assessment amounts to EUR 885 million and that the value of losses was EUR 640 million, giving a total value of EUR 1,525 million, as shown in Table 1-1. This figure represents about 3 % of the gross domestic product of the country, and provides a measure of the size or magnitude of the disaster caused by the floods and landslides.

Table 1-1. Estimation of total value of damages and losses caused by the disaster

		Disaster Effects, million EUR		
		Damage	Losses	Total*
<b>Social</b>		<b>234.6</b>	<b>7.1</b>	<b>241.7</b>
	Housing	227.3	3.7	230.9
	Education	3.4	0.1	3.5
	Health	3.0	2.7	5.7
	Culture	1.0	0.6	1.6
<b>Productive</b>		<b>516.1</b>	<b>547.6</b>	<b>1,063.6</b>
	Agriculture	107.9	120.1	228.0
	Manufacturing	56.1	64.9	121.0
	Trade	169.6	55.2	224.8
	Tourism	0.6	1.6	2.2
	Mining and energy	181.9	305.8	487.7
<b>Infrastructure</b>		<b>117.3</b>	<b>74.8</b>	<b>192.1</b>
	Transport	96.0	70.4	166.5
	Communications	8.9	1.1	10.0
	Water and sanitation	12.4	3.2	15.7
<b>Cross cutting</b>		<b>17.2</b>	<b>10.6</b>	<b>27.9</b>
	Environment	10.6	10.1	20.6
	Governance	6.7	0.6	7.2
<b>Total</b>		<b>885.2</b>	<b>640.1</b>	<b>1,525.3</b>

\*Due to rounding up some totals do not exactly add up.

When considering some municipalities that were not included in the needs assessment and which were affected to a smaller degree, the estimated value of damages and losses should increase to from EUR 1.7 to 1.8 billion.

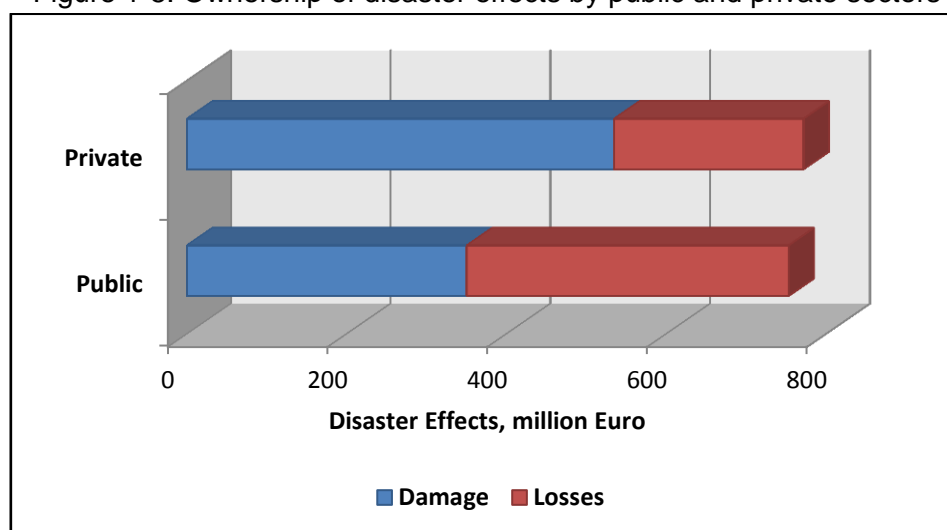
It must be pointed out that of the total amount of disaster effects, 57% represents the value of destroyed assets that would need repair or reconstruction, while production losses



represent the remaining 43%. Production losses have been estimated to occur during 2014 and 2015, since it was assumed that recovery and reconstruction activities would be completed within that period of time.

The public and private sectors were affected differently by the disaster, although their respective participation in damages and losses was similar. When considering the ownership of disaster effects, it can be stated that the private sector sustained a higher value of damages than the public sector, and that the public sector sustained higher values of damage. Figure 1-5, shows the ownership of disaster effects by public and private entities, and provides a first indication of the relative efforts that each sector must assume in the post-disaster phases of recovery and reconstruction.

Figure 1-5. Ownership of disaster effects by public and private sectors



Effects of a disaster on the different sectors of economic and social activity vary from one disaster to another and from one country to another. In Serbia case, disaster effects were heavily concentrated in the main productive sectors (i.e. agriculture, industry, trade and mining), followed by the social sectors (housing, education, health), while infrastructure sectors lagged behind. Figure 1-6 illustrates the distribution of damages and losses among those main sectors, and enables to conclude that the Serbia event was of a type that may be defined as a productive and social disaster, rather than an infrastructure-based event. The thematic distribution of disaster effects provides a first indication of the relative efforts to be conducted during recovery and reconstruction activities by each of the main sectors.

Taking the above analysis further, the breakdown of disaster effects by individual sectors of economic and social activity is of special relevance as it reveals the most affected ones, which will of course require more attention during recovery and reconstruction. Figure 1-7 shows the estimated values of damages and losses per sector, where it may be observed that the mining and energy sector sustained the highest values of disaster effects, followed by housing, agriculture and trade. The breakdown between damages and losses within each sector varies, and this will result in specific differences between their individual requirements for recovery and reconstruction.

Figure 1-6. Relative distribution of disaster effects by main sectors of activity

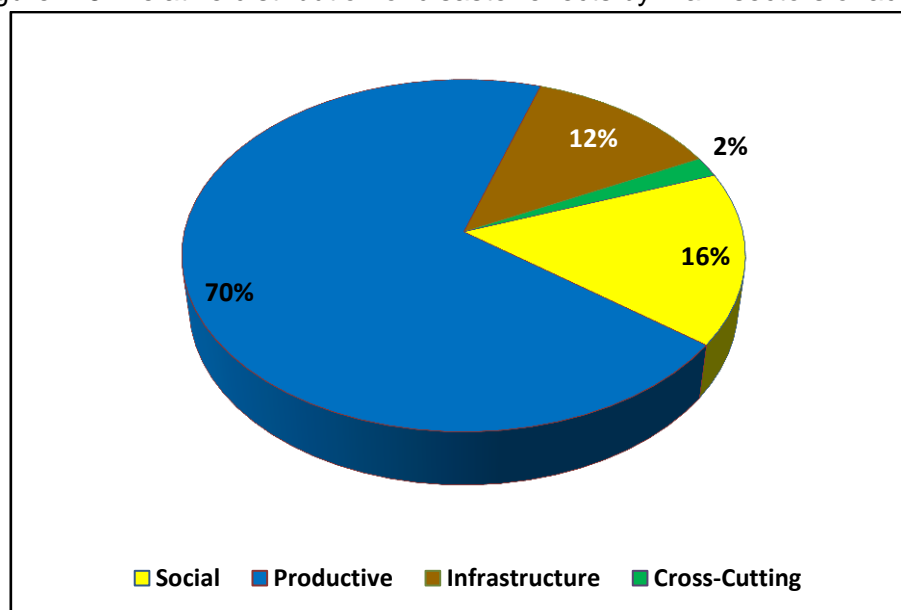
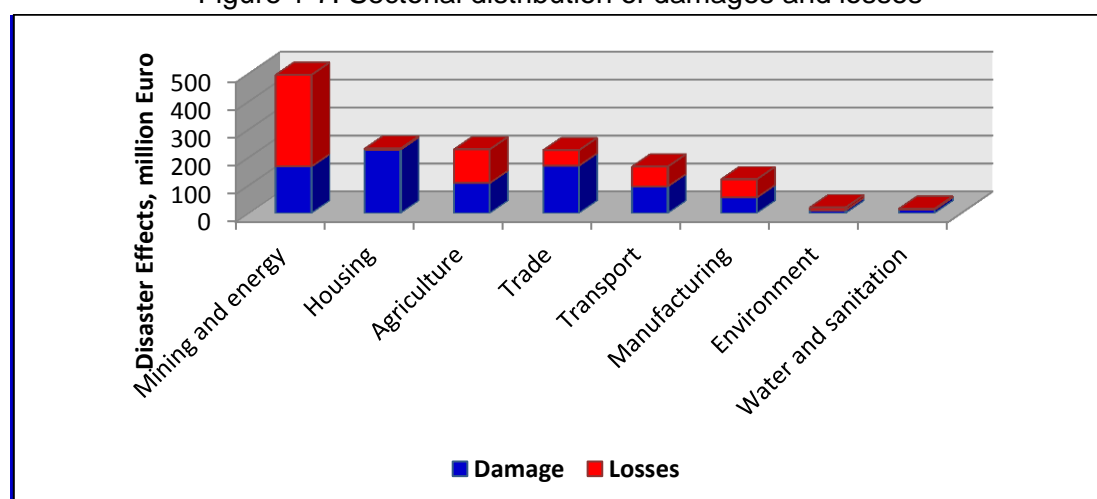


Figure 1-7. Sectorial distribution of damages and losses



Before concluding this section, it is worth to point out that the estimated value of damages for the affected areas is equivalent to 13.8 % of the value of gross fixed capital formation that the country had in 2013. This ratio provides an early indication that reconstruction after the disaster cannot be carried out in a single calendar year, because the country does not have the capacity to do so. It is very likely that reconstruction would need to be spread over three years.

Finally, if the total value of damages and losses is compared to the total population of the country, it can be said that each person sustained average disaster effects of about EUR 210 per person.

## 2.2.2 Sectorial damages and losses

### 2.2.2.1 Agriculture, livestock and water resources

The agriculture sector includes the subsectors of crop production, livestock, fisheries, forestry and water resources (floods control and irrigation).

#### Sector overview

Agriculture makes significant contributions to GDP (10% in 2011) and exports (23% in 2011, for agriculture, food and beverages combined).<sup>5</sup> It is at the heart of rural life in Serbia: around half of Serbia's 7.4 million inhabitants reside in rural areas and over two thirds of rural households identify agricultural activity as a source of income. Agriculture is considered to be the biggest employer in the rural areas and the main contributor to the rural population's food security.

In value terms, crop production is dominant together with corn, wheat and vegetables as main products. Corn (maize) is the single most important Serbian market product with an average production of 5.6 million tonne over the last decade and a planted area of 1.2 million hectares. Wheat production is about 2 million tonnes from about half a million hectares.

Serbia is the largest regional producer of vegetables, which were grown on an area of about 175,000 hectares in the past decade. Competitiveness of vegetable production is largely dependent on the inputs, i.e. the price and quality of seeds and fertilizers. Volume of vegetable production increased in recent years, due to significant investments in equipment, machinery and inputs.

Fruit (including raspberry, strawberry, plum and apple) production accounts for about 11% of the value of agricultural production, on about 260,000 ha. The sector is still at a relatively low technological level and its production is subject to the influence of weather, particularly drought, hail and frost with resulting annual production variation.

Horticulture accounts for 6.4% of agricultural land use including fruit (4.8% /0.55 ha per participating farm household), vegetables (1.0% /0.28 ha per participating farm household) and vineyards (0.6% /0.32 ha per participating household). Only 3% of utilised agriculture land is irrigated.

Agriculture is in particular important for vulnerable and older people. The average age of the holder on family agricultural holdings is 59 years, with 35% over 65 years of age. In 2010, 13.6% of rural residents were classified as poor.

The main responsibility for protection against floods and management of the respective infrastructure lies with the Ministry of Agriculture and Environment Protection (MAEP) through the Directorate of Water Management, in accordance with the provisions of the Water Law. In implementation of this mandate, MAEP collaborates with other ministries (e.g. Ministry of Interior, Ministry of Construction, Transport and Infrastructure, etc.), public

<sup>5</sup> The data source in this introductory section is, *The Statistical office of Serbia and Agricultural Census 2012* quoted in *The Draft Strategy of Agriculture and Rural Development of the Republic of Serbia (2014–2024)*.

agencies and local public administration. MAEP is responsible for water management on “level 1” watercourses and actual implementation of this mandate is delegated to three public Water management companies (PWMC): Srbijavode PWMC, Vode Vojvodina PWMC and Beogradvode PWMC. On the other hand, the Water Law assigned the responsibility for water and floods management of “level 2” water courses to the local authorities, on the territory falling under their administration.

### Disaster effects quantification

The floods are attributed to a rare combination of events (estimated probability of once per 1,000 years. Three compounding factors coincided: (i) saturated land following previous rain and mild winter, (ii) high river levels and (iii) heavy rainfall.

Serbian farmers are familiar with floods that affect agricultural production in the river valleys, but these floods were on a different scale. Exceptionally heavy rainfall occurred for around four days from 13 May 2014 in western parts of the country and drained into the Sava River basin. This resulted in (i) flash floods up to seven meters in tributary rivers such as the Kolubara that receded after a few days; and (ii) slower, rising water levels in the Sava River itself that reached about 3.5 meters and receded very slowly (over two to three weeks).<sup>6</sup> Flash flooding caused land erosion and debris deposition, damages to buildings, destruction of crops, machinery and livestock death. Where fields flooded more slowly and remained flooded longer there was generally enough time to move machinery and livestock, but significant losses occurred to standing crops. The timing of the floods coincided with high value harvest for early season greenhouse crops such as tomatoes.

The flash floods that occurred in small and medium catchments, sometimes associated with landslides, affected the small localities along the respective valleys. The responsibility for water management and floods protection on the water courses (“level 2”) in these catchments lies with the local public administration which has almost no financial and technical resources to implement these responsibilities.

The floods damaged large portions of floods protection infrastructure (mostly embankments) which failed either because they were overtopped or following underground erosion of their foundations (suffusion). The high velocity of floods waves and large volume of sediments transported (sometimes, large rocks have been rolled over by the floods) produced severe erosion of the river banks and river beds and even destroyed the river bank protection. In some cases, the riverbed enlarged from 50 to over 300 meters, damaging other types of municipal infrastructure (roads, water supply pipe, cables).

Drainage infrastructures were also affected, including both collector canals and pump stations used to help discharging the excess water collected on lower land when it cannot flow by gravity to the recipient river. No damage was reported either on the public infrastructure for irrigation supply or on the field irrigation equipment, which are the private property of farmers.

<sup>6</sup> UNDAC Mission to Serbia Report, May 2014.

The estimated number of farmers affected by the disaster is around 33,000.<sup>7</sup> Many small and medium sized farms suffered: the average agricultural area per holding is 5.4 hectares. Only 3.1% (19,274) of farm households have more than 20 hectares and this represents 44% of total agricultural land utilization. Most livestock farming is small-scale: 49% of all cattle, 56% of pigs and 74% of sheep are kept in holdings of less than 10 animals.<sup>8</sup> Small farms include units managed by vulnerable or older people. The disaster's effect on small farmers is consistent with the national farm profile, where small and medium farms are the most numerous (see Table 1-2). Thus, agriculture was affected by the disaster in every single one of the 24 disaster-affected municipalities.

Insects have become a post-floods problem, especially mosquitoes, and control measures have been implemented by the Government as well as rodent control. The veterinary and health authorities are concerned about mosquito-borne West Nile virus, which can cause fever, and sometimes severe, fatal disease, for horses and humans.

Table 1-2. Farm/producer Structure in Serbia

Producer	Number	Arable Land hectares	% age of land
Small agriculture holdings	≈ 250,000	≈ 700,000	21%
Medium holdings (5 ha)	≈ 160,000	≈ 800,000	24%
Commercial farms (10 ha)	≈ 70,000	≈ 800,000	24%
Cooperatives	≈ 800	≈ 130,000	4%
Micro companies	≈ 12,000	≈ 500,000	15%
Small companies	≈ 3,000	≈ 250,000	7%
Medium sized companies	≈ 400	≈ 150,000	4%
Big companies	≈ 10	≈ 70,000	2%

Source: Farmer registry, Statistical Office

### Assessment methodology

Data were collected through a variety of methods and crosschecked. In particular,

1. Reports were reviewed, including the UNDAC Mission report and Municipality reports.
2. Damages and losses assessment forms were sent to all 24 disaster-affected municipalities. These requested data on damages and losses for crops, livestock, irrigation, fisheries, honey production and floods control works. All 24 responded, though some had not fully assessed the agriculture sector in their municipality due to more pressing priorities.<sup>9</sup>
3. Field visits were made to Ub, Smerderevska Palanka, Sivilajnac, Sabac and Krupanj in order to meet the authorities and affected population and to view

<sup>7</sup> Data source, Livelihoods Sector team, which estimates 33,495 based on best available data on flooded area and farm size. This figure equates to around 23% of registered farms in the 24 Municipalities (143,535 farms).

<sup>8</sup> Data source as for footnote 1, above.

<sup>9</sup> Municipalities were working to the Government's 60-day deadline to report detailed disaster effects: their mid-July reporting target meant that not all Municipalities were ready to provide all requested data in the time-frame of the Assessment reported here.

floods effects. The floods control works subsector team also made field visits and independent assessments.

4. Assessment of losses for crops in municipalities was validated. Data provided by municipalities were crosschecked with official data of the Government. Cropped surfaces communicated by municipalities were compared against data of the 2012 Census carried out by the Ministry of Agriculture and Environmental Protection (MAEP) and the Statistical Office. Yields for the different crops were provided by the Statistical Office and calculated on the basis of the average yields for 2012. Losses were then calculated using the % age of agricultural land affected, as assessed by the Republic Geodetic Authority on the basis of remote senses imagery.
5. The team worked with crosscutting sector teams, in particular with the Environment and Gender experts, both of which accompanied field visits and received information and data from the Agriculture team.
6. Draft assessments were reviewed by and discussed with the Team Leader to ensure consistency and to avoid double-counting with other sectors.

### Effects on Infrastructures and Physical Assets

An estimated 11,943 hectares extent of land was rendered useless for production for a season and estimated area of 4,815 hectares now requires removal of debris. Some farm machinery and equipments were damaged by submersion; many greenhouses (mainly plastic sheeting construction) were destroyed. Trstenik municipality is known for producing quality fruit tree seedlings and tree nursery damages occurred there.

Damages to bridges and rural roads reduced market access in some places and reduced access to land to harvest fodder for conservation. Irrigation systems were also damaged, especially electric pumps.

Animals drowned or were lost due to the flood, though in many cases owners had sufficient warning to move them to higher ground and prevent fatality. Most municipalities did not report damages to livestock-related infrastructure or to machinery and equipment. Full municipality assessments had not been completed, but the RNA team assumes that damages would have been reported if highly significant. Damages reports were received concerning beehives and colonies as well as fish-farming equipment and fish.

Damages to Floods Control Works infrastructures affected mostly the embankments where a large number of failures happened because of overtopping and erosion of inside bank of dykes by high water velocity and waves. In few cases, suffusion of material in dyke foundation occurred and created holes under the construction that, then, rapidly enlarged and triggered the dyke failure on a total length of 6.4 km. The floods also carried out sediments of large dimensions (sometimes even rocks) that eroded the river banks and beds, enabled appearance of local whirlpools, sometimes digging deep holes in river beds. As a consequence, a total length of 45.6 km of river banks and beds was damaged. The inflow of flash floods from torrential catchments into rivers also damaged the embankments and, locally, the riverbeds. Many such torrents enlarged their channels three to ten times and would require complete reshaping of their junction with the river.



In the 15 pump stations for drainage the water submerged the electrical equipment (motors, switches and control panels) and turned the stations out of function. In most cases, the water could not be drained out for days because of impossible access and high levels in the recipient rivers/streams. When access was eventually possible, large mobile pump stations have been used to drain out the stations and make possible to repairs of the electrical parts. However, restoring of their functionality will take some more time. In addition, the buildings structure suffered serious damages.

### **Effects on Production Flows**

Main drivers are crop production decline, described in the section on losses, below. Higher production costs also occurred due to replanting crops that were lost. Losses have occurred on land rendered useless, for example, with deposits of gravel and tree debris. It is estimated that this land will be recovered and back in agricultural production in 2015. Raspberries are a high-value crop that is frozen for export: disruption to a smooth farm road surface causes damages to the crop by shaking during transport from farm to cold store and reduces the crop value.

There are reports that some consumers are unwilling to buy fresh fruit and vegetables from flood-affected areas because they fear contamination. In addition, animal fodder production has been lost and winter shortages are predicted.

Following seeds and other input provision (e.g. maize and soya seeds, vegetable seedlings) by the Government, and replanting by private initiative, farmers will get some income in 2014 from replanted crops. However, it was not possible to estimate this income. Through Extension Services, seeds to replant 2,000 hectares of soya and 14,000 hectares of maize were distributed.<sup>10</sup>

### **Effects on Access and Availability of Services**

Raw milk collection and processing was affected. For example, in Obrenovac, the service was disrupted for one month. In other Municipalities, the effects on the milk subsector lasted about five days.

### **Effects on the environment**

Five municipalities reported damages to forests, mostly under public ownership. Government soil analysis showed that heavy metal levels were generally below maximum permitted values for agricultural land and, thus, crops can be considered safe. However, some areas are known to have soil that is high in nickel and chromium. There is concern in some areas that leafy crops like lettuce, chard and brassicas may be contaminated. This underlines the need to remove sludge debris. Mine leakage in Krupanj raised fears of antimony contamination downstream: further soil samples have been taken there.

<sup>10</sup> Milan Rakic, personal communication.

### Effects on Governance

It was reported in Sabac that the city municipality has taken on the obligation to service the debt, that is, pay interest, on loans to farmers. Veterinary Services functioned efficiently, for example, coordinating the transport and disposal of dead bodies by incineration and clean-up and disinfection. Veterinary Services enhanced their disease surveillance, but did not report increased outbreaks immediately following the disaster. Known anthrax areas were not affected and anthrax is not considered to be a post-disaster issue.<sup>11</sup>

### Effects on Risk and Vulnerabilities

Many farms are small-scale family farms (average size is 4.5 hectares) and have a few cattle, around ten pigs and some chickens. Livestock make an important contribution to household nutrition as well as to income for women through the sale of, for example, milk and cheese. Although relatively few livestock have been lost, at household level the impact of losing a few animals on a small farm is significant, especially for isolated, elderly people. Medium-scale farmers often take loans and/or take input supplies (seed, fertilizers) on credit from retailers. This resulted for many as an increased debt level. Also, due to floods effects on crops, there will be less work for seasonal workers such as fruit pickers, and will result with reduced income for some poor individuals and families.

### Estimation of the Value of Damages and Losses

The estimates of the value of damages and losses are summarised in the table below.

Table 1-3. Summary of Damages and Loss Estimates [million RSD]

Subsector	Disaster Effects		Ownership	
	Damage	Losses	Public	Private
<b>Agriculture, crops</b>	9,325.1	13,570.7	0	22,895.8
<b>Livestock</b>	233.7	302.3	0	536.0
<b>Fishery</b>	62.1	18.8	0	80.9
<b>Forestry</b>	67.0	0.1	54.2	12.9
<b>Floods control works</b>	2,788.6	0	2,788.6	0
<b>Total</b>	<b>12,476.5</b>	<b>13,891.9</b>	<b>2,842.8</b>	<b>23,525.6</b>

<sup>11</sup> Source: Dr Dejan Bugarski, CVO and Director of Serbian Veterinary Services, personal communication to Bernard Vanhoye, 23 June 2014.



**Text box. The story of Maja Nikolic and family, Liso Polje village, Ub Municipality**

Ms Maja Nikolic lives on their farm with her mother and three children. She used to sell around 20 kg of cheese and 5 kg of *kajmak* each week in Bajloni market in Belgrade. But the flood drowned all three of their cows. The water rose quickly in the night and reached 2.5 meters. It destroyed their home, the crops on their 4.5 ha including vegetables for the home, drowned their three cattle, two sheep, a sow and 10 piglets, a dog and all but a few of their chickens, which managed to get on the roof.

The family rode out the flood on the roof of their home. A neighbour rescued them the next day in a boat. One pig survived in a tree and two others found their way back to the farm after three days: they had been washed out of their pen when the water rose.



Three generations in the household.



One of the three surviving pigs.

Now their house is uninhabitable. They have lost farm machinery. Their well water is contaminated and they rely on delivery of bottled water for them and tanker delivery for the surviving animals. They have lost their sources of milk, eggs, vegetables, meat and income. They desperately needed assistance after the flood.

## Damages

The floods deposited debris on agricultural land consisting mainly of tree and branches and, in some places, stones and gravel. Tree debris is not a serious problem, but other debris and sludge has rendered land useless and requires clearance. In one location agricultural land may be contaminated with heavy metal (antimony) due to leakage at a mine.

Damages were reported to crop machinery equipments (RSD 9.3 million) and for damages by subsector.

Some livestock died in the flood, but relatively small numbers. In many cases, there was time for owners to move animals to safe ground. Livestock deaths according to the Veterinary Directorate figures are as follows: 28 adult cattle, 9 calves, 799 pigs, 2,490 sheep, 178 goats, 207,822 poultries, 52 dogs, 5 cats, 18 bee hives and 183 unspecified. Over 2,000 sheep died at one pre-export holding facility (Svilajnac municipality) where floods embankments were breached nearby. Damages were reported to commercial fisheries, consisting of fishery equipment and fish stock that disappeared.

Damages to floods control works is actually reconstruction costs, estimated by using the current construction costs for the respective types of works and replacement/repair costs for equipment (electrical, mechanical, hydraulic, as the case is). The damages have been

estimated together with the three PWMCs for the territory under their administration, respectively.

The value of the estimated damages by type of structure is shown in the table below (see Table 1-4). Table 1-5 shows the breakdown of physical damages by PWMC and type of infrastructure.

Table 1-4. Damages by type of structure

Structure type	%	Value, million RSD
Embankment	77	2,067
River banks and bed	17	459
Drainage (pump stations, canals)	5	137
Torrents	0.7	18
Other constructions	0.2	6
<b>Total</b>	<b>100</b>	<b>2,687</b>

Table 1-5. Damages by PWMC and type of structure

PWMC	Embankment, kms	River and bank bed, kms	Drainage pump St, #	Torrents, kms	Other construction
Srbijavode	3.5	44.9	6	0	0
Beogradvode	2.4	0.0	6	0.08	0
Vode	0.6	0.7	3	0	2
Vojvodina					
<b>Total</b>	<b>6.4</b>	<b>45.6</b>	<b>15</b>	<b>0.08</b>	<b>2</b>

## Losses

Production losses occurred especially in the agricultural crops subsector. Municipalities reported the number of hectares lost for different crops, including animal fodder, pastureland, fruit and vegetable production, industrial crops and cereals. Information by crop is shown in the table below. Fruits and vegetables are important both for the domestic market and for export.



Figure 1-8. Cereal production total crop loss



Figure 1-9. Cereal crop rotting after submersion

Table 1-6. Losses reported by crop type

Crop type	Production loss [RSD]	Crop type	Production loss [RSD]
<b>Arable</b>		<b>Fruit</b>	
Wheat	769,586,227	Strawberries	1,735,861,850
Rye	420,000	Fruit seedlings	200,000,000
Barley	196,409,568	Raspberries	500,405,160
Oats	84,499,297	Apple	14,447,600
Triticale	67,282,342	Apricot	2,171,724
Other cereals	5,065,809	Cherry	9,938,796
Rape	2,520,000	Nuts	770,400
Sugar Rape	47,343,578	Peaches	500,087
Hops	0	Pears	7,221,280
Maize	3,160,149,762	Plums	48,769,478
Sunflower	39,320,124	Quinces	44,400,000
Industrial Peppers	0	Sour Cherries	41,703,700
Soyabean	428,651,749	Vineyards	2,236,400
Tobacco	10,114,590	Blackberry	6,846,000
Millet	0	Melons	106,006,000
<b>Vegetables</b>		<b>Fodder</b>	
Potatoes	889,488,914	Pastures	1,190,237
Carrot	21,340,500	Meadows	72,839,001
Onion	121,225,700	Clover	144,698,445
Garlic	12,276,128	Lucerne	353,946,812
Beans	13,250,380	Vetch	10,145,950
Green Beans	332,622,000	Fodder peas	15,195,625
Peas	26,168,689	Maize for fodder	32,500,000
Cucumber	140,305,000	Fodder Rape	32,000,000
Cabbage and Kale	147,996,200	Temporary Grassland	6,509,982
Tomatoes	282,299,400		
Peppers	233,794,200		
Kohlrabi	48,000		
Green salad	100,000		
Beet root	360,000		
Pumpkins	40,560,000		
Asparagus	480,000		
Celery	9,900,000		
Spinach	150,000		
Leek	108,000		
Broccoli	630,000		
Aubergine	0		
		<b>Subtotal all crops [RSD]</b>	<b>10,474,770,683</b>



Figure 1-10. Raspberry canes destroyed



Figure 1-11. Paprika crop lost

The decline in livestock production, such as reduced egg production, may be underestimated below because of incomplete data from Municipalities. In the livestock subsector, reported losses occurred in milk, beef and honey production. Fishery (trout and carp) production was lost. There was one report of lost timber production from a privately owned forest.

### Losses caused by insect and rodent control measures

As the mosquito is the vector for West Nile virus, mosquito control has become a human health concern (the virus can also cause severe disease for horses). West Nile virus is known to occur in the region. Rat control was also implemented by the Government after the floods. The Health Sector is dealing with vector control, but has not recorded losses. According to information provided to the Health Sector, the costs for mosquito and rat control, which should be included in the RNA's overall assessment of losses, are: mosquito control RSD 454, 954,800.00 and rodent control RSD 21,417,867.

### 2.2.2.2 Manufacturing Sector

The manufacturing sector is essentially owned by the private sector, although there exist a number of important, Government-owned industries. Both privately- and publicly-owned establishments were affected by the floods and landslide disaster.

#### Sector overview

The manufacturing sector provides a significant share of Serbia's economic activity, with a valued added in 2012 equivalent to 14.4% of the gross domestic product (GDP).

The number of producing units in the affected municipalities is equivalent to 19% of the total number of industries in the country and, based on field data and on parameters related to the effects of the disaster in the housing sector, it was estimated that a total of 352 units were affected by the floods, equivalent to 3% of the units located in the 24 affected municipalities.

#### Overall effects

In the private manufacturing sector, estimated damages and losses amounted to approximately RSD 12 billion, with damages corresponding to 53% and losses to 47% of the total costs. The impacts of the floods in the industry sector were concentrated in few

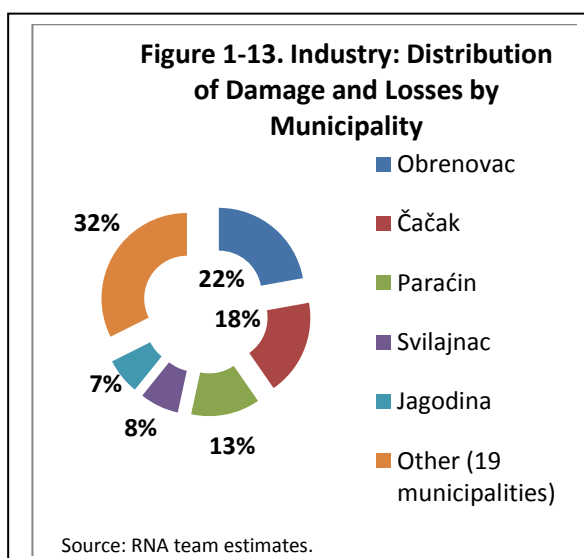
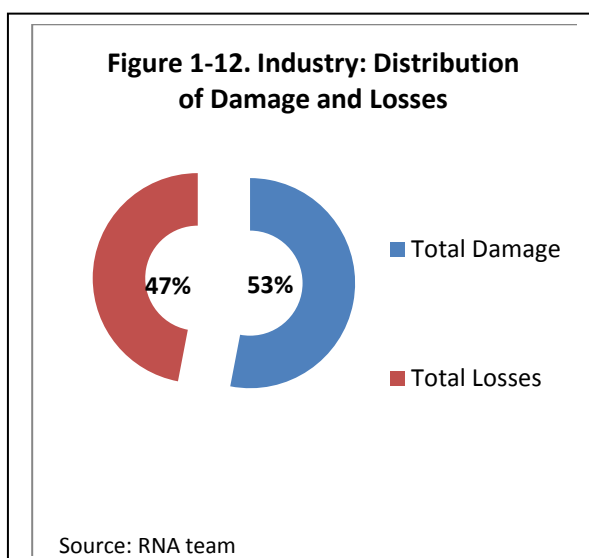


municipalities, affected mostly small units, but with significant effects on medium and large enterprises as well.

Table 1-7. Disaster effects in manufacturing sector, million RSD (EUR 1 = 115.66 RSD)

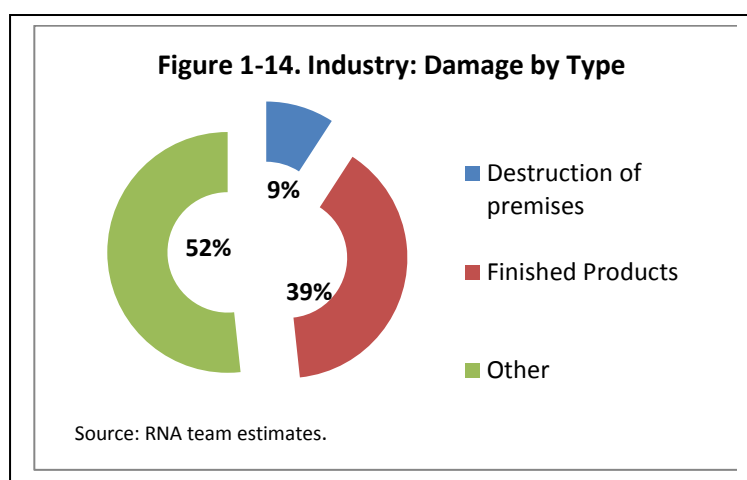
	Damage			Losses		
	Estimated	Ownership		Estimated	Ownership	
	Value	Public	Private	Value	Public	Private
<b>Estimation of Damage</b>						
Destruction of premises	585.2		585.2			
Finished products	2,498.8		2,498.8			
Furniture	n. d.		n. d.			
Vehicles destroyed	n. d.		n. d.			
Other	3,302.8		3,302.8			
<b>Estimation of Losses</b>						
Production decline				5,658.8		5,658.8
Higher production costs				n. d.		n. d.
Other				n. d.		n. d.
<b>TOTAL</b>	<b>6,386.8</b>		<b>6,386.8</b>	<b>5,658.8</b>		<b>5,658.8</b>

Damages and losses in Obrenovac, Čačak and Paraćin correspond, respectively, to 22%, 18% and 13% of the total costs.



### Manufacturing: damages

Total damages in the manufacturing sector was estimated at RSD 6.4 billion, with RSD 585 million (9%) corresponding to damages to building structure or premises, RS 2,499 million (39%) to damages to finished products, and RSD 3,303 million (52%) corresponding to the destruction of other assets, including machinery and equipment.



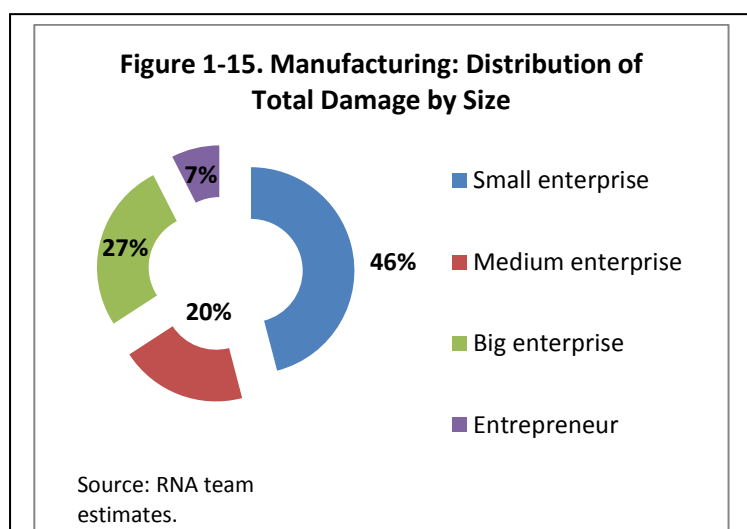
The high concentration of damages on equipment and finished products implies that resuming regular activities will require funding that might not be easily available to producers, especially to the small-sized units.

According to a special sample survey carried out in the manufacturing and commerce sectors, only about 18% of industrial enterprises have

insurance for disaster and, besides that, even for those insured, coverage is not significant compared to the replacement costs of partially or totally destroyed equipment, premises and finished products.

Restricted access to credit could prevent timely recovery and exacerbate economic losses, therefore the recovery strategy for the sector needs to facilitate the actions of private financial institutions and support the national developing bank programs, since given both, the general nature of the industry sector and the specific features of the impacts of the floods

in the Serbian industry, the potential for cash grants as a coping mechanism is limited.

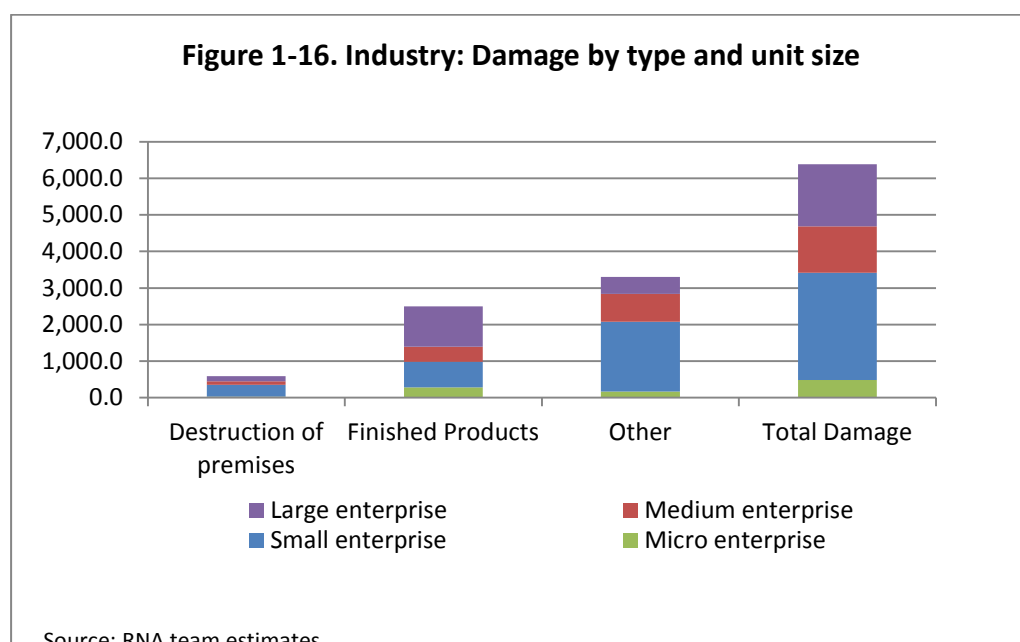


More specifically, about 47% of the total damages corresponds to large and medium size enterprises that require more substantial financial resources to reestablish the pre-disaster level of production. Nevertheless, estimates indicate that a relatively large number of small units sustained damages as well

and, therefore, a recovery strategy that takes into account the specific needs of each different group would facilitate the reestablishment of regular production and prevent additional economic losses.

Table 1-8. Damages by industry type and size (million RSD)

	Destruction of premises	Finished Products	Other	Total Damage
Micro enterprise	30.2	285.3	164.6	480.1
Small enterprise	324.0	700.1	1,909.4	2,933.5
Medium enterprise	91.1	412.0	767.2	1,270.4
Large enterprise	139.9	1,101.4	461.6	1,702.9
<b>Total</b>	<b>585.2</b>	<b>2,498.8</b>	<b>3,302.8</b>	<b>6,386.8</b>



### Manufacturing: losses

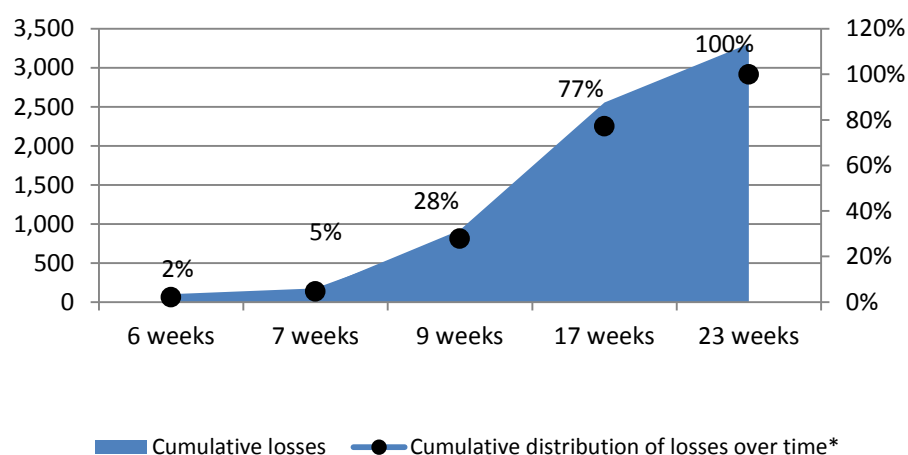
The losses in the manufacturing sector were estimated at RSD 5.6 billion and consider declines in revenues of producing units for up to six months. Losses of large units accounted for 22% of the total, while those for medium enterprises correspond to 22%. Nevertheless, losses to small units added up to 55% of the total losses given the relatively larger number of small units affected.

Losses were estimated for two different groups of industries, namely, those that at the time of the realisation of the survey had already resumed operations and those still shut down. For the second group their expectation about the time required to reestablish production was used in the calculation of the losses.

The losses of non-operational producing units were estimated at RSD 3.3 billion approximately for a period up to six months, which represents almost 60% of the total losses. About 85% of the surveyed units stopped production due to the floods and among those 17% were still non-operational at the time of the survey (14% of the total number of units consulted), which was carried out more than one month after the event.

**Figure 1-17. Industry: Distribution of Losses over time**

Non-operational units\*\*



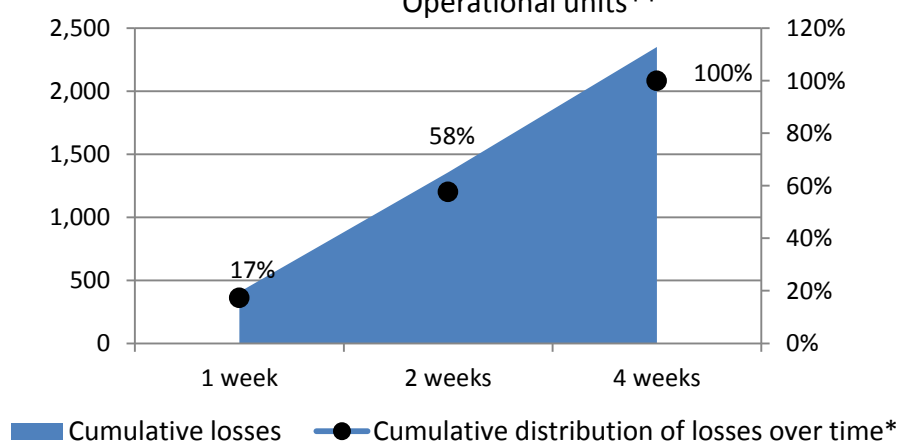
Source: RNA team estimates.

\* Considers only a period of approximately six months after the event.

\*\* As per the period of the realization of the survey.

**Figure 1-18. Industry: Distribution of Losses over time**

Operational units\*\*



Source: RNA team estimates.

\* Considers only a period of approximately 1 month after the event.

\*\* As per the period of the realization of the survey.

While about 70% of the surveyed units had resumed business at the time of the survey, the estimated losses (RSD 2.3 billion) or almost 60% of total losses occurred within 2 weeks after the event.

### Government-owned manufacturing enterprises

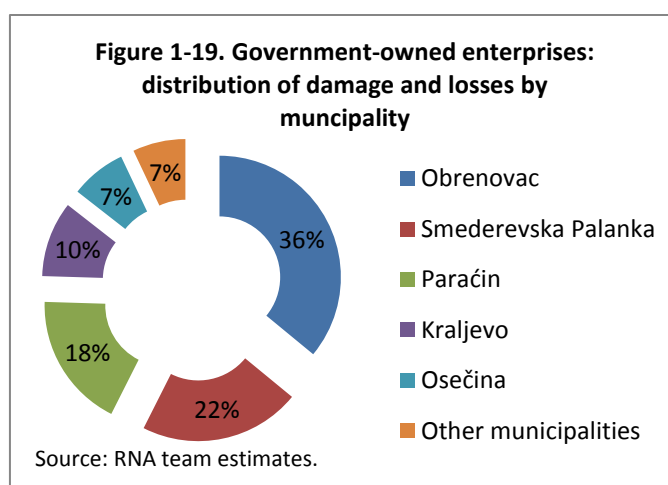
Government-owned enterprises are relevant in Serbia and were affected by the floods as well. Damages and losses were as high as RSD 1.8 billion, with losses corresponding to almost 60% of the total costs. Destruction of machinery and equipment accounted for about 62% of the total damage, while production decline is the main component of the total losses.



Table 1-9. Damages and losses sustained by Government-owned manufacturing enterprises  
(million RSD– 1 EUR = 115.66 RSD)

	Damage			Losses		
	Estimated Value	Ownership		Estimated Value	Ownership	
		Public	Private		Public	Private
<b>Estimation of Damage</b>						
Destruction of premises	250.4	250.4				
Machinery and equipment	492.5	492.5				
Raw materials destroyed	45.8	45.8				
Vehicles destroyed	n. d.	n. d.				
Other	n. d.	n. d.				
<b>Estimation of Losses</b>						
Production decline				961.1	961.1	
Higher production costs				90.0	90.0	
Other				n. d.	n. d.	
<b>TOTAL</b>	<b>788.7</b>	<b>788.7</b>		<b>1,051.0</b>	<b>1,051.0</b>	

In total, 37 units reported damages or losses, among which 10 units are located in Obrenovac, the most affected municipality among the 24 considered. As a result, 36% of the damaged and losses suffered by Government-owned enterprises were reported by companies in Obrenovac, 22% by units in Smederevska Palanka and 18% in Paraćin.



### 2.2.2.3 Trade Sector

#### Sector overview

This is a vital part of Serbia's economy. The valued added by the trade or commerce sector<sup>12</sup>, severely hit by the floods, corresponded to about 24% of gross domestic product (GDP) in 2012. Another important feature of the trade sector is the high participation of micro and small traders and the major role the smaller units play as employers. In 2011, for instance,

<sup>12</sup> Considers the sub-sectors of wholesale and retail, financial services, real estate, and other services.

about 62% of the total turnover in the retail sector corresponded to small shops, markets and street sales.

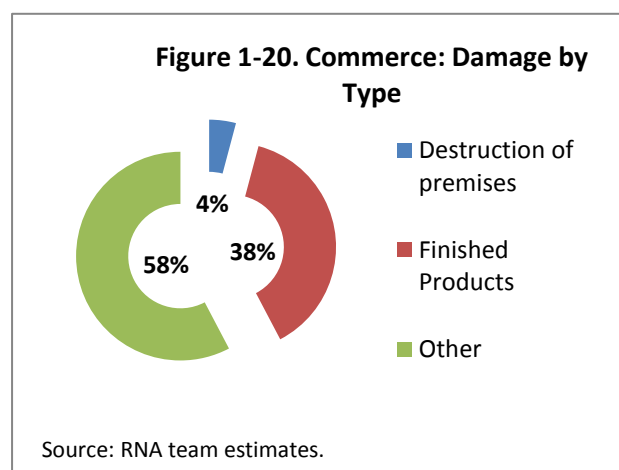
In the 24 affected municipalities, the number of traders is equivalent to 15% of the total number of commerce enterprises in the country, suggesting a high exposure of economic activity to the floods. Based on field data and on parameters related to the impacts of the disaster in the housing sector, it was estimated that a total of 1,554 units were affected by the floods, a number that represents about 5% of the units located in the affected area.

### Trade: Overall effects

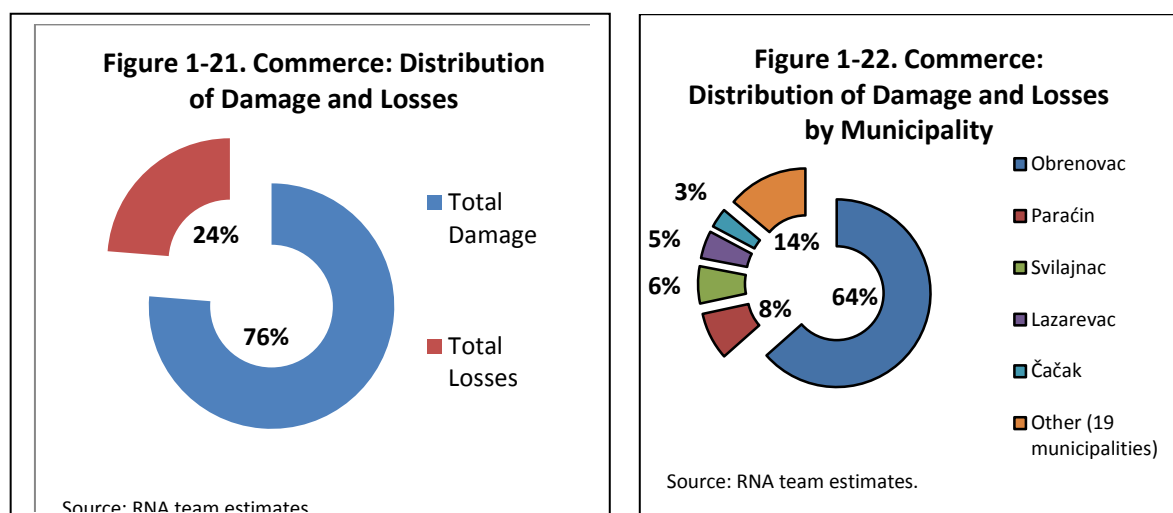
The effects of the floods in the trade sector were significant, highly focused on micro and small enterprises, and concentrated in few municipalities severely hit by the disaster. Damages and losses were as high as RSD 27.2 billion, with total damages accounting for 76% and sales losses for 24%<sup>13</sup> of the total effects (See Table 1-10).

Table 1-10. Estimation of damages and losses in the trade sector (million RSD– 1 EUR = 115.66 RSD)

	Damage			Losses		
	Estimated Value	Ownership		Estimated Value	Ownership	
		Public	Private		Public	Private
<b>Estimation of Damage</b>						
Destruction of premises	860.9		860.9			
Finished products	7,930.7		7,930.7			
Furniture	n. d.		n. d.			
Vehicles destroyed	n. d.		n. d.			
Other	11,994.3		11,994.3			
<b>Estimation of Losses</b>						
Sales decline				6,466.4		6,466.4
Higher production costs				n. d.		n. d.
Other				n. d.		n. d.
<b>TOTALS RSD</b>	20,785.9		20,785.9	6,466.4		6,466.4



<sup>13</sup> Considering approximately six months.



Out of the total damages and losses, RSD 17.2 billion correspond to the effects in the municipality of Obrenovac, where flooded shops, storages and other installations experienced both high destruction to physical assets and revenue losses during the weeks they had to shut down for a variety of reasons ranging from power shortage in the immediate aftermath of the disaster to the persisting lack of working capital and extreme liquidity constraints.

### Trade: Damages

Damages to trade sector assets were the highest among the economic sectors (considering industry, agriculture, and tourism). While damages to premises were relatively low, the costs associated to finished products partially or totally destroyed were as high as RSD 7.9 billion, and those related to the destruction of other assets such as equipment and furniture add up to RSD 11.9 billion. Therefore, only 4% of the total damages corresponds to building structures or premises affected by the floods, while finished products and other assets replacement costs correspond to 38% and 58% of the total damages, respectively.

The main implication of such distribution of damages in the commerce sector is that with finished products destroyed traders find it even harder to resume pre-disaster activities. Moreover, only about 20% of surveyed traders<sup>14</sup> were insured for disaster and coverage for those insured is low.

Within this context, limited access to liquidity could hamper recovery, implying additional economic losses and even permanent closure of severely affected units. Therefore, ensuring adequate and timely availability of funds to replace working capital is essential to the recovery of the commerce sector.

Another important feature of the damages distribution is the high concentration on micro and small units. Approximately 93% of the total estimated damages is associated to micro (4%) and small (89%) units. The distribution of damages to finished products is similar, with 88% corresponding to small units and 5% to micro. Damages to buildings, on the other hand, are

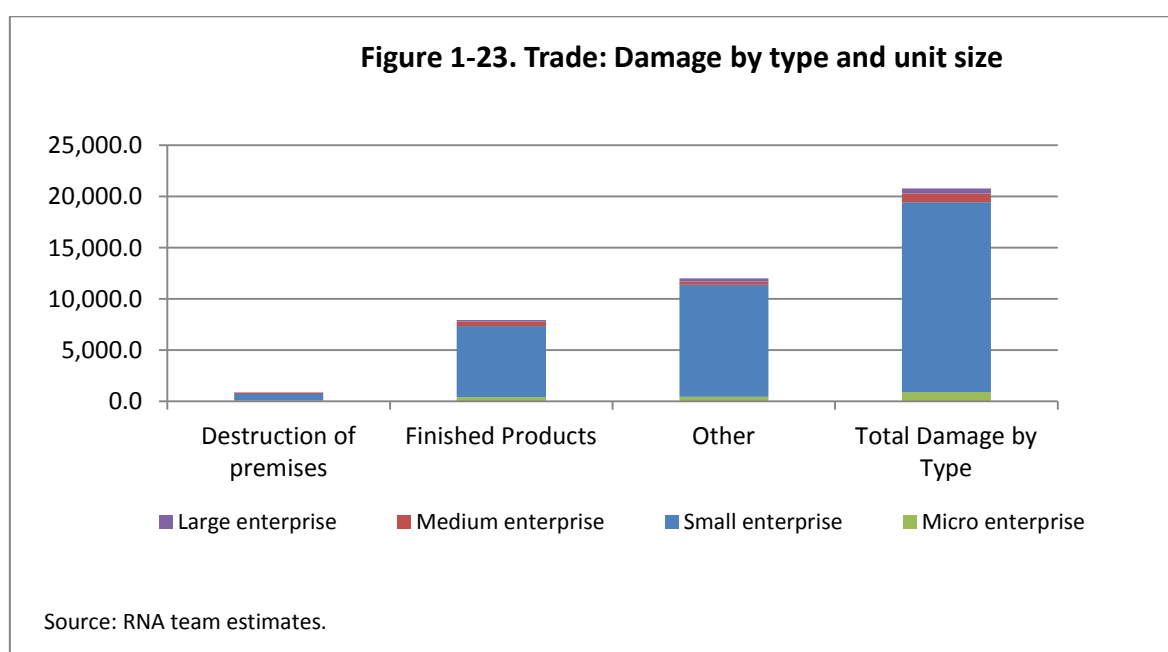
<sup>14</sup> A special sample survey was conducted as part of the assessment that inquired 330 companies in the commerce and industry sectors about the impacts of the disaster on their business.

relatively less concentrated on small units (74%), with damages to medium enterprises accounting to 13% of the total replacement costs.

Table 1-11. Damages by type and size of trading units (million RSD– 1 EUR = 115.66 RSD)

	<b>Destruction of premises</b>	<b>Finished Products</b>	<b>Other</b>	<b>Total Damages by Type</b>
Micro enterprise	74.6	383.4	443.4	901.5
Small enterprise	638.3	6,944.4	10,943.2	18,525.9
Medium enterprise	112.3	441.1	297.2	850.6
Large enterprise	35.7	161.8	310.4	507.9
<b>Total</b>	<b>860.9</b>	<b>7,930.7</b>	<b>11,994.3</b>	<b>20,785.9</b>

Combined, these features characterise a challenging environment for timely re-establishment of normal market conditions. Damages are concentrated on working capital and on micro and small enterprises with limited access to immediate liquidity and no insurance coverage. As an illustration, approximately 90% of the estimated damages refers to damages to working capital in micro and small units, with damages to finished products in micro and small enterprises accounting for about 35% of the total damages in the commerce sector.



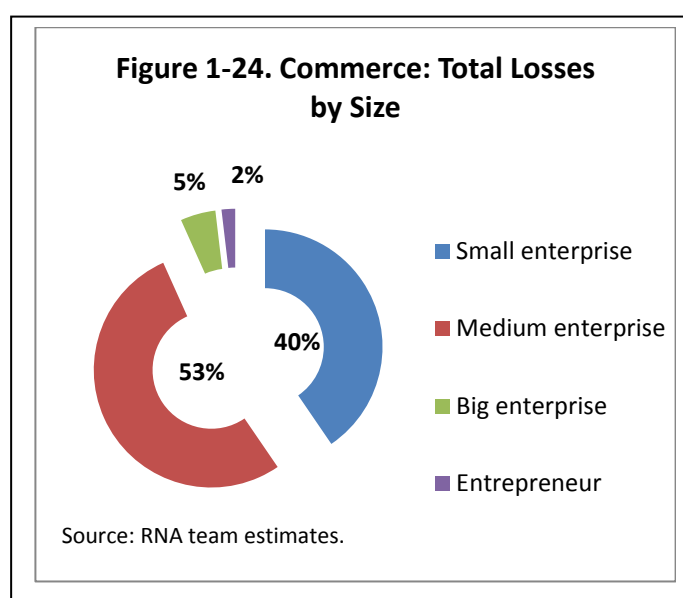
### Trade: Losses

Losses in the trade or commerce sector were estimated at approximately RSD 6,466 million, considering declines in revenue<sup>15</sup> of traders for a period of up to 6 months. Losses of medium enterprises correspond to about 53% of the total losses, while micro and small account for 42%.

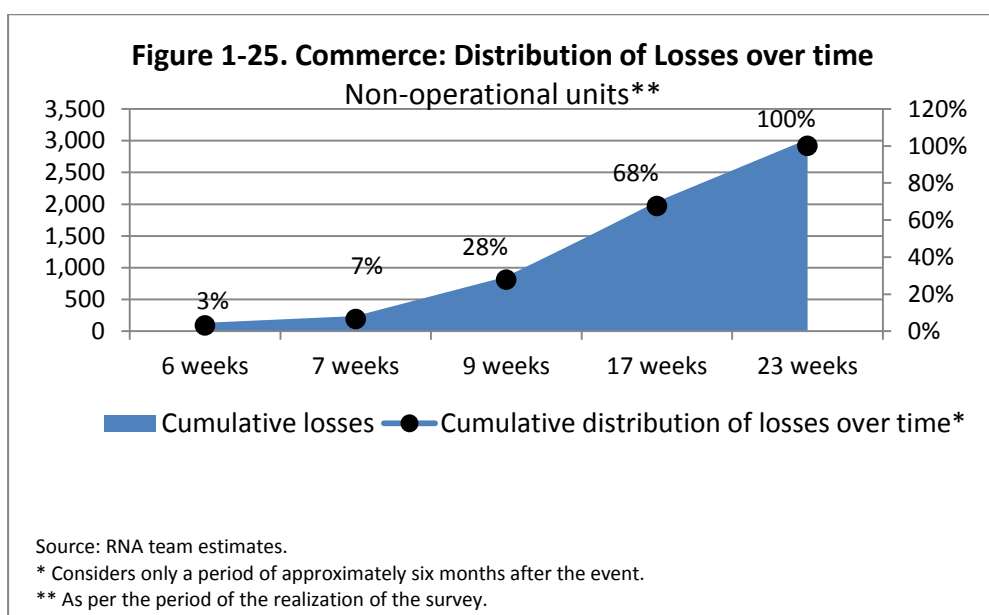
<sup>15</sup> Other losses such as increased costs were not considered due to data availability constraints.

Since time is a major component of total losses, the estimations were carried out considering two different groups of traders, namely, those that at the time of the survey were already back to business and those still shut down as consequence of the floods.

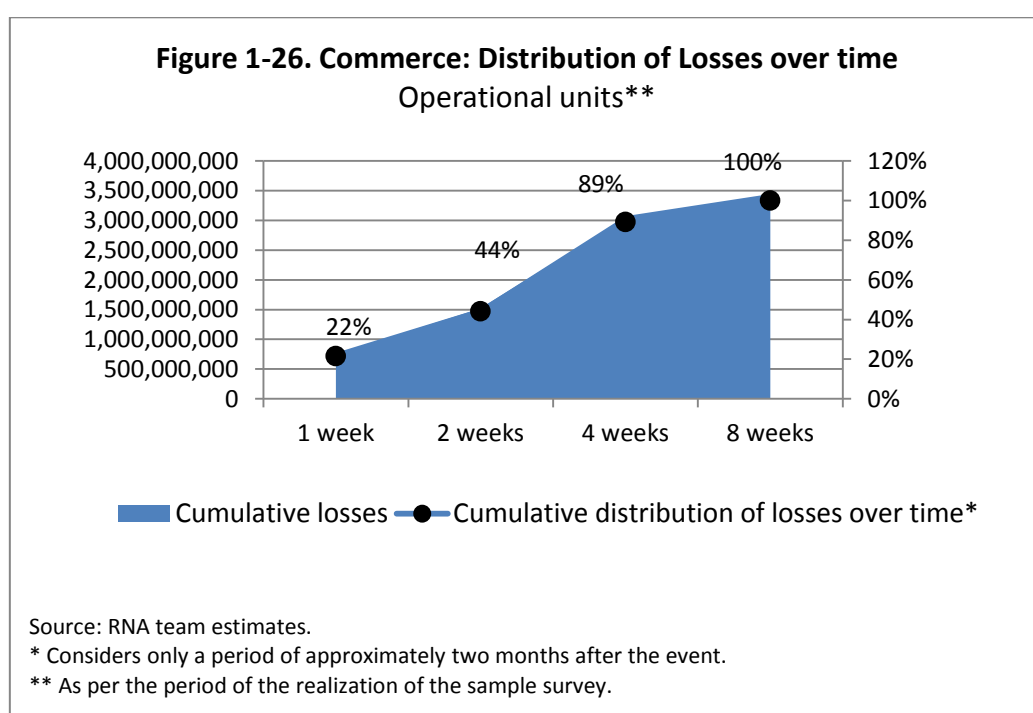
The losses of the non-operational units were estimated at approximately RSD 3 billion over a time period ranging from 1.5 to six months. Among the companies that interrupted their operations due to the floods, which represent 74% of the total surveyed units, 12% were still shut down at the time of the consultations. That is, approximately 8% of the units considered had not resumed their normal activities more than a month after the floods.



As a relatively larger proportion of medium enterprises are among those that need more time to resume normal operations, losses in this group correspond to almost 50% of the total losses. Regarding the time frame for the realisation of the losses, most of it is expected to materialise between July and September.



On the other hand, about 65% of the surveyed units had already resumed operations, but still the implied revenue losses for this group due to business interruptions are estimated at RSD 3.4 billion. Most of the losses materialised within one month following the floods.



## 2.2.2.4 Tourism Sector

### Sector overview

The value added by the tourism sector in 2012 was equivalent to approximately 1% of the country's gross domestic product (GDP), and the direct contribution of the sector to the total

economy and employment is relatively modest, not comparable with that of the neighbouring countries such as Croatia and Montenegro.

The main characteristics of the sector are a modest number of beds (less than 29,000 overall) and concentration of the offer on intermediate, middle-intermediate and high-intermediate categories (two to four stars). Moreover, tourists' movements are characterised by a strong incidence of the domestic component, with the foreign one counting for the 45% of the total arrivals and the 35% of the total overnights (May 2013-May 2014).

In regard to the total number of units of the hospitality, beverage and service activities in the 24 municipalities considered for the assessment, their relevance is below the national average, as suggested by local density indicators (See Table 1-12).

Table 1-12. Units of accommodation and food services

Municipality	Units in accommodation services	Density (*)	Units in food and beverage service activities	Density (*)
Total 24 affected municipalities	251	2.2	3,817	33.7
Serbia	2,062	2.9	25,364	35.3
(*)= (number of units/population)*10000				
Source: Sors				

### Tourism: Overall effects

In the tourism sector, damages and losses were estimated at approximately RSD 252.7 million, with about 75% corresponding to losses and 25% to destruction of physical assets. Six hotels in the affected area reported damages to building structure, furniture and equipment amounting to RSD 63.2 million (See Table 1-13).

Table 1-13. Estimation of damages and losses in Tourism (million RSD– 1 EUR = 115.66 RSD)

	Damage			Losses		
	Estimated Value	Ownership		Estimated Value	Ownership	
		Public	Private		Public	Private
<b>Estimation of Damage</b>	<b>63.2</b>		63.2			
Destruction of premises						
Furniture and equipment						
Vehicles destroyed						
Other damage						
<b>Estimation of Losses</b>						
Revenue decline				189.5		189.5
Higher production costs						
<b>TOTAL</b>	<b>63.2</b>		<b>63.2</b>	<b>189.5</b>		<b>189.5</b>

Out of the affected units, two were located in Paraćin, while the municipalities of Jagodina, Valjevo, Krupanj and Čačak each reported one damaged hotel. In Paraćin, damages to food

services equipments and furniture implied both lost of revenues and increased costs to the affected units.

Losses were estimated for the overall area and include revenue losses due to decreased demand during the period between May and August. As the domestic component is the most relevant for the industry, income losses and other disruptions in the affected area have caused cancellations and, besides that, the reputations losses could potentially cause additional revenue losses during the summer season.

### 2.2.2.5 Mining and Energy Sector

#### Sector overview

The annual primary energy demand amounts to approximately 14.6 million tons of oil equivalent (Mtoe). Serbia is characterised by a high share of coal use, mostly of low energy lignite, in the total primary energy (over 50%), which is primarily used for the production of electricity. The second largest share is oil and oil products (25 %), followed by natural gas (11 %), biomass (7 %), and hydro resources (6 %). The predominant use of domestic coal explains the country's low import dependency and also relatively high CO<sub>2</sub> emissions. Net energy import dependence of coal, oil products and natural gas has reduced slightly in recent years from 33.5 % in 2010 to 27.7 % in 2012. In 2010, CO<sub>2</sub> emissions were at 6.3 metric tons per capita, which is below the European Union average of 7.4, but higher than the Balkan average of 5.0.

Energy intensity, i.e. the total primary energy consumption per unit of gross domestic product (at purchasing power parity) is at the level of the countries in the region, but 1.89 times higher than the European Union average. Higher energy intensity is partly a consequence of unavoidable technical losses in transforming lignite coal into electricity, but, above all, of irrational behaviour i.e. low efficiency in consumption in households, industry, due to the low level of capacity utilisation and obsolete technology, as well as in other sectors. Primary gas consumption per capita is about 33% of the EU level, so this sector can have a high growth potential. At the end-consumers side, total final energy consumption was 8.5 million toe in 2012. The residential sector represents the largest portion of energy consumption at approximately 35 % (298 ktoe). Industry and transport follow closely behind with 29 (247 ktoe) and 22 % (187 ktoe), respectively.

The Ministry of Mining and Energy is responsible for overall policy and oversight of the mining and energy sectors. The regulatory competencies are performed by the Energy Agency of the Republic of Serbia (ARES). Serbia's energy sector policy and regulatory development is largely driven by the EU accession process and the obligations under the Energy Community Treaty<sup>16</sup>. The primary legal act is the Energy Law („Official Gazette of the Republic of Serbia“ No. 57/11, 80/11-amendment, 93/12 and 124/12, hereinafter: the Law), which was amended twice in 2012 to include more robust legislation on energy efficiency, energy permits and renewable energy. The law prescribes the obligation to enter the open market, i.e. starting from January 1, 2013 the right to regulated supply has been terminated for the customers whose facilities are connected to the transmission system, i.e. the transmission of natural gas. For electricity customers whose facilities are connected to the

<sup>16</sup>The Energy Community is an international organization dealing with energy policy. The organization was established by an international law treaty in October 2005. Parties to the Treaty are the European Union and 8 Contracting Parties from the South East Europe and Black Sea region



distribution system, except for households and small customers starting from January 1, 2014. For the customers of natural gas connected to distribution, except for households and small customers starting from January 1, 2015. The Ministry also started drafting necessary amendments necessary for the implementation of the European Union's Third Energy Package. State Owned Enterprises (SoEs) play a pivotal role in the energy sector in Serbia. The largest of these is the fully Government owned, vertically integrated holding company *Elektroprivreda Srbije (EPS)* encompassing thirteen legal entities. Five of them are licensed for the generation of electricity. Coal production (open pit mining) is done by a separate legal entity within EPS as well as within one of the power generation companies. A new legal entity has also been recently established for electricity generation from renewable energy sources. Publicly owned *Elektromreža Srbije (EMS)* is the country's only transmission and transmission system operator. EMS is responsible for the organisation and administration of the balancing market according to the Energy Law.

With regards to natural gas, the vertically integrated and 100 % Government owned *Srbijagas* manages all trade, supply, transmission and distribution activities. The Company operates 95% of the gas transmission network in Serbia, accounts for around 70% of gas sales. *Srbijagas* holds 49% shares of the underground storage *Banatski Dvor* and 25% shares in *Yugorosgaz*, a company established in 1996. *Yugorosgaz* other shareholders are *Gazprom* (50 %) and *Central ME Energy and Gas Vienna* (25 %). *Yugorosgaz* holds licenses and is active in the business of natural distribution and supply.

### Coal mining

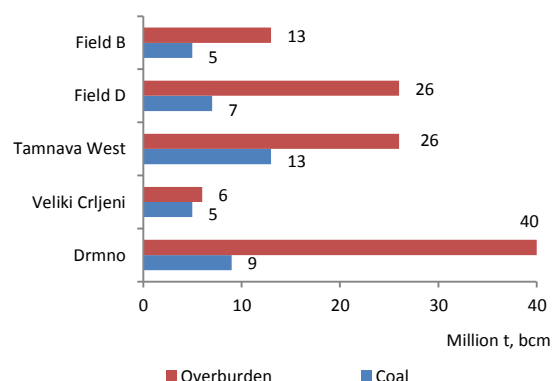
Coal production is focused on two mining basins Kolubara (open cast mines Field B, Field D, Tamnava-West Field and Veliki Crljeni) and Kostolac (open cast mine Drmno). Annual coal production in 2013 was about 39 million tons while total overburden production is around 110 million m<sup>3</sup>. Coal produced is lignite with low calorific value between 7.5MJ/Kg low quality. The overwhelming majority of production, 96 – 1 euros = 115 dinars, is directly used to supply the thermal power plants. Out of the total electricity generation in 2013, almost 74 % was generated by the EPS thermal power plants firing coal originating from the Kolubara and Kostolac mines. Coal produced by the mining basin Kolubara made possible the generation of some 55.20 – 1 EUR = 115 dinars of the total electricity generation of EPS, while the share of open cast mine Kostolac was 17.60 – 1 EUR = 115 dinars. The Morava TPP fired coal produced by the PE Underground pit mine exploitation and its share in the total electricity generation of EPS is 0.68 – 1 EUR = 115 dinars.

Table 1-14. Coal supply by sector

(t)	MB Kolubara	Kostolac	EPS
Thermal Power Plants	29,152,350	8,606,211	37,758,561
Drying	981,622	-	981,622
Industry	363,451	197,548	560,999
Heating Plants	212,292	-	212,292

Figure 1-27. Coal production capacities

<b>TOTAL</b>	<b>30,709,715</b>	<b>8,803,759</b>	<b>39,513,474</b>
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## Electricity

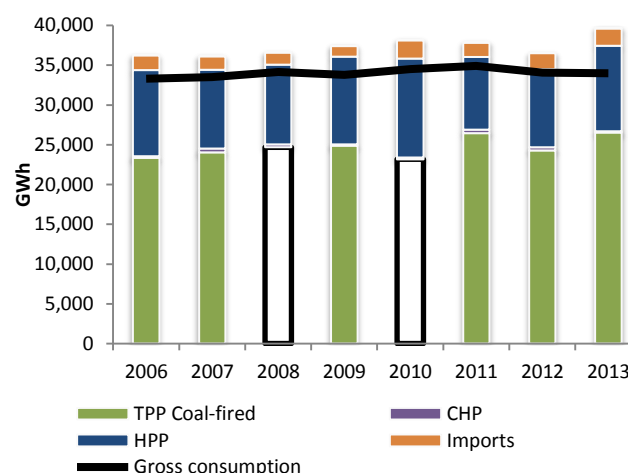
In 2013, Serbia produced approximately 37,540 GWh of electricity and consumed around 34,000 GWh. After taking combined transmission and distribution losses (16.2 % in 2013) into account, the country had a deficit of just under 2,000 GWh which was met with net energy imports at a cost of EUR1.8 million. Both consumption and total generation have remained fairly flat over the last few years, but aging infrastructure are making it increasingly difficult to optimise power generation.

Total net installed capacity of power plants in Serbia, excluding APKM, but including small hydropower plants of independent producers amounts to 7,177 MW. Out of this, lignite fired plants make up the over whelming majority of installed capacity at 3,936 MW. Installed hydropower capacity is 2835 MW and CHP (natural gas, fuel oil) accounts for 353 MW. There are currently 13 small hydropower plants that contribute 19.8 MW of installed capacity to the generation mix. The average age of Serbia's thermal power plants is about 40 years old. Several of thermal and hydro power plants are in need of rehabilitation work. New generation capacity for both thermal and hydropower generation is also planned, but financing has proved difficult. With regards to renewable energy generation, the National Renewable Energy Action Plan (NREAP) for Serbia envisions 3,100 GWh of new generation capacity by 2020.

Table 1-15. Installed capacity, MW

<b>Coal</b>	<b>3,905</b>
Kolubara	245
Kostalac A	281
Kostolac B	640
TE Morava	108
Nikola Tesla A	1,502
Nikola Tesla B	1,160
<b>Combined Heat and Power Plants</b>	<b>356</b>
<b>Hydropower</b>	<b>2,835</b>
Đerdap I	1,058
Đerdap II	270
Bajina Bašta	364
Bajina Bašta pumped storage	614

Figure 1-28. Generation and consumption, GWh



HE Zvornik HPP	100
Other Hydro	429
<b>Other Renewable owned by EPS</b>	<b>20</b>
<b>Other Renewable – independent producers</b>	<b>61</b>
<b>Installed Generation</b>	<b>7,177</b>

The basic structure of the electricity sector was established in 2005 after the adoption of the Law on Energy in 2004 ("Official Gazette of RS", No. 84/04), by separation and internal restructuring of a single vertically integrated JP EPS.

The structure of the electricity sector at the end of 2013 was as follows:

<b>Public Company ELEKTROMREŽA SRBIJE (JP EMS) www.ems.rs</b>	<b>Public Company ELEKTROPRIVREDA SRBIJE (JP EPS) www.eps.rs</b>	<b>OTHERS</b>
ELECTRICITY TRANSMISSION	POWER GENERATION – 6 companies	POWER GENERATION – 5 independent producers
MANAGEMENT OF TRANSMISSION SYSTEM	DISTRIBUTION OF ELECTRICITY – 5 companies	
ORGANIZATION OF BILATERAL AND BALANCED MARKET	ELECTRICITY SUPPLY • on free market • regulated public supply • backup supply (2014)	ELECTRICITY SUPPLY - 71

Transmission system, excluding APKM, consists of 30 transformer stations of 400/h and 220/ h kV/kV of 13,469 MVA installed capacity (out of which 25 transformer stations of 12,981 MVA installed capacity are owned by JP EMS), 8 substations and power lines of 400, 220 and 110 kV with total length of 9,637 km (out of which 9,312 km of transmission lines is owned by JP EMS). JP EMS also owns three transformer stations of 110/h kV/kV (Table 3). In 2013, the process of handing over of 53 transformer stations of 110/h kV/kV to electricity distribution companies was started and it has reached the final stage, as well as the process of taking over 110 kV of transmission lines from these companies. Completion of the handover and acceptance of facilities is expected in 2014. Transmission System of JP EMS is connected to neighbouring power systems via 22 interconnection lines of 400, 220 and 110 kV in voltage.

Activity of electricity distribution in the Republic of Serbia, without APKM, is carried out by five electricity distribution companies- PD Elektrovojvodina d.o.o. Novi Sad, PD Elektrodistribucija d.o.o. Belgrade, PD Elektrosrbija d.o.o.. Kraljevo, PD Jugoistok d.o.o. Niš and PD Centar d.o.o. Kragujevac. Distribution system, excluding the territory of APKM, includes about 36,000 transformer stations with a total installed capacity of about 30,600

MVA and around 158,900 km of distribution lines, of the voltage level of 110, 35, 20, 10 and 0.4 kV, which distribute the electricity to end customers. Companies own 34,230 transformer stations of total installed capacity of 28,965 MVA and 152,079 km of distribution lines of all voltage levels. Approximately 3.58 million customers, including 3.18 million households are supplied throughout the country. Consumption increases slightly during winter months due to inefficient use of electricity, particularly for heating for heating purposes. The structure of consumption by voltage level is given in Table 1-17 below:

Table 1-16: Transmission System

Transmission System	Total	
Total length	km	9312
400 kV	km	1614
220 kV	km	1884
110 kV	km	5814
Number of transformers		54
Number of substations switchyards		33
Number of interconnection lines (active)		22

Table 1-17: Structure of Electricity Sales, 213

Voltage Level/ Consumers	Electricity supplied		Number of clients
	GWh	%	
High Voltage - 110KV	177	1%	2
Middle Voltage - 35KV to 10KV	5,856	23%	4,755
Low Voltage (0.4 KV)	4,997	19%	357,327
Households	14,146	55%	3,241,567
Public Lighting	583	2%	24,377
<b>TOTAL</b>	<b>25,759</b>	<b>100%</b>	<b>3,628,028</b>

As a signatory party to the Energy Community Treaty, Serbia has an international obligation to liberalise its electricity market by January 1 2015. The obligation not only derives from the Treaty, but also from existing respective legislative framework. As of end 2013, buyers purchased 2.24 TWh on the open market in the electricity sector, which is 8% of the consumption of end customers. Also, 5.5 TWh have been purchased under market conditions that are needed to cover losses, and 1 TWh for pumping into lakes of power plants and 0.5 TWh for other purposes of power plants, which is an additional 20% of the gross consumption. In the natural gas sector, 55 buyers bought 649 million m<sup>3</sup> on the open market, which is 34% of end customers' consumption purchased from suppliers. Consumption of gas for technological needs of the system was only 20 million m<sup>3</sup>, i.e. 1% of gross consumption. Total consumption of end customers amounted to 2 192 million m<sup>3</sup>, out of which 300 million m<sup>3</sup> was consumed by NIS directly from its own production. Although there is a large number of licensed suppliers on the open market (for electricity up to 72, and 24 for natural gas), in 2013 electricity end-use customers were being supplied only by two suppliers and gas customers by three natural gas suppliers. The dominant suppliers are JP EPS - for electricity and JP Srbijagas - for natural gas.

Regulated electricity prices for end customers are approved verified by the Serbian Government following the recommendation from AERS. Current tariff structure is divided in 11 different rates according to a combination of consumption type and voltage. They range from 3.9 €cents/kWh to 7 €cents/kWh. While tariffs were increased by 11% for households in

August 2013, it is estimated that they are still not cost reflective. Below market prices pose significant challenges to the future growth and development by limiting public and private investments in the sector.

### Natural gas

In 2013, natural gas consumption was of about 2.5 billion cubic meters (bcm). Industry is the largest consumer of natural gas at 66% of total consumption, followed by district heating at 24%, and the remaining 10% by households. The largest share of gas consumption (1.8 bcm) is imported principally from Russia under a long-term contract. Domestic production in 2013 was of about 0.5 bcm, representing 19% of domestic consumption. The gas transmission network is 2,273 km long, of which all but 125 km is located in central and northern Serbia. *Srbijagas* and *Yugorosgaz-Transport* own 95% and 5% respectively of the gas transmission network. The distribution system spans 15,839 km and has approximately 261,000 active connections. *Srbijagas* operates 44% of the distribution network. There are currently 33 distribution system operators with supply and distribution licenses (primarily municipalities with a blend of public-private ownership). Ten distribution companies and 14 energy entities with supply licenses operate in the free market, but only three suppliers, *Srbijagas*, *Russian-Serbian Trading Co. (RST)* and *Elgas Trading Ltd.*, were active in 2013.

### District Heating

Serbia consumes more energy during the winter months due to heating needs. Serbia has 55 municipalities with operating district heating systems. In addition to industry and commerce, over 50% of the population is connected to district heating in larger towns such as Belgrade and Novi Sad. Total installed capacity is 6,587 MW thermal and total heat demand of connected customers is approximately 5800 MW thermal (82% residential, 18% commercial).

### Assessment of disaster effects

Heavy rain and subsequent devastating floods had a dramatic impact in the energy sector in Serbia. Up to 110,000 customers were affected by supply interruptions in 28 municipalities touched by the floods. During May 15<sup>th</sup> - 19<sup>th</sup>, water overflowing from Kolubara River and its tributaries Vranicina and Prestan flooded open pit mines Tamnava West, Veliki Crljeni, as well Fields B and D in the Kolubara coal basin. Large portions of the distribution network were also affected and to a lesser extent, the transmission network

Immediately after the floods started, the Government put in place an emergency working group led by the Ministry of Mining and Energy and including EPS, EMS, *Srbijagas*, and other state agencies. The working group successfully coordinated and monitored the security of energy supply in the country and coordinated all necessary actions aimed at preserving the integrity of the energy sector. Specific measures included protection of key facilities, emergency repair in the power transmission and distribution systems, assistance to municipalities in securing energy supplies, and plan for the immediate recovery of the system. As a result of these efforts, consumers in other regions in the country were not affected by power shortages and by end-May, power supply was restored to all consumers in the zones affected by the floods.

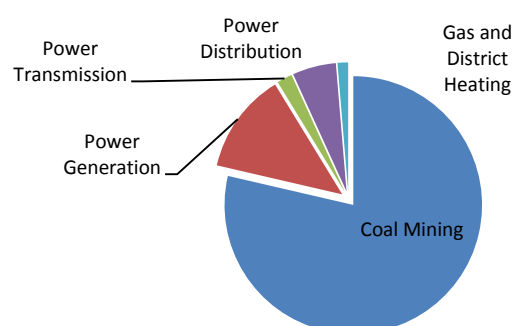
### Damages

Overall damages in the power sector are estimated at 21,218 million RSD (see table below). Over ninety % of the damages are in the coal and power generation sectors, followed by the power distribution sector. Some damages were also registered in the power transmission, natural gas, and district heating sector. All major enterprises affected by the floods are fully Government owned. A description of the impact of the floods in each subsector is presented below.

Table 1-18. Estimated damages

Million RSD	Damages
Coal Mining	16,682.4
Power Generation	2,683.2
Power Transmission	409.6
Power Distribution	1,161.6
Natural Gas and District Heating	282.0
<b>TOTAL</b>	<b>21,218.7</b>

Figure 1-29. Share of Distribution damages by sector



**Coal mining and power generation.** Damages in the coal sectors were the most severe. Outpouring of water from the Kolubara river and the failure of a water control dam located upstream of the mine caused a large volume of water to surge and flooded open pit mines Tamnava West, Viliki Crljeni. Fields D and B in the Kolubara mining basin were also partially flooded. Overall these open pit mines account for about two thirds of the coal produced in the country. After dewatering and rehabilitation, the production process in Fields D and B was fully recovered on June 5th. However, Tamnava West and Viliki Crljeni open pit mines are still flooded. It is estimated that the volume of water in these fields is around 200 million cubic meters. De-watering is ongoing in the Viliki Crljeni field and de-watering of the Tamnava West pit is also planned.

Due to the high flow rate of the water entering the pit meant, it was impossible to remove critical equipment from the mine. Mining equipment which is currently submerged includes among others, four bucket excavators, belt wagons, belt conveyors, spreaders, draglines, cranes, and pipe layers. It is very difficult to assess the degree of damages of submerged equipment before both pits are fully dewatered. However, it is likely that deep refurbishment, and perhaps full replacement of some equipment, may be necessary. There were also some other damages to the railway coal transport system from the mine to the Nikola Tesla Thermal Power Plant (TPPs) complex. River beds and floods protection systems in the mine and in the surrounding of the Power Plants were also heavily affected. Important efforts during the floods were made to protect the Nikola Tesla and Kostolac TPP. While the main



facilities were protected, some ancillary equipment such as transformers, controls, etc. have to be replaced.

Overall damages in the coal mining and power generation sectors are estimated at RSD 19,366 million. Damages include the estimated cost of mine de-watering, mine reconstruction, repair and replacement of damages mining equipment. It should be highlighted that there are large uncertainties regarding on the actual scope and cost of these activities. This will be known only after the open pit mines are de-watered and a more precise assessment of the need for reconstruction and stabilisation of mine slopes and repairs of the submerged equipment is made. Damages estimate also includes other costs items such as reconstruction of river beds and railway system and repairs of equipment in the Nikola Tesla and Kostolac Thermal Power Plants.

**Power Transmission.** The floods had relatively minor impact to the transmission network and no transmission tower collapsed. As a result, there were no interruptions in electricity transmission service. Most of the damages resulted from landslides and erosion following the floods. Based on the damages assessment as of June 30, EMS assessment indicates that for 110kV transmission lines, there are 3 landslide locations and 1 water erosion location. In the 220kV transmission lines, there is 1 landslide location. There was also one substation in Obrenovac which was damaged and some other small damages on EMS' buildings. Overall repairs to the transmission systems are estimated at RSD 410 million.

**Power Distribution.** Immediately after the floods wave, more than 110,000 customers (mainly households) lost power supply. EPS staff was committed to perform quick restoration and electric supply in dry and stable areas were quickly recovered, and number of customers without power supply decreases significantly. Among the five distribution companies, *Elektrodistribucija Beograd (EDB)* and *Elektrosrbija Kraljevo (ES)* were severely affected by the floods. *Elektrovojvodina Novi Sad (EV)* and *Center Kragujevac (C)* are lightly affected, and *Jugoistok Nis (JI)* is not affected. According to EPS' assessment as of June 30<sup>th</sup>, around 360 substations of different voltage level have been damaged; more than 60 Km of medium voltage overhead cables and lines, four tower foundations, as well as 100km of 1KV overhead lines, and 22,000 meters. Repairs and replacement of the damaged equipment in the distribution sector are estimated at RSD 1,160 million.

Table 1-19. Estimated damages in distribution

Million RSD	Total
Substations	331.3
Mid voltage cable lines	105.3
Mid voltage overhead lines	220.8
Low voltage grid	504.2

Table 1-20. Estimated damages in transmission

Milion RSD	Total
220 kV overhead line N° 209/1 Substation Bajina Basta – Substation Sremska Mitrovica 2	33.7
110 kV overhead line N° 1116 Substation Osecina – Substation Krupanj	28.3
110 kV overhead line N° 1176 Substation Krupanj – Substation Ljubovija	30.9
110 kV overhead line N° 106A/2,	18.0

		106B/2 Substation Valjevo 3 – Substation Osecina	
		110 kV overhead line N° 1183 Substation Cacak 3 – Substation Gornji Milanovac	8.7
		Substation 400/200 kV Obrenovac	284.5
		Damages to buildings in EMS' facilities	5.5
<b>TOTAL DAMAGES</b>	<b>1,161.6</b>	<b>TOTAL</b>	<b>409.6</b>

**Natural gas and district heating sectors.** Due to heavy rains, the gas sector network also suffered some damages but there was no interruption of service during the floods. After the disaster, a visual inspection was made of all the major pipelines (MG), distribution pipelines (RG), the city network of medium pressure, the main measuring and regulating stations (GMRS), and measuring and regulating stations (MRS) as well as distribution pipelines. Locations concerned by the floods include Preljina, Gornji Milanovac, Cacak, Lucani, Sabac, Trstenik, Krusevac, Svilajnac, Smederevska Palanka, Paracin Jagodina, Umka. Estimated cost for repairs in the gas network amounts to RSD 60.8 million.

The District Heating system in the city of Obrenovac was the most affected as result of the floods. The municipally-owned public enterprise (JKP) TOPLOVOD registered damages in water heating substations, conversion heating substations, the complete underground and overground pipeline networks, chambers, manholes, connections. The estimated preliminary damages is around RSD 221 million.

### Losses

The bulk of the losses were incurred by the coal, power generation, and power distribution sectors. There were no losses reported by the power transmission Company EMS. Losses in the natural gas and district heating sector were not available by the time the report was issued.

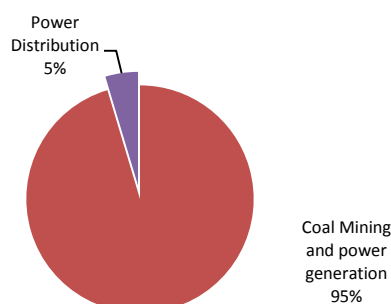
Losses incurred in the coal, power generation, and distribution sectors were estimated on the basis of: (i) business disruption (reduced capacity to supply coal, electricity) and (ii) reduced metering and/or bill. Total value of losses amounts to RSD 35,670.7 million. Out of this figure, revenues lost this the end of this year account for around 70% (RSD 79.7 million), while the remaining are likely to be incurred before mid-2015, when all sectors are expected to recover to their pre-floods output levels. As for the structure of losses by sectors, 95% is the share of losses in coalmining and power generation and 5% on distribution systems (Table 1-20). Out of total losses, 100% are registered in public sector of the country.

Table 1-21. Estimated losses

Million RSD	Damages
Coal Mining and power generation	34,017.2

Figure 1-30. Share of Distribution of  
losses by sector

Power Transmission	0.0
Power Distribution	1,653.5
Natural Gas and District Heating	N.A.
<b>TOTAL</b>	<b>35,670.7</b>



**Coal mining and power generation.** Losses in coal mining result from reductions in coal output in the Kolubara mining basin. As mentioned above both the Tamnava West and Veliki Crljeni fields are still flooded and no coal production is possible. These fields accounted for about 46% of coal production in 2013. The vast majority of the coal produced is destined to supply Thermal Power Plants Kolubara, Nikola Tesla A and B, and Morava.

Losses due to lost power generation in these power plants due to lack of coal supplies were calculated based on expected reduction of available coal quantities over the next year or so multiplied by the historical specific coal consumption for electricity generation ratio of 1.453 kg/kWh. The coal production gap within the next eight /twelve months compared to the baseline data for 2014/2015 is expected to be of around 55%. It should be noted, however, that assumptions on the reduction of coal output from the Tamnava West and Veliki Crljeni have a high degree of uncertainty due to assumptions on the necessary time for the de-watering of the pits, restoration of the equipment, and time needed for the reconstruction of the mine as noted above. Power prices to value lost generation were estimated as the average monthly market prices for the base load power on the Hungarian Power Market (HUPX). Overall, losses due to lost production in the power generation in the Kolubara mining basin are of about RSD 30,276.4 million.

Other losses in the coal mining sector include lower revenue from coal sold to the retail market (incl. industrial consumers, District Heating plants, residential consumers, etc). According to EPS, coal sales are expected to decrease from 1,700 thousand tons to 900 thousand tons over the next year for an estimated value of RSD 3,052.5 million.

During the floods, there were also losses due to reduced output from Hydro power plants (HPPS). Due to large daily inflows during May 2014, water spillage occurred in order to ensure protection of the dams in HPPs Djerdap 1 and Djerdap 2. As a result, it is estimated that losses in power generation were of around 150 GWh valued at around RSD 688.3 million.

### Power distribution

Losses in operation of distribution companies were incurred from the first day of the disaster. Around 110,000 customers were disconnected from the distribution grids after initial flooding. Main focus of distribution companies was to reconnect as many customers as possible in a short period of time, if necessary even without providing meters. Since this was an emergency operation, some equipment was energized after high-pressure water cleaning

and rust-prevention spraying without replacement, and some switchgears have been bypassed because of drive mechanism malfunction, and lack of spare inventories and spare parts. To prevent large amount of non-technical losses and to reduce uncollectible bills, it is necessary to install about 22,000 metering facilities. As a result, distribution companies had losses due to supply interruptions and unmetered electricity sold to consumers.

The floods also led to significant increase in operational expenses during the recovery period. Increased operational expenses will also continue going forward due to necessity of replacement of affected equipment in order to secure reliable electricity supply and public safety. Total losses in distribution systems amount to RSD 1,635.5 million. The breakdown by distribution company is presented in the table below.

Table 1-22. Estimated losses in the distribution sector.

Distribution Company LOSSES (Mill RSD)	<i>Elektrovojvo dina Novi Sad</i>	<i>Elektrodistrib ucija Beograd</i>	<i>Elektrosrb ija Kraljevo</i>	<i>Center Kragujev ac</i>	TOTAL
Loss of revenues	0.4	69.3	2.2	0.0	71.9
Additional operation expenditures	0.0	22.8	918.3	10.6	951.7
Other (inventories, etc)	72.9	12.9	494.9	49.3	629.9
<b>TOTAL LOSSES</b>	<b>73.2</b>	<b>104.9</b>	<b>1,415.4</b>	<b>59.9</b>	<b>1,653.5</b>

### 2.2.2.6 Housing Sector

#### Sector overview

According to the 2011 census, the total number of housing units was 2,423,208 with 179,703,282 square meters of total floor area, occupied by a population of 7,186,862. The last two decades have brought considerable changes to the housing sector in Serbia. Following the fall of communist Yugoslavia in 1991, State/enterprise subsidies have been eliminated from the housing sector. The overall difficult economic situation of the country and the influx of refugees and IDPs from wars in the region during the last decade, have made the situation in the housing sector even more complex. At the same time, the withdrawal of the State from maintenance and management of the existing housing stock, in particular the multi-unit stock, has led to a continuous deterioration of this stock, due to lack of investment in refurbishing or upgrading.

Approximately 65% of the entire stock was built during the socialist era, 1971-1980 being the most productive period. Only 5-6% of the stock originates from the period before 1919. A share of about 10% was added to the current stock after 1990. Based on this, one can say that the housing stock in the country is not very old.

The great majority, above 80%, of the existing housing stock is built of solid materials, bricks and reinforced concrete. The remaining 20% are built in such a way that it cannot be considered structurally sound. It is however evident that some of the old multi-unit buildings might need substantial investment to be brought up to standards.

Peri-urban growth of Serbia is characterised by illegal construction, informal settlements and uncontrolled urban sprawl. A low quality of life in illegal settlements is evident due to a lack of services and insufficient social integration, but the most obvious indicator is the very poor condition of physical structures and infrastructures. People live in unfinished houses, mostly built without permits, and with a severe lack of sewage. Most often, if not always, inhabitants make improvised sewage network towards a nearby stream, which during strong rains easily spills over in the streets.

On 11 September 2009 the Social Housing Act entered into force. It lays down a complex institutional system that will assume the task of providing social housing in the country. The Act has provided the basis for establishment of an appropriate institutional infrastructure: the National Housing Agency, which will mainly formulate and monitor the implementation of social housing programs, and non-profit housing organisations, primarily local housing agencies, which will implement social housing programs.

### Disaster Effects

Two distinct phenomena occurred in the Serbian part of the Sava River basin. The tributaries of the Sava River (e.g. Kolubara River) responded almost immediately during the rainfall event. The water levels in these rivers rose almost immediately after the onset of the rainfall event, but also dropped quickly to normal values. For example, the water level at Beli Brod in the Kolubara river rose about 7 meters between May 14 and May 16, but was back to normal conditions by May 18-19. This is a typical example of a “flash flood” situation. The Sava River itself, however, rose more gradually about 3.5 meters between May 14 and May 19-20. The water level in the Sava River in Serbia peaked after the rainfall event had stopped. Also, the water level decreased slowly after the peak with a typical drop of 20-30 cm/day.

The heavy rainfall and rising water levels had three distinctly different effects in different areas: the flash floods of high intensity resulted in the total destruction of houses, bridges and sections of roads (as observed in Krupanj and areas near Sabac). The rising water levels resulted in widespread flooding of urban areas (in particular Obrenovac) and rural areas (around Sabac). Finally, the increased rise in ground water levels resulted in widespread landslides leading to the destruction of houses, roads, and agricultural land (observed around Krupanj and Bajina Basta).

As a result of the flooding, over 30,000 people were evacuated from their homes. While the vast majority of evacuees found shelter with relatives, some 5000 persons were accommodated in temporary shelters established by the Serbian Red Cross.<sup>17</sup> According to the preliminary assessments done by the Government<sup>18</sup> as at 31 May 2014, the total number of municipalities affected by floods has been 110, and they are located across the country, and with a total population of 4,823,298.

<sup>17</sup> UNDAC Team, Mission to Serbia 18-31 May 2014, End of Mission Report

<sup>18</sup> Prva Preliminarna Procena Stete (31. Maj 2014)

At the time when the RNA has entered into its finalisation stage, the Government of the Republic of Serbia was preparing the Law on Rehabilitation in Flooded Areas, which is planned as *lex specialis* with maximum applicability of one year. It is expected that this law will target 48 municipalities with a total population of 2,253,732.

### Effects on Infrastructure and Physical Assets

Some of the flood-affected areas in the 24 municipalities included in the assessment are mainly flat with some pockets in terrain depressions, while others are hilly in nature. In addition, some affected areas are urban and some are rural. The existing housing stock consists of individual family houses in rural areas and family houses and multi-unit apartment blocks in urban areas.

A great number of the existing houses were affected by floods and landslides. The physical forces of the floodwaters which act on the structures are divided into three load cases: hydrostatic loads, hydrodynamic loads, and impact loads. These load cases are exacerbated by the effects of water scouring soil from around and below the foundation.

Landslides and flooding are closely allied because both are related to precipitation, runoff, and the saturation of ground by water. In addition, debris flows and mudflows occur in small, steep stream channels and often are mistaken for floods; in fact, these two events often occur simultaneously in the same area. Landslides can cause flooding by forming landslide dams that block valleys and stream channels, allowing large amounts of water to back up. This causes backwater flooding and, if the dam fails, subsequent downstream flooding. Also, solid landslide debris can "bulk" or add volume and density to otherwise normal stream flow or cause channel blockages and diversions creating floods conditions or localised erosion.

Even when the flooded houses did not suffer structural damages, their walls and floors get saturated, electric installation of the flooded floors is permanently damaged, bathroom fixture get clogged by mud, wooden doors in the flooded floors get destroyed, similar happens to wooden windows depending on the depth of the floods water and the furniture and home appliances get damaged or destroyed.

All of the above mentioned factors have had an impact on the housing stock in the floods affected areas in the 24 municipalities.

For purposes of data collection and estimation of damages, losses and needs, the following typology was used in the housing sector:

TYPE OF HOUSE		TYPE OF DAMAGE	
H1	Individual, permanent, made of bricks and RC, >150m <sup>2</sup>	D1	Fully Destroyed in Landslides
H2	Individual, permanent, made of bricks and RC, 80m <sup>2</sup> < house <150m <sup>2</sup>	D2	Fully Destroyed in Floods
H3	Individual, permanent, made of bricks and RC, <80m <sup>2</sup>	D3	Partial Structural Damage
H4	Individual, improvised temporary houses	D4	Temporary Flooded
H5	Apartment Block		



Accordingly, the following is the data collected from the 24 municipalities on their housing stock damages. It should be noted here that the Municipality of Obrenovac submitted data for only 70% of their affected housing stock, and that the assessment team had to extrapolate the estimates.

OBRENOVAC				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	15	204
H2	0	6	119	1590
H3	0	114	272	2712
H4	0	0	0	0
H5	0	0	16	244

SABAC				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	1	48
H2	0	0	6	173
H3	0	2	6	316
H4	0	0	0	0
H5	0	0	0	0

VALJEVO				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	38	5
H2	12	1	52	16
H3	31	5	74	94
H4	0	0	0	0
H5	0	0	0	0

BAJINA BASTA				
Type of house	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	4	0	22	0
H2	11	0	60	0
H3	25	0	41	0
H4	0	0	0	0
H5	0	0	0	0

CACAK				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	0	46
H2	0	0	0	344
H3	0	0	0	69
H4	0	0	0	2
H5	0	0	0	0

JAGODINA				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	0	0
H2	0	0	9	666
H3	0	12	0	854
H4	0	0	0	0
H5	0	0	0	0

KRALJEVO				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	0	15
H2	0	0	0	153
H3	0	1	2	300
H4	0	3	0	134
H5	0	0	0	0

KRAGUJEVAC				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	0	0	0	0
H2	0	0	0	0
H3	0	1	5	551
H4	0	0	0	0
H5	0	0	0	0

KRUPANJ				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	4	7	15	36

LJUBOVIJA				
Type of House	Type of Damage			
	D1	D2	D3	D4
No. of Houses				
H1	1	0	6	20

H2	12	5	89	73
H3	5	3	33	17
H4	5	54	15	16
H5	0	0	0	0

H2	0	0	12	20
H3	46	0	20	40
H4	1	0	0	0
H5	0	0	0	0

LOZNICA				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	3	0	0	0
H2	4	0	0	0
H3	1	0	10	63
H4	0	0	0	0
H5	0	0	0	0

KOSJERIC				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	0
H2	0	0	0	0
H3	3	0	9	8
H4	0	1	0	0
H5	0	0	0	0

MALI ZVORNIK				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	0
H2	0	0	0	1
H3	7	0	0	0
H4	0	0	0	0
H5	0	0	0	0

PARACIN				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	220
H2	0	3	4	577
H3	0	26	20	1104
H4	0	0	0	0
H5	0	0	0	52

SID				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	0
H2	0	1	0	0
H3	4	7	0	4
H4	0	0	0	0
H5	0	0	0	0

SMEDEREVSKA PALANKA				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	6	101
H2	0	1	6	191
H3	1	3	10	244
H4	0	0	0	1
H5	0	0	0	0

SVILAJNAC				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	76
H2	0	0	0	860
H3	0	10	0	869
H4	0	1	0	0
H5	0	0	0	0

TRSTENIK				
Type Of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	35
H2	0	0	3	41
H3	0	0	0	51
H4	0	0	0	0
H5	0	0	0	0

UB				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	2	192
H2	1	0	11	67
H3	8	0	10	52

VARVARIN				
Type Of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	0
H2	0	0	0	0
H3	0	5	10	66

H4	0	0	0	0
H5	0	0	0	8
<b>VELIKA PLANA</b>				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	5
H2	0	0	0	16
H3	0	0	0	17
H4	0	0	0	0
H5	0	0	0	0

H4	0	0	0	0
H5	0	0	0	0
<b>LAZAREVAC</b>				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	62
H2	0	0	0	430
H3	0	0	5	733
H4	0	0	0	0
H5	0	0	0	0

<b>KOCELJEVA</b>				
Type of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	0	27
H2	0	0	0	67
H3	6	2	0	45
H4	0	0	0	0
H5	0	0	0	0

<b>OSECINA</b>				
Type Of House	Type of Damage			
	D1	D2	D3	D4
	No. of Houses			
H1	0	0	2	2
H2	1	0	11	44
H3	14	0	10	55
H4	0	0	0	0
H5	0	0	0	0

The following table summarises the number of damaged houses in the 24 municipalities:

		Type of Damage			
		Fully Destroyed in Landslides	Fully Destroyed in Floods	Partial Structural Damage	Temporarily Flooded
		D1	D2	D3	D4
		Number of damaged units			
<b>H1</b>	Individual, permanent, made of bricks and RC, >150m <sup>2</sup>	12	7	107	1,094
<b>H2</b>	Individual, permanent, made of bricks and RC, 80m <sup>2</sup> < house <150m <sup>2</sup>	41	17	382	5,329
<b>H3</b>	Individual, permanent, made of bricks and RC, <80m <sup>2</sup>	151	191	537	8,264
<b>H4</b>	Individual, improvised temporary houses	6	59	15	153
<b>H5</b>	Apartment Block	0	0	16	304

The following table presents a summary of damaged apartments located in apartment blocks:

Municipality	Type of Damage	
	D3 – Partially Damaged	D4 – Temporarily Flooded
	No. of Apartments	
Obrenovac	78	1000
Paracin	0	52
Ub (only basements)	0	40

The following pictures illustrate the above mentioned type of houses and damages.



Figure 1-31. Obrenovac, Household goods destroyed in floods



Figure 1-32. Smed. Palanka, after the floods water receded



Figure 1-33. Krupanj, effects of landslides and flooding



Figure 1-34. Flooded apartment blocks

### Estimation of Damages and Losses

For the estimation of damages and losses, bills of quantities for typical houses and typical damages were analysed. Values of unit prices of construction works were confirmed in consultations with several construction companies presently working in the construction of houses made of traditional materials and pre-fabricated houses.

### Damages

The following parameters and costs were used for estimation of damages:

Average floor area for houses type H1	150 m <sup>2</sup>
Average floor area for houses type H2	110 m <sup>2</sup>
Average floor area for houses type H3	65 m <sup>2</sup>
Average floor area for apartments in apartment blocks type H5	65 m <sup>2</sup>
Unit cost of house H1 for damages type D1 and D2	EUR 400 /m <sup>2</sup>
Unit cost of house H1 for damages type D3	EUR 150 /m <sup>2</sup>
Unit cost of house H1 for damages type D4	EUR 100 /m <sup>2</sup>
Unit cost of house H2 and H3 for damages type D1 and D2	EUR 350 /m <sup>2</sup>
Unit cost of house H2 and H3 for damages type D3	EUR 150 /m <sup>2</sup>
Unit cost of house H2 and H3 for damages type D4	EUR 100 /m <sup>2</sup>
Total value of house H4	EUR 1,000
Unit cost of apartment H5 for damages type D3	EUR 300 /m <sup>2</sup>

Unit cost of apartment H5 and H3 for damages type D4	EUR 250 /m2
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## Losses

The following losses were analysed:

- Cost of temporary shelters for evacuees
- Expenditures related to demolition of totally destroyed houses, 419 houses @ EUR 200 /house
- Temporary housing expenses during reconstruction
- Rental income losses, 175 houses (app. 10% of all damaged houses) @ EUR 125 over 6 months

Table 1-23 presents the estimated values of disaster effects for the housing sector. Damages was estimated at 23.2 billion RSD; losses amounted to 185.7 million RSD more.

Table 1-23. Summary of damages and losses for housing sector (million RSD)

	Damage		Losses			
	Estimated Value	Ownership	Estimated Value	Ownership		
		Public		Private	Public	Private
Damages to housing units	16,863.9		16,863.9			
Household goods	6,352.0		6,352.0			
Temporary shelter costs				50.0	50.0	
Demolition/debris removal				69.7		69.7
Temporary housing costs				50.1		50.1
Rental income losses				15.9		15.0
<b>Total</b>	<b>23,216.0</b>		<b>23,216.0</b>	<b>185.7</b>	<b>50.0</b>	<b>135.7</b>

## 2.2.2.7 Education Sector

### Sector Overview

The education sector covers the following sub-sectors: pre-school education and social care; elementary education; secondary education; university education and adult education.

Pre-university and university education is implemented as a public service based on the principles of accessibility, fairness and quality. The education system covers: a) social care of children and preschool education; b) elementary education; c) general and artistic secondary education; d) secondary education; and e) university education includes basic academic, masters, PhD and applied studies. Adult education includes several levels - from elementary to higher education and is based on the concept of lifelong learning. The national distribution of institutions and students is shown below in Table 1-24.

Table 1-24: An overview of the number of institutions and children/students by regions

STATISTICS REGION	Total number of preschool institutions	Total number of kindergartens	Total number of children in preschool institutions	Total number of parent ES	Total number of separate classes of ES	Total number of students at ES	Total number of SS	Total number of students at SS
Belgrade	17	395	55,803	193	176	124,597	86	62,023
Vojvodina	45	638	54,884	385	207	156,171	128	72,355

Šumadija & western Serbia	53	360	42,942	348	1,067	166,271	136	78,535
Southern & eastern Serbia	47	269	32,310	299	984	126,929	125	60,282
<b>TOTAL</b>	<b>162</b>	<b>1,662</b>	<b>185,939</b>	<b>1,225</b>	<b>2,434</b>	<b>573,968</b>	<b>475</b>	<b>273,195</b>

ES=Elementary Schools; SS=Secondary Schools

The education sector is one of the Serbian Government's priority sectors. The '*Strategy for Development of Education in Serbia up to 2020*' (adopted in 2012) stipulates further harmonisation of the education system with European educational targets, and further development of a knowledge based society capable of ensuring high employment of citizens. In alignment with chapter 26 of the *acquis* ('Education and Culture'), the above named sector strategy stipulates mandatory secondary education, stronger ties with the labor market and economic development - with a clear objective of increasing the number of individuals with higher education until 2020, from the current 4.5% to about 6% of the population.

The education sector is being reformed and large-scale interventions are underway, notable amongst these are the following: the adoption of the National Framework of Qualifications (NFQ); the establishment of sector councils; redefining the school network, changing the initial education system for the teaching profession; adoption of new curricula for elementary and secondary education, and the definition of an external graduation program.

There is a risk that sector reforms might slow down with changing priorities resulting from the redirection of funds in favor of the revitalisation and removal of consequences of the natural disaster. The natural disaster coincided with the near end of the school year, preparations for the final exam at elementary schools, enrolment of students in secondary schools, and preparations for the upcoming school year.

In response to the Government's declaration of a national state of emergency the Ministry of Education, Science and Technological Development (MoESTD) and educational institutions organized their activities in compliance with announcements of the competent services, and took measures that can be classified as:

- Preventive measures,
- Measures during the natural disaster,
- Measures directed to normalisation of the situation.

The preventive measures referred to all the activities prior to the floods wave (raising the documents and records as well as light furniture and equipment above the rising water levels; introduction of attendance of employees; establishment of constant cooperation with the civil protection staff of local governments).

During the natural disaster, after taking care of their own family members the employees contacted students and their families and established contacts on social networks aiming at constant exchange of information. Some educational institutions were declared reception centres, and the employees got involved in the reception of affected persons.



The measures taken after the natural disaster were directed to normalization of the situation: organisation of all the necessary activities to end the school year pursuant to the law (holding the missed lectures, organizing the activities of destroyed schools at other locations, enhanced preparatory courses for the final exam for students from affected areas, etc.). In addition, physical protection of property was ensured, and the archives and documents, as well as the most expensive equipment were removed from the facilities that were out of use.

The period from the beginning of the emergency situation to the end of the school year was short and the statement of school professional bodies<sup>19</sup> that there were no significant adverse impacts on students' achievements and realisation of their curricula has been accepted. Eighth grade students in elementary schools were offered an option to take the final exam in two examination periods. Some 98.5% opted for the first period. There were no significant deviations from this % age in flood-affected areas. There is a plan to carry out a variance analysis of the results achieved in final exams by students from flooded areas, in comparison with average results at the national level. The results of this analysis may indicate a need for introduction of certain affirmative measures for enrolment in secondary schools.

### **Damages assessment methodology**

Multiple sources were used to collect and verify data. The main source for flow of information was the MoESTD. The education sector Recovery Needs Assessment (RNA) team also interacted directly with the authorities in the municipalities and with the principals of educational facilities to seek their views regarding the extent of devastation and through questionnaire completed by the later. The RNA team also visited the affected areas to verify data. Some of the principals had damages estimates prepared (with a different level of details) while the RNA team had to make preliminary assessment for the others where that was not a case. However, the data will need to be refined as more detailed surveys are conducted to prepare projects and facility-by-facility detailed needs should be worked out during for the reconstruction phase.

### **Effects on infrastructures and physical assets**

In the period from 18 to 21 June 2014, the RNA team carried out an analysis of the situation in 24 municipalities and performed a needs analysis on 35 identified facilities. It was found that the floods water in buildings was between 50 cm and 2.5 m high and that it remained in facilities for between 3-30 days. The floods wave severely damaged the 35 educational institution buildings examined which were distributed as follows: 12 preschool institutions; 13 elementary schools and 10 secondary schools located in seven municipalities (see Table 2 below). In those buildings the educational activities are realised with 45,329 children/students - of which 14% are preschool children, 62% are elementary school students and 25% are secondary school students.

### **Effects on access and availability of services**

The floods had direct effects on the normal activities of educational institutions. Students, employees and facilities in certain municipalities were directly affected in terms of safety, some schools became reception centers for citizens of flooded areas, and in some schools the lectures had to be interrupted due to potential hazards. Specifically, on 21 June 2014, 18

<sup>19</sup> Evidence based on the minutes of the grade and teachers' councils meetings

preschool institutions, 90 parent elementary schools, 258 local schools and 35 secondary schools were closed. The working hours were shortened in 4 parent elementary schools, 20 local schools and 3 secondary schools. Activities of reception centers were organised in 22 school facilities, which accepted citizens who had to be evacuated due to the floods.

### Effects on risks and vulnerabilities

The MoESTD will potentiate and intensify the already established mechanisms for the support to marginalized and vulnerable social groups, aiming at offering them greater support than before, and respond to the expectations concerning the expansion of the circle of those in need for additional support, after the natural disaster. The possibility of introducing a new subject '*Civilian Protection and First Aid*' into the educational system is also considered, as well as possible implementation of appropriate educational contents referring to coping with emergency situations in the existing school subjects.

## Estimation of the value of damages and losses

### Damages to facilities

In quantitative terms, 35 institutions out of the total 1,108 were reported to have suffered damages in the 24 affected municipalities. Overall this represents only 3 % of the total institutions in the 24 municipalities. No buildings were reported as destroyed, nor this was observed during the field visit by the RNA team. Of these 35 educational facilities, 9 have damages estimated at over 15 million RSD (26% of the damaged facilities), 7 at damages valued between 8 to 15 Million RSD (20% of the damaged facilities) and 19 have damages valued to be under 8 million RSD (54 % of the damaged facilities). Thus the partially damaged institutions constitute around 46% of the total reported affected schools and the remaining are slightly damaged or in need of minor repairs. The majority of affected institutions are located in 7 municipalities: Obrenovac (13), Paracin (7), Valjevo (5), Sabac (4), Trstenik (3), Svilajna (2) and Ub (1). Table 1-25 provides the details of affected institutions by municipalities and level of education. The total value of damages to building is estimated at 230 million RSD.

### Damages to schools furniture, materials and equipments

22 of the affected educational institutions have had their furniture, school materials and equipment damaged and in most cases partially destroyed. Indeed most of furniture that were on ground floors of affected buildings were destroyed due to long immersion in floods water.

Furniture damages is estimated at 93.6 million RSD and equipment damages at 48.8 million RSD. The total estimation of damages for building, furniture and equipment is 374.5 million RSD.

### Losses

In the affected municipalities the flooding occurred during the last period of the academic year. There was no loss of life among the students or staff. Rapid action taken by the MoESTD in collaboration with the Municipalities resulted in minimal loss of educational

contact hours. In the aftermath of the flood, staff of education institutions, parents and volunteers stated the process of removal of debris and cleaning operations. Operational costs were for the transport of students from the affected schools to other non-affected institutions in order to complete the year end examination process. In addition to children that will remain in temporary shelters for unknown period of time, and for which child friendly corners has been set up along with psycho-social support, it is likely that a significant number of students and teaching and non-teaching staff will suffer from emotional trauma, necessitating counseling services. This in turn would require teachers to be trained for school-based psychosocial support, such as counselling. None of these activities are covered by the normal budget.

The total value of losses for the Education sector was estimated at 16.3 million RSD.

Table 1-25: Number of affected educational institutions buildings per municipality and level of education

Municipality	Pre-primary education		Primary education		Secondary education		Tertiary education		TOTAL	
	Total # of buildings	Affected by flooding	Total # of buildings	Affected by flooding	Total # of buildings	Affected by flooding	Total # of buildings	Affected by flooding	Total # of buildings	Affected by flooding
Bajina Bašta	5		20		2				27	
Lazarevac	32		33		3				68	
Obrenovac	27	5	28	5	3	3			58	13
Valjevo	11	3	53	2	6		3		73	5
Varvarin	11		17		1				29	
Velika Plana	17		21		3				41	
Kosjerić	4		14		1				19	
Koceljeva	1		16		1				18	
Kragujevac	48		63		9		7		127	
Kraljevo	52		61		9		1		123	
Krupanj	1		19		1				21	
Loznica	9		43		4				56	
Ljubovija	1		22		1				24	
Mali Zvornik	1		10		1				12	
Osečina	1		13		1				15	
Jagodina	12		21		2				35	
Svilajnac	1	1	13		1	1			15	2
Smederevska Palanka	1		22		1				24	
Trstenik	35		43	1	2	2			80	3
Paraćin	28	2	33	2	4	3			65	7
Ub	1	1	5		1				7	1
Čačak	54		61		9		3		127	
Šabac	1		3	3	1	1			5	4
Šid	18		19		2				39	
<b>Total</b>	<b>372</b>	<b>12</b>	<b>653</b>	<b>13</b>	<b>69</b>	<b>10</b>	<b>14</b>		<b>1108</b>	<b>35</b>

Source: Figures within the table are based on the data provided by RSAs on 26 June 2014 and field visit conducted by the MoESTD, UNICEF and EU team in the period from 18 to 21 June 2014

Table 1-26. Summary of damages and losses in education, in RSD (1 EUR = 115.66 RSD)

	Pre-School	Primary-School	Secondary School	Total
<b>Damages</b>				

Damaged building	85,940,300	83,955,000	62,162,000	<b>232,057,300</b>
Destroyed equipment	26,220,000	8,380,000	14,200,000	<b>48,800,000</b>
Destroyed furniture	28,224,000	26,298,000	39,069,000	<b>93,591,000</b>
<b>Total Value of Damages</b>	<b>140,384,300</b>	<b>118,633,000</b>	<b>115,431,000</b>	<b>374,448,300</b>
<b>Losses</b>				
Expenditure on transport				<b>2,200,000</b>
Demolition-debris removal	6,607,400	3,050,000	4,475,000	<b>14,132,400</b>
<b>Total Value of Losses</b>	<b>6,607,400</b>	<b>3,050,000</b>	<b>4,475,000</b>	<b>16,332,400</b>

### 2.2.2.8 Health Sector

#### Sector Overview

In 2012 the estimated population of Serbia was 7,199,077 (3,505,713 males and 3,693,364 females), a decline of 4 % compared with the population recorded in the 2002 census. Women of childbearing age (15 to 49 years) make up 22.5 % of the population and those aged 65 and over, comprise 17.5 %. Many demographic indicators are equal or better than those in the most recent EU member states. Average life expectancy at 74.7 years (males, 72.2 and females 77.3) is similar to other Central and Eastern European countries. Life expectancy in 2012 was 75 for both males and females. This is comparable with other countries in the region and with EU member states. According to the World Health Organization (WHO) the adult mortality rate (probability of dying between 15 and 60 years of age per 1,000 population) is 173 for males and 85 for females (WHO, 2014a). This is comparable with other countries in the WHO European Region, which on average are 179 and 80 respectively.

Serbia has made significant progress over the last 10 years in improving health outcomes (WB, 2012). The epidemiological pattern of disease in Serbia is like most countries in Eastern Europe with high levels of heart disease, stroke, and cancer. Smoking is estimated to be linked to 30 % of mortality. The three commonest causes of death are:

- Diseases of the circulatory system 53.7% (men 48.8%, women 58.8%)
- Cancer 21.2% (men 23.8%, women 18.5%)
- Diseases of the respiratory system 4.9% (men 5.7%, women 4.0%).

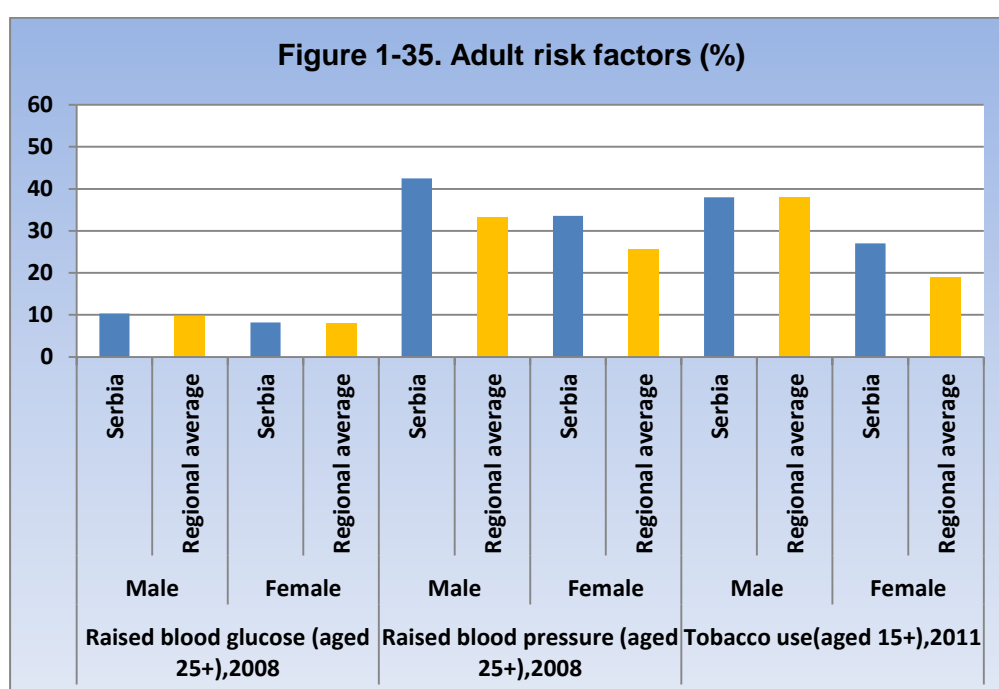
There is a growing burden of chronic diseases and a high prevalence of adult risk factors<sup>20</sup>, see the diagram below. According to the results of a study in 2000, ischemic heart disease, cerebrovascular disease, lung cancer, depression (unipolar so none of the 'highs' of bipolar depression) and diabetes accounted for almost two thirds of total burden calculated for 18 health problems in Serbia. Road traffic accidents ranked fourth as a burden for males, for females they ranked twelfth<sup>21</sup>.

<sup>20</sup> World Health Organisation, 2014

<sup>21</sup> Ministry of Health, 2003.

In 2012 there were 281,207 reported cases of communicable diseases, an incidence of 3,913 per 100,000 population<sup>22</sup>. Respiratory infections accounted for 90.5 % of all reported cases, a trend seen since 2008. 29 of the 312 deaths in 2012 due to communicable diseases were linked to *Clostridium difficile* enteritis. Alimentary or digestive tract infections ranged from between 39.7% and 52.4% of all epidemics between 2008 and 2012. In 2012, the most common cause was *Salmonella enteritis*. The commonest vector borne diseases are Lyme's disease and West Nile Fever. In 2012 there were 71 cases recorded of West Nile Fever and in 2013 303 cases were reported (of which 200 were confirmed as positive and 103 as probable) with 35 deaths. Vaccine preventable diseases in 2012 accounted for 0.23% of the total number of reported cases of communicable diseases. The last case of diphtheria was notified in 1980, polio in 1996 and one case of neonatal tetanus was reported in 2009.

According to the key findings of the 2014 MICS the % age of children age 12-23 months who received the third dose of OPV vaccine (OPV3) by their first birthday was 86.4% overall in Serbia compared with just 61% in Roma settlements. While the % age of children age 24-35 months who received measles vaccine by their second birthday in Serbia is 86.7% again, in Roma settlements it is low at 38.3%. Of great concern is that just 66.1% of children age 24-35 months in Serbia received all vaccinations recommended in the national immunization schedule by their first birthday (by their second birthday for measles), and among Roma it is only 8.9%<sup>23</sup>.



According to the World Health Organization (WHO) in its Country Cooperation Strategy, health access by, and the health status of, the most vulnerable remains precarious. The

<sup>22</sup> National Institute of Public Health, 2012.

<sup>23</sup> SoRS and UNICEF, 2014.

strategy highlights that it is estimated that more than million people, about 15% of the population, do not have access to primary care including public health services. While some clear strides have been made, especially in regards to the Roma population, inequities remain. The immunisation rates referred to earlier are a good example.

As in many health systems in Europe there is pressure for increased health spending due to the aging population, the introduction of new and expensive pharmaceuticals and the development of new technologies. These exacerbate the fiscal pressures already confronting the system as a consequence of the global economic crisis. The crisis has led to an increase in unemployment and poverty, which has reduced the revenue base of the Health Insurance Fund (HIF) and increased the pool of vulnerable groups, who must be subsidised from the general budget. Out of pocket expenditure is reportedly about 30%.

The total spending on health accounts for about 10.4% of GDP, with 7.23% of Serbia's 2014 budget allocated to health. Financing reform and improving efficiency in health care delivery remain the main challenges in this sector. Despite many improvements in recent years the health care system still suffers from numerous inefficiencies and low productivity. The Ministry of Health (MoH) and the HIF have initiated financing reforms at both the primary and secondary levels of care that will replace the input based system of financing in the health sector, in which providers were paid according to historical budgets, with a new system that will introduce a productivity factor into the payment of providers at secondary and tertiary levels of care. For primary care, the Government has opted for performance-based payment, a formula combining per capita payments, number of services and preventive services<sup>24</sup>.

In recent years there has been a major effort made to rationalise health facilities and staffing levels. The latter because whilst overall in the country the number of physicians per 100,000 population is only slightly higher than in newer EU members there is evidence of an excessive number of doctors at the primary care level. According to WHO, overall in Europe there is an average of one primary care physician per 3,500 inhabitants. In Serbia in 2012 the ratio was 1 for 1,310 inhabitants (NIPH 2012). For salary payments health facility providers submit reports on health services provided in accordance with HIF criteria and standards for contracting with health care providers<sup>25</sup>.

## **Assessment of disaster effects**

### **Effects on infrastructure and physical assets**

Out of the 24 municipalities declared by the Government to be most seriously affected by flooding, 15 reported to the MoH and National Institute for Public Health (NIPH) that some of its health facilities had been damaged. One additional municipality also reported to the MoH that it had damaged health facilities. Following visits to all 16 municipalities by the health sector team a total of 74 facilities were verified as having been damaged. One had severe structural damages requiring demolition and the rest had partial damages. Many also reported loss of assets such as equipment, furniture and/or medicines and supplies. The type of health facilities worst affected were health posts or as they are commonly known,

<sup>24</sup> World Bank, 2014.

<sup>25</sup> In accordance with the Law on Salaries of state bodies and public services ("Official Gazette of RS", no. 34/01 and 62/06) and a regulation on the calculation and payment of salaries of employees in public services.



ambulanta (in Serbian).

Debris from the floods affected health facilities comprises mainly of internal furnishings (such as carpets, curtains, chairs, etc.), equipment and some internal structural elements that have been damaged by the floods waters. In only one case (ambulanta in Divici, Valjevo municipality) there is the need for demolition of a damaged building which will result in bricks and concrete of minor quantities. All debris has been planned for removal and disposal at municipality identified disposal sites.

Considering the nature of the work in health facilities, certain parts of the debris can be hazardous (damaged medicines, X-ray equipment with low radioactive levels, etc.). Such hazardous wastes are to be removed from the debris and disposed of separately in accordance with the regional waste management plan.

### **Effects on Access and Availability of Services**

The lack of access or limited access to health facilities lasted only for 2-4 days in all the municipalities. This meant there was minimal disruption to health services and no decline in revenues. Another factor that enabled health services to function at almost 100% capacity immediately after the floods waters had receded (and mud and debris cleared) was the impressive speedy implementation of the health sector disaster preparedness plan by each facility<sup>26</sup>. Many removed equipment and supplies to a higher floor or removed them from the facility to a safer location. Neither higher nor fewer numbers of patients were recorded or observed as having been seen once a facility re-opened. The main exception to the resumption of services in their existing location is for kidney dialysis in Obrenovac where all the dialysis machines were damaged. But again, the health authority reacted swiftly by arranging for the patients to be transported to Belgrade for treatment.

Information or public awareness campaigns were immediately initiated by the NIPH. They also implemented enhanced epidemiological surveillance at national level and through the public health institutes at municipality level. The epidemic prone conditions being monitored are: acute lower respiratory tract infections, acute watery diarrhea, acute bloody diarrhea, other forms of diarrhea, acute hemorrhagic fever syndrome, acute jaundice syndrome, acute flaccid paralysis, measles, suspected bacterial meningitis and fever of unknown origin. Between 15th May and 27th June 2014 no Institute of public health in the affected municipalities had recorded an outbreak of any communicable diseases.

### **Effects on the environment**

As with the implementation of their disaster preparedness plan health staff, sometimes helped by military and/or firemen, impressively cleared debris from their health facility as soon as was feasible. No injuries were reported in the process although there was, in some places, a lack of protective clothing such as boots and gloves. The main environmentally hazardous waste from health centres is X-ray machines, computers, unused syringes and needles and mercury containing thermometers and sphygmomanometers (blood pressure machines). One health facility reported that their remaining debris is heavy fuel oil from the heating system in the basement of the building and oil pumps and radiators that now contain

<sup>26</sup> In the public sector all health facilities are, by law, required to have a disaster preparedness plan

a mixture of water and fuel oil. Pharmacies also lost some medicines.

### Effects on Governance

There was little, if any, detectable disruption of governance in the health sector. In other words very little or no changes in the functioning and performance capacity of the MoH at central level or of health facilities at municipality level as a result of the floods.

The health system is organised on the basis of social health insurance principles with the MoH responsible for the overall governance of the sector. The budget for the MoH is mostly for the prevention of ill health, purchase of equipment and infrastructure, and payment for health care provision for vulnerable groups<sup>27</sup>. While the HIF is in charge of collecting contributions, pooling resources, and purchasing services from health care providers. The HIF is of the opinion that it will lose some revenue as a result of the flood. Mostly from the loss of health insurance contributions by those self-employed people such as farmers who have lost their livestock and/or food crops and those who work from home and whose houses have been destroyed or damaged.

Health centers provide primary care and are owned by municipalities. The MoH owns hospitals and clinical centers for the provision of secondary and tertiary care. By law, all health facilities have to have a disaster preparedness plan. As mentioned earlier the implementation of the plan by the majority of facilities was excellent. Only a few mentioned a problem such as a standby generator not working. At the health center in Obrenovac discussion with a staff member revealed that they had not anticipated that they would be so totally isolated. They were surrounded by, and the facility was flooded with, the floods water and they had no means of communication as all power lines were down.

### Effects on Risk and Vulnerabilities

Some people are beginning to experience high level of stress as they try, for example, to replace lost personal documents; this could result in an increase in the severity of pre-existing risks such as high blood pressure/hypertension. Pre-floods hypertension was a significant risk factor among both men and women in the country.

Those groups considered vulnerable by the health sector include the elderly, the unemployed, children aged less than five years of age, Roma, disabled persons, and single headed households. There is no evidence at present that any one of these groups have suffered more than others or received less attention. It is possible that the floods will have the worst impact on the elderly, especially if they have lost everything. Being (temporarily) re-located for safety, no longer being surrounded by their memorabilia and the stress of an uncertain future will all add to any existing symptoms of dementia or create confusion. Mentioned was made earlier about the low immunisation rates among Roma children.

It is too soon to assess the impact on mental health but it is highly possible that there will be an increase in stress related behavior such as smoking, alcohol drinking and maybe in domestic violence. In Belgrade the Mental Health Institute organized mobile teams to visit collective centers in the city to provide counseling and support to help mitigate any risky

<sup>27</sup> The vulnerable as defined by the MoH for the purpose of payment for health care provision are those on social welfare, the disabled, pregnant women and children and youth up to 18 years of age

behaviour among individuals related to the floods. All health personnel working in health centers and their outposts in municipalities are trained in mental health and so will be able to recognize if they begin to see more people with stress, aggressive behavior or recurrent nightmares which are common after flooding (WHO, 2013). However, it may be that there need to be more innovative ways to identify those who do not go to a health facility when feeling stressed or depressed but who are for example, drinking more, smoking more and/or being verbally or physically abusive at home.

The floods related epidemic prone conditions of concern are respiratory tract infections, diarrhea, hepatitis, polio, measles, meningitis and West Nile Virus. The high levels of personal and domestic hygiene prevailing throughout the country will help mitigate against hygiene related outbreaks. The risk of an outbreak of West Nile Virus is high so in order to prevent any such outbreak the WHO Regional Office for Europe has provided recommendations to health authorities in Serbia, Bosnia and Herzegovina and Croatia. These recommendations include advice on insecticides (both against adult mosquitoes and against mosquito larvae) that are considered safe to use.

During the field visits it was observed that mold had already started growing in one damaged health facility. A disaster-induced health risk is that people's homes that were damaged and are taking some time to dry out will have a problem with mold growing on the walls. If inhaled mould spore can exacerbate any existing chronic lung disease.

## Estimation of the Value of Damages and Losses

### Damages

A total of 74 health and health related facilities<sup>28</sup> were damaged in 16 municipalities. Apart from 17 private pharmacies all the other facilities were in the public sector. The total value of the damages to facilities, equipment, furniture, medicines and supplies is RSD 346,715,495, see Table 1-27, below. Out of the 74 damaged facilities just one health post/ ambulanta in Divici, Valjevo municipality, will need to be demolished and to be built back better (BBB). The value of the damages to facilities is RSD 201,773,425. The most seriously affected was the health centre in Obrenovac. The basement was completely flooded to well above ground level. Among other things it housed the physiotherapy centre and many supplies. The dialysis centre was also damaged.

The cost of removing damaged material has been calculated on the basis of strip out of debris from the floods affected buildings at RSD 2,000/m<sup>2</sup> of building area and for the ambulanta in Veljvo a demolition cost of RSD 4,600/m<sup>2</sup> of building area.

The total value of the damaged equipment, furniture and medicines and supplies is RSD 144, 942, 070. High cost equipment that was damaged was mainly x-ray machines and kidney dialysis machines. The latter was in one location, Obrenovac where all the machines in the dialysis unit were damaged.

Table 1-27. Estimation of damages in the health sector (1 EUR = 115.66 RSD)

<sup>28</sup> The assessment included hospitals, health centers, health posts, public health institutes, methadone centers, stand-alone kidney dialysis centres and any other stand-alone health facility plus health insurance fund offices.

Facilities, equipment, furniture & supplies	Number affected	Estimated value of damages in Serbian Dinar (RSD)
Hospitals	7	30,533,553
Health centers	10	106,734,566
Health posts	31	27,549,946
Pharmacies*	3	23,374,582
Health related facilities	6	13,580,778
Equipment	-	117,386,899
Furniture	-	14,164,045
Medicines & supplies	-	13,391,126
<b>Total</b>		<b>346,715,495</b>

\*Note: 17 private-sector pharmacies were also damaged. The value of their damages is included in the estimate of the value of commercial sector damage

## Losses

The losses in the health sector refer to changes in the financial flows of the sector due to the increased need for health interventions such as vaccination and mental health counselling, and for transport for dialysis patients and for increased surveillance, public health information campaigns and food risk analysis, see Table 1-28, below. The losses were measured as the change in operational costs for the provision of the post-floods health and health related interventions. They include higher expenditures over and above the normal budgetary appropriations for the health sector, and lower revenue. It can be seen in Table 1-28 the time needed for increased surveillance and for vaccination and mental health counselling has been determined.

The cost for vector control, mosquitoes and rodents, is included in the agriculture sector as the veterinary department within that sector is responsible for these interventions. Rodent control to prevent haemorrhagic fever in the affected municipalities is estimated at a cost of RSD 21,417,867. The cost for mosquito control is high, RSD 454, 954,800. This is because both aerial and ground spraying is required to prevent West Nile Virus. Serbia is using an imported insecticide that is environmentally friendly, especially to bees.

Table 1-28. Estimation of losses in the health sector (1 EUR = 115.66 RSD)

Losses in the health sector	Cost in RSD
Higher expenditure on dialysis patients referred to another facility	3,500,000
Loss of health insurance revenue	8,977,182
Cost of surveillance (18 months)	29,690,799
Cost of information campaigns (4 months)	21,666,980
Cost of vaccination (3 months)	22,687,386
Other costs for prevention (food risk analysis)	42, 073,959
Mental health counselling (6 months)	6,000,000
Demolition & rubble removal	8,520,000
Removal of hazardous waste	600,000
Disinfection of premises	1,464,949
<b>Total</b>	<b>141,681,262</b>

### 2.2.2.9 Culture Sector

#### Sector overview

The national Serbian register of cultural monuments includes a total number of 2,458 sites and localities recognised and protected as cultural heritage by the law<sup>29</sup>. Four of these have been recognised by UNESCO as cultural world heritage sites, whilst 11 are included in the UNESCO national tentative list.<sup>30</sup> With regard to natural protected heritage, among protected areas there are five national parks, 17 nature parks, 69 natural reserves and special nature reserves, 16 landscapes of exceptional features, 325 nature monuments (253 are of botanical character, and 72 of geological and hydrological character) and two protected habitats. Other figures show the richness and depth of national cultural assets which include 142 museums, 551 libraries and 32 art galleries. Most of these are based in Belgrade, as are most of the institutions dealing with culture and heritage. However, the whole national territory holds a rich history and variety of cultural expressions and exhibits high cultural, ethnic and religious diversity. Local communities are characterised by long standing traditions, especially in the areas of handcrafts, music, theatre and visual arts. This cultural richness was evident in the 24 municipalities covered by this assessment of post floods damages, collectively the assessed municipalities contained 24 cultural centres and five theatres.

According to a wider definition of culture as '*cultural capital*' which includes both a set of historical, tangible values and a set of tangible and intangible community values; the culture sector was analysed considering:

- Cultural and heritage assets, defined as tangible heritage expressions;
- Community infrastructure, intended as cultural services, and defined in terms of production and accessibility to cultural goods and services.
- The five sub-categories of cultural assets recognized in the Serbian national institutional and regulatory framework in which the first three sub-categories are defined as cultural /heritage assets and the remaining two are classed as community infrastructure /services, as described below.

#### *Built heritage, conservation urban areas and cultural sites (BH):*

Includes buildings recognised as having cultural significance, ranging from a coherent grouping of structures (e.g. historic districts, rural and urban settlements) to a single building or site (places of worship, archaeological sites, monuments, historic landmark) imbued with recognised cultural values by local, national or international mechanisms of designation. It also includes spatial cultural units such as urban conservation areas and other cultural sites.

The following institutions/agencies are responsible for BH: Ministry of Culture and Information (international cooperation directorate/ cultural heritage directorate); Institute for the Protection of Cultural Monuments; Local cultural heritage institutes: Cultural Heritage Preservation Institute of Belgrade; Cultural Heritage Preservation Institute of Valjevo; Institute for Protection of Cultural Monuments of Kragujevac; Regional Institute for Protection of Cultural Monuments in Smederevo.

#### *Natural heritage (NH):*

<sup>29</sup> Source: [Law on Cultural Property](#) (RS Official Gazette No 71/94) from 1994

<sup>30</sup> <http://whc.unesco.org/en/statesparties/rs>

Includes environmentally protected areas and places of particular community significance; both within urban and rural settings (regional and national parks). The following institutions /agencies are responsible for NH: Ministry of Agriculture and Environmental Protection; Institute for Nature Conservation of Serbia; Institute for Nature Conservation of Vojvodina Province.

*Intangible cultural heritage (IH):*

Includes the practices, representations, expressions, knowledge and skill sets recognized as meaningful by communities and practitioners. The following institutions /agencies are responsible for IH: Centre for the Intangible Cultural Heritage of Serbia at the Ethnographic Museum in Belgrade;

*Heritage repositories and museums (HR):*

Covers museums, libraries, archives and cultural institutions and includes all movable properties such as collections of works of art, archaeological / ethnological artefacts and archival records. The following institutions /agencies are responsible for HR: National Museum, of Belgrade; Archives of Serbia; National Library of Serbia; Public Library of Obrenovac;

*Cultural Centres (CC):*

Physical facilities like cultural and civic centres, and cultural services, like program or activity delivered to the community, including resources and processes for the production, distribution and sale of creative cultural goods such as music, crafts, audio-visual products, cinema, and books. The Centre for study in cultural development is responsible for CC.

## Disaster effects quantification

### Assessment methodology

Of the 24 municipalities investigated, 8 showed no significant direct impacts of the floods on cultural assets or community infrastructures and services, whilst the remaining 16 had at least one place and/or service which were flood-affected. With regard to the 16 affected municipalities, these were placed into three groups as follows:

- (i) Highly affected, these were Valjevo (12 records) and Obrenovac (11 records);
- (ii) Moderately affected, these were the municipalities of Krupanj, Paracin, Smederevska Palanka and Svilajnac (4 records each) and Kragujevac (3 records);
- (iii) Slightly affected, (1 or 2 records) which covered the municipalities of Cacak, Kraljevo, Jagodina, Lazarevac, Loznica, Šabac, Šid, Trstenik and Bajina Bašta.

Local and national Government authorities expressed a strong concern regarding the archaeological site of Vinca (municipality of Grocka), which is the largest prehistoric and most comprehensively excavated Neolithic settlement in Europe and located in a very vulnerable position on the shores of the river Danube at the vicinity of its confluence with the river Bolečica, as shown in Figure 1, below. After a survey and evaluation of the case, this location was added to the initial list, bringing the number of municipalities assessed for floods damages to 25.





Figure 1-36. Profile section of the archaeological site of Vinča, with the changes recorded before and after the flooding period

Considering the five sub-categories of cultural assets described above, the majority of the recorded floods effects (37/53= 70%) concerned cultural assets as follows: 31 for Built Heritage; 4 for Natural Heritage; 2 for Intangible Heritage. The remaining 16 were related to the community infrastructure (6 for Heritage Repositories; 10 for Cultural Centres).

The distribution of floods damaged cultural assets /services in the 25 assessed municipalities is shown in Table 1-29, below. In terms of population, the number of inhabitants directly or indirectly affected by floods damages and losses regarding culture, heritage and community infrastructure and services was equal to 1,241, 218.

Table 1-29: Recorded floods damages per municipality and per cultural asset category.

municipality	CULTURAL ASSETS				COMMUNITY INFRASTRUCTURES			TOT
	1. built heritage	2. natural heritage	3. intangible heritage	total cultural assets	4. heritage repositories	5. cultural centres	total community infrastructures	
Obrenovac	6	1	0	7	2	2	4	11
Paraćin	3	0	0	3	0	1	1	4
Ub	0	0	0	0	0	0	0	0
Čačak	0	0	0	0	1	0	1	1
Krupanj	3	0	0	3	0	1	1	4
šabac	2	0	0	2	0	0	0	2
Mali Zvornik	0	0	0	0	0	0	0	0
Velika Plana	0	0	0	0	0	0	0	0
Loznica	0	0	0	0	0	1	1	1
Trstenik	0	0	0	0	0	1	1	1
Jagodina	1	0	0	1	0	0	0	1
Šid	0	1	0	1	0	0	0	1
Valjevo	9	0	1	10	1	1	2	12
Osečina	0	0	0	0	0	0	0	0
Varvarin	0	0	0	0	0	0	0	0
Koceljeva	0	0	0	0	0	0	0	0
Kosjerić	0	0	0	0	0	0	0	0
Kragujevac	1	0	0	0	1	1	2	3
Kraljevo	0	1	0	1	0	0	0	1
Smed.Palanka	1	0	1	2	1	1	2	4
Svilajnac	4	0	0	4	0	0	0	4
Ljubovija	0	0	0	0	0	0	0	0
Lazarevac	0	0	0	0	0	1	1	1
Bajina Bašta	0	1	0	1	0	0	0	1
Grocka	1	0	0	1	0	0	0	1
<b>TOTAL:</b>	31	4	2	36	6	10	16	53

### Effects on Infrastructure and Physical Assets:

With regard to Built Heritage (**BH**), all buildings taken in consideration have a status of designated cultural monuments. Some of them are categorized as cultural monument of great value and of outstanding value. The main affected monuments were located in Obrenovac, where the floods highly impacted both the physical assets and the cultural vitality of the place. The entire historic district was flooded up to a level of 1m or more. This included around 220 private houses located around Miloš Obrenovic Street which are deemed to have cultural significance because they are part of historic-architectural assemblages (11) or they have urban cultural value (74) or ambient cultural value (85). Water caused severe physical damages to the cultural monuments of greatest value since these have fragile structures based on timber frames with brick in-filling. This was the case for the Mihajlović family house and the Obrenovac library building, see image below.



Figure 1-37. Flood Damages in Obrenovac:

Mihajlović's family house and the library building in the urban historic centre of Obrenovac

(May 18<sup>th</sup> 2014)

As in Obrenovac, also in Paracin where the historic town centre were completely flooded up to the level of 1 m. Also flooded was the historic urban centre of Valjevo (known as Tešnar) which is protected by law as being part of the spatial cultural-historical units of outstanding value; the basements of these old houses were full of water. In other municipalities a lot of vernacular architecture, known to be vulnerable structures and legally protected as cultural monuments, were severely affected. In most cases buildings recorded damages caused by damaged roofs and attic construction, wet facades, capillary humidity and humidity raised by flooded basements, sometimes also covered with mud. There was evident static instability in the case of some churches and old vernacular structures plus also in Šabac Fortress. A number of houses and churches in rural areas are threatened by landslides and terrain instability (e.g. Bebića Luka, Brankovina in municipality of Valjevo, church in Barič, Obrenovac).

All Natural Heritage sites (**NH**) that were assessed had the status of designated protected areas. The Zabran wood near Obrenovac, a popular recreation zone for the whole local community, was completely flooded. All the present facilities, trails, signage were fully damaged. The Bosuta wood in the municipality of Šid was also flooded. Visible damages to the protected areas and their landscape features occurred due to landslides in: the national park *Tara*; the '*Man and Biosphere*' reserve; and the nature park *Golija-Studenica*.

With regard to intangible heritage (**IH**) no major losses were actually recorded. However, two folklore ensembles have reported damages (to spaces and equipment as traditional costumes and music instruments) caused by the floods and rain in Valjevo and Smederevska Palanka, and a diffused concern was also recorded about the vulnerability of the cultural traditions of the communities in the Brankovina/Valjevo villages.

Heritage repositories (**HR**) mostly museums and libraries, suffered damages in physical structures, particularly as damages in roofs and ceilings, flooded basements, humidity problems of walls and structures. Humid air over a long period of time caused the appearance of moisture in buildings and adversely influenced stored collections due the

changed environmental conditions. In Resavska library, Svilajnac, the basement of the building was completely submerged and filled by mud. The stored books were in danger because of the moisture that spread throughout the building and because of the continuous problem arising due to the age of the building, dampness and lack of waterproofing. In Obrenovac, which was directly flooded, around 25.000 books from the library (20% of the whole collection) were lost. In relation to observed damages to archives, part of the cadastre cadastre and tax register archival documentation of Obrenovac was covered by water and mud. Around 450 linear meters of documentation were damaged. Some damages were also registered in four buildings in Jagodina and surrounding areas. Alarming situations, however without significant damages, were recorded in Šabac and Sremska Mitrovica. Museum institutions affected by floods damages were recorded in Kragujevac, Čačak, Paraćin, Valjevo and Smederevska Palanka.

As regards the cultural centres and other community services (CC) the assessment in 24 municipalities showed that 10 institutions reported physical damages to buildings and halls which had an impact on a quality and number of cultural programs. Two theatres and one cinema hall in Obrenovac were flooded up to the level of 1.7 meter. Water and mud caused severe physical damage, and after the withdrawal of water of a large quantity of contaminated mud that soaked the floor coverings, wall coverings, walls, all furniture, computers, documents, archives, all of which are located in ground. All floor coverings, furniture and equipment, were removed out of the theatre hall (complete stage and parterre seats), small theatre hall, music room, office, restaurant, hall, ancillary facilities. Similar damages occurred in Cultural centre in Paraćin, where theatre hall (to the 6<sup>th</sup> row of seats) and the basement flooded – walls, floor, proscenium, wooden stairs to the stage, scenography for four plays were ruined. Other cultural centres reported damages to flat roofs, and due to it, problems with humidity and damages on ceiling and electrical installation.

### **Effects on production flows and on access and availability of services**

Losses have been identified on the effects on the culture, heritage and community service production flows (production decline and higher costs of production), and considering the effects on the availability and possibility to have access to cultural services.

In relation to built heritage (BH), in most of affected cases it was recorded a temporary inaccessibility or limited access to built heritage sites. Having been completely flooded, in Obrenovac and Paracin, all built heritage assets were temporary unavailable for public use. Losses for built heritage are calculated on the basis of temporary emergency measures and those to prevent further damages to the cultural assets.

As regards natural heritage (NH) major losses are recognised in the temporary unavailability of the recreation areas (for instance the Zabran wood located in the urban area of Obrenovac). Other losses to be considered are the negative impacts on the ecosystem services provided by natural heritage and cultural landscapes (recreational functions in particular) which is also important for the identity of the local community. For natural heritage, losses are calculated on the basis of: (i) the numbers of people affected in each municipality; (ii) the size of the protected natural area which was affected; and (iii) the temporary unavailability of sites for visitation (in months). Generally, losses in this category were considered from the point of view of cultural and community-infrastructure and did not

attempt to include assessments of the costs related to environmental issues, such as losses due to the damaged trees and forests (loss of timber, reduction in oxygen production /carbon sequestration, and erosion control). These damages and losses were considered in the parallel environment sector assessment.

As regards intangible heritage **(IH)** two folklore ensembles were recorded (in Valjevo and Smederevska Palanca) are represented as non-profit civil society organization and they are performing their activities in public institutions such as cultural centres. Therefore the losses were calculated according to temporary unavailability of these cultural centres.

For the heritage repositories **(HR)** losses were calculated on basis of additional costs for emergency measures (e.g. relocation of goods when it was needed to be done). In the case of Obrenovac library, losses were estimated also according to inaccessibility of repository, which depends on reconstruction of premises that are completely flooded. The estimation of period of closure is at least 2-3 months. There are evident losses of income that are caused mainly because of less selling tickets and cancellation of scheduled activities, which are typical for spring-summer season, such as excursions of school aged children. Some high losses in this regard were reported by the National Museum of Valjevo which is responsible for heritage and museum site of memory complex in Brankovina. However, to avoid double accounting, these types of losses were not included in the calculation for losses in the culture sector, they have been considered in the parallel assessment of trade (tourism) sector losses, see example in text box, below.

Similarly, the losses in terms of staff salaries have been calculated in the assessment of losses in the livelihood and employment sector.

For the cultural centres **(CC)** losses are identified in temporary unavailability of the cultural service, in cancelled or suspended events and programs as well as on emergency measure costs for all cultural centres. The disaster caused temporary closure of many of cultural centres, but most affected are those in Obrenovac and in Paraćin, having been completely flooded, see images below.

In the Cultural and Sport Centre of Obrenovac, 79 people are employed, and their income is considered at risk since the program activities will not take place for around 6 months. The full amount of salaries for one month amount in EUR 44,400, was calculated on the basis of the previous year. The Centre will stay closed and (at least partially) unavailable for around 6 months. The income (EUR 35.000 per month calculated on the basis of the previous year) from ordinary activities (restaurant, cinema tickets, renting rooms, as well as extra activities as events and sport activities) is lost for all the time of closure. The local city summer festival, planned every year, will probably not take place. The calculation takes 79 salaries at risk x 6 months: 266.400; no income from summer festival: EUR 3000; no income from ordinary activities: EUR 210.000. Total: EUR 479400.

In Paraćin, programmes (mainly theatre plays) cannot be conducted due to damages of the

**Example of losses not included in the culture sector assessment:**

*Cultural center Vuk Karadžić from Loznica (cultural institution of national level of importance) has reported the estimation of 3,2 million dinars less revenue due to cancellation of excursions of school aged children in historic memory village of Tršić and memorial complex Tekerš. All such losses are not included in the economic value of losses for the cultural sector, and were considered as part of the assessment in the trade sector (tourism).*





Figure 1-38. Cultural center of Obrenovac. The situation after the withdrawal of water. The picture top right shows the small theater hall, the line of flooded level is evident. The two pictures bottom right and left show the great theater hall after the remove of parterre seats and the damages to the revolving rotation system of the theatre stage. theatre hall. It will take around 6 months for the recovery of the theatre. The loss income is estimated around EUR 2000 per month.

### Effects on environment

Effects on environment have been described above in relation to the natural heritage sub category.

### Effects on governance

At the national level, the governance and administrative function of the sector has not been affected. At the local level, the capacity to operate of the administrative staff of some cultural centres and heritage repositories (especially the library of Obrenovac, and the cultural centres in Obrenovac, Paracin, Valjevo) have been temporary impoverished due to their necessary full commitment on the very first emergency interventions. This is particularly evident in the impossibility, for the period after the floods, to implement most of the already planned activities or events in the culture sector, as well as the impossibility to plan new initiatives due to unavailability or unsafety of places and/or equipment.

### Effects on risk and vulnerabilities

Many of the cultural expressions considered in the assessment will be exposed to new risks after the flooding event. This is mainly due to the poor state of conservation and precarious functional conditions of many of the heritage assets which existed before the floods including the abandonment (or not full use) of some of the buildings and the general lack of adequate preventive measures to safeguard heritage sites. This being the case for the buildings of the memorial complex of Krupanj, or the Resavska library in Svilajnac, the Sabac fort or the



Kusadak houses in Smederevska Palanka. In general, because of the heavy rainfall and flooding, the static structures of the historic building have been weakened, and some of the functional components of the same buildings (like roofs) have been damaged and could be a considerable source of further damages in case of further heavy rains. *Extremely fragile heritage expressions (like that at the archaeological site of Vinca) deserve a high level of attention and immediate measures to prevent from further risk of damages and losses.* Further losses in the cultural sector may occur if post-disaster emergency and recovery interventions do not adequately and rapidly take place. Additional risks, like loss of authenticity and historic values, could be caused by using no culturally adequate reconstruction measures, or carrying on interventions with no regard to the heritage value of damaged areas. This risk could impact negatively especially in the areas where there is a high cultural significance related to the whole urban landscape space (e.g. Obrenovac historic district, Trstenik historic district, Bebica Luka vernacular village). Moreover, one of the risk is linked to a possible misperception of the relevance of this sector in terms of absolute values and of potential contributions for the overall recovery strategy, and this may cause not inadequate considerations for culture and heritage in the whole reconstruction.

### Estimation of damages and losses

Due to the unique nature of cultural assets and community services, a precise estimation of all the damages and especially all the losses are difficult to make. Moreover, given the time constraints and the other pressing priorities for local communities (i.e. other than culture), limited information was available to assess the heritage structures and sites, especially regarding privately owned assets and cultural services. Thus, it should be considered that a large margin of error exists in the overall estimation, and that it deserves some completion of information and to be progressively detailed.

In addition, it is worth to notice that some of the damages and losses are in mixed sub-categories e.g. the Saint Nikola church in Svilajnac (physical damages but also losses in books and icons), the Resavska library in Svilajnac, or Tršić (BH but also loss in the cultural offer) Obrenovac (historic building hosting the public library), historic building in Paraćin (Maksima Gorkog st., n. 17) cultural monument and museum; Vila Nikolić, historic building hosting cultural centre of Paraćin, historic building in Paraćin (Branka Krsmanovića, n.47) hosting the library; National museums of Čačak and National museum of Smederevska Palanka, National museum of Valjevo and National Museum of Kragujevac, all four museums are also representing cultural heritage buildings. Similarly, the Cultural Centre in Valjevo is also designated as a cultural monument. In all such cases the assessment was based on the prevalent category. Only in the case of Obrenovac, given the consistency of the damages provided to both the building and the library did the assessment take into account two separate sub-categories (BH and HR).

With regard to ownership, some of the assessed areas/sites have mixed ownerships e.g. in the case of cultural heritage sites in the village of Brankovina in Valjevo municipality which are partly publicly owned and partly the private property of the Orthodox Church. Similar mixed ownership exists in the Obrenovac conservation area and the Tešnjar historic district in Valjevo (see image below). In all such cases, the assessment was based on the prevalent ownership.



Figure 1-39. The historic district of Tesnjar in the municipality of Valjevo. An example of cultural heritage site with mixed public and private ownership.

For avoiding double accounting purposes, the income decline for heritage institutions (like the national museum of Valjevo, or Tršić historic village) have been calculated as part of the total damages and losses in the trade sector. For the same reason, the identified personal income losses are not added to the values of sectorial damages and losses, but included in livelihoods, employment and income sector, which looks at disaster impact at personal level. As regards natural heritage, only losses have been calculated, while damages have been included in the environment sector.

### Estimation of Damages

The value of damages of the culture sector was obtained by summing the single physical damages assessed for each good in each of the analysed categories. As shown in table 1-30, below, the total damages in the culture sector were quantified as RSD 112.7 million, of which RSD 98.1 million belong to the public sector and RSD 14.7 million to the private sector.

Table 1-30: Value of damages caused to cultural assets (in millions RSD-1 EUR = 115.66 RSD)

Table 1.20: Value of damages caused to cultural assets (in millions USD) 2014-2016 (base 2014)				
		Ownership		
		Estimated value	Public	Private
			Sub-categories	
cultural assets	1. <i>built heritage</i>	57.7	43.5	14.3

	<b>2. natural heritage</b>	0.6	0.6	0
	<b>3. intangible heritage</b>	0.4	0	0.4
<b>community infrastructures</b>	<b>4. heritage repositories</b>	7.9	7.9	0
	<b>5. cultural centres</b>	46.1	46.1	0
<b>TOTAL</b>		<b>112.7</b>	<b>98.1</b>	<b>14.7</b>

### Estimation of Losses

The value of losses of the culture sector is shown in Table 1-31, below. These were obtained by summing the losses recorded for all the single sub-categories analysed. Total losses were quantified as RSD 8.4 million. Of these, RSD 7.3 million belong to the public sector, whilst RSD 1.1 million to the private sector.

Table 1-31: Estimated losses caused to cultural assets (in millions RSD)

		Ownership		
		Estimated Value	Public	Private
	<b>subsectors</b>			
<b>cultural assets</b>	<b>1. built heritage</b>	2.3	1.2	1.1
	<b>2. natural heritage</b>	4.8	4.8	0
	<b>3. intangible heritage</b>	0	0	0
<b>community infrastructures</b>	<b>4. heritage repositories</b>	0.4	0.4	0
	<b>5. cultural centres</b>	0.9	0.9	0
<b>TOTALS</b>		<b>8.4</b>	<b>7.3</b>	<b>1.1</b>

### 2.2.2.10 Transport and Communications Sector

#### Sector Overview

The international roads and railways crossing Serbia represent the shortest link between Western and South Eastern Europe and Greece, Turkey and further east. Corridor X of the Trans European Network (TEN-T) connects Austria/Hungary, Slovenia/Croatia, Serbia and Bulgaria/Macedonia/Greece. The Government and international financial institutions are financing the construction of several road segments on Corridor X through the on-going Corridor X Highway Project. The backbone of the Serbian rail network is also along the Corridor X corridor, about 870 km, with branches to the Hungarian and Bulgarian borders. GoS is in the process of upgrading the Corridor X rail line.

The Road Network: The road network is a major asset for Serbia but connectivity and road conditions need improvement to support economic growth. The road network, estimated to have an asset value of US\$13 billion, extends 40,800 km, including about 16,700 km of national roads. Road transport is the dominant mode, with a share of 80 % of total cargo transport and about 74 % of total passenger transport. Despite the importance of the road network, the quality of road infrastructure appears to have declined in the past few years.

While a 2010 survey of the National Road Network indicated that 48 % of the network was in good condition,<sup>31</sup> the 2012-2013 Global Competitiveness Report (GCR) ranked Serbia 122<sup>nd</sup> out of 144 countries on road quality. While this represents an improvement from its 131<sup>st</sup> position out of 142 countries in the 2011-2012 GCR, it is a significant drop from the 2008-2009 GCR ranking of 83rd out of 134 countries. The poor quality of roads manifests itself in high vehicle operating costs and inadequate road safety; and reduces Serbia's overall trade competitiveness.

The Ministry of Construction, Transport and Infrastructure (MCTI) is responsible for policy, while the Public Enterprise for State Road Management (Public Enterprise "Roads of Serbia" or PERS) is responsible for construction, maintenance, operation and management of national roads. Road sector institutions in Serbia have undergone major institutional reforms in the past few years. The Serbia Roads Directorate was transformed into a PERS in 2008,<sup>32</sup> and the Ministry of Capital Investments into Ministry of Transport, which was merged with construction this year to form the MTCTI. In early 2009, Government of Serbia established the Corridor X Company, a subsidiary of PERS for construction of Corridor X. In 2010 the Company was transformed into Corridors of Serbia (CoS) to manage road construction projects of strategic national importance.

The Railway Network: There are about 3,819 km of network, of which only 1,279km is electrified. The length of the main lines is 1768km while the line of I and II category have the total length of 2,041km. The lack or insufficient maintenance of rail lines in the last 15 years is the main factor producing the existing bottlenecks of the whole rail mode and resulting in deterioration of rail network. To offset this trend and preserve safety the rail infrastructure speed restrictions both permanent and temporary are introduced.

In May 2013 a new law on railways was adopted (Official Gazette 45/2013). The law envisages introduction of competition among operators and reorganisation of Serbian Railways. The infrastructure management and transport of passengers and freight are to be separated. New organisation of railways should contribute to efficiency of railway system and its integration in transport services market allowing an increase in the number of operators.

The owner of the infrastructure is Republic of Serbia while the management of infrastructure is of public interest. The license to manage infrastructure can be issued in line with conditions set in Article 10 of the Law on Railways. Currently, Joint-Stock Company Serbian Railways has two directorates, Directorate for Infrastructure and Directorate for transport. Directorate for transport consists of Departments for passenger, freight, rolling stock maintenance and traction.

Directorate for infrastructure includes Departments for investment, technical (vehicles), traffic, electro-technical and civil works. Serbian Railways is directly under Ministry of Construction, Transport and Infrastructure competences. The company performs carriage of passengers and goods, hauling of trains and maintenance of traction units, trains and rolling

<sup>31</sup> The survey was conducted by the Faculty of Civil Engineering of the University of Belgrade.

<sup>32</sup> The World Bank-funded Transport Rehabilitation Project and the Twinning Arrangements with Swedish National Road Administration (SNRA) supported the newly-established PERS.

stock. The company is in charge of tracks maintenance and inspection, inspection of other permanent way and station structures and installations, maintenance and assembling of devices, plants and installations.

Inland Waterways and Ports: Serbia, with over 1,680 km of internal waterways, has an important place within 36,000 km long European inland waterways network. Unlike in 10 other European countries, the Danube through Serbia is navigable along its entire length, which amounts to almost one quarter of the total navigable stretch of the river. Geographically, Serbia has a strategic position on the continent.

The geographical position of Serbia, with its 1680 km of navigable waterways provide natural benefits for intensive inland waterway transport through a developed river network, especially through the Danube, Sava and Tisa rivers, inclusive of canal network among which the hydro-system “Danube-Tisa-Danube” canal (DTD) is the most prominent one. Length of the Danube is 588 km, Sava is 211 km long, Tisa 164 km, Tamis 41 km, Begej 77 km, and DTD 599 km. Serbia has over 900 inland vessels under its flag, 400 of them operational. Total size of fleet that participated in the river traffic in 2012 was 1,032 vessels. In recent years, there has been growth in registration of small fleet of private shipping companies. Strong inland waterways transport requires strong economy. Revival of this mode in Serbia will thus be dependent on the more intense industrial development.

Inland waterways handled 8.7% of total cargo transported in 2011 and this type of traffic is expected to increase by 30% by 2017. Serbia has 10 ports open to international traffic, nine of them on Danube and one on Tisa. Similarly on the Sava River there are 2 ports for serving domestic transport (Sremska Mitrovica and Sabac).

The Sector for Water born Transport and Safety of Navigation within the MCTI is responsible for policy. The Directorate for Inland Waterways (ex “Plovput”) is responsible for the maintenance of waterways: it first used to operate as an autonomous entity (Administration), after which it became part of the Ministry as a directorate (see Institutional Arrangements section above).

Air Transport: There are two major airports in Serbia, namely Nikola Tesla in Belgrade and Konstantin Veliki in Nis, each of them serving international traffic, and additionally 18 small airports without commercial character (used for pilots training and amateur flying) None of the airports were affected by the disaster except for the small airport in Smederevska Palanka which is providing small aircraft maintenance services.

### **Baseline information**

A brief tentative description of the transport infrastructure and assets is given below, divided into the following main divisions of roads, railways, airports, inland waterways and ports and communications:

Roads. The total length of the national road network is approximately 40,800 km, including about 16,700 km of state roads. Road transport is the dominant mode in Serbia, with a share of 80 % of total cargo transport and about 74 % of total passenger transport.



The road network consists of the following:

- 667 km of highways (state roads IA category)
- 4,628 km main roads (state roads IB category)
- 11,415 km regional roads and (state roads IIA and IIB category)
- 24,090 km local roads.

Railways. There are 3,819 kilometres of rail lines (4,093 km total track length), of which 1,279 are electrified and 283 kilometres are double-track railroad. Line alignments are predominantly hilly, with 334 tunnels (total length 154 km), 981 bridges (total length 47 km), as well as many sharp curves and steep gradients.

Air transport. There are two major airports in Serbia, namely Nikola Tesla in Belgrade and Konstantin Veliki in Nis, each of them serving international traffic, and additionally 18 small airports without commercial character (used for pilots training and amateur flying) None of the airports were affected by the disaster except for the small airport in Smederevska Palanka which is providing sport aircraft maintenance services.

Inland Waterways and Ports. Three international and interstate inland waterways exist: The Danube (Pan-European Corridor VII), Sava and Tisa Rivers. The length of the Danube River flowing through Serbia is 588 km – navigable in its entirety. River Sava is a major by discharge, 990 km long tributary of the Danube. It flows through Slovenia, Croatia, along the northern border of Bosnia and Herzegovina, through Serbia, discharging into the Danube in Belgrade. The River Tisa is the longest Danube tributary, navigable on 532 km out of which 168 km are in Serbia.

Communications: Telephony, Internet and Postal Services. Fixed telephony (landlines): There are four operators who are holders of the license for public fixed telecommunications network and services: Telekom Srbija, Telenor, Orion and Serbia Broadband.

Mobile telephony: There are three operators with the licenses for public mobile telecommunications networks and services: Telekom Srbija, Telenor Ltd and Vip Mobile Ltd.

Internet Services; In December 2012, there were 222 Internet service providers (ISPs) registered in Serbia. The continued expansion of the Internet market is reflected, not only by the increase in the number of users (Internet connections), but also by the constant increase in the total revenues from the Internet service provision in the past year.

Postal Services. The “Post of Serbia” (Posta Srbije) is the only operator in the country holding universal licence to provide postal services. Currently there are 52 private operators holding approval to perform unreserved postal services. The operational network of Post of Serbia stands as the largest infrastructure and logistic network in the country, engaging various functional capacities (December 2013) for the performance of the postal activities.

### **Assessment of Disaster Effects**

Some information on the damages affected road and rail sector is provided in the table below:



	Rail	Main roads	Regional roads	Local roads	Total
Km affected	209	41	74	621	945
Bridges affected	3	69	49	186	307
Landslides	12	13	38	84	147

Throughout the areas affected, the damages to the transport infrastructure assets have been caused mainly by the following conditions:

Landslides. There are approximately 2000 landslides reported but out of these about 135 have affected the road network and 12 that of the railways.

Mali Zvornik is one of the major landslides that have affected the IB 28 regional road for a length of approximately 50 meters. The cause of the landslide was the extreme precipitation resulting in high pore pressures in the landslide mass that has probably been active also in the past.

Note that the area has been deforested and possibly cultivated as compared with the surrounded forest vegetation. Following emergency clean-up earthworks reopening of the road has been achieved. This is a temporary diversion that should not be considered as a permanent solution since reactivation of the landslide may happen anytime following even small scale precipitation directly affecting the large tension cracks developed in the slide mass. It is recommended that constant monitoring using survey points is applied and that inclinometers and piezometers are installed and monitored on a regular basis to provide warning signs of further movement in the slide mass. Remedial measures should be carefully designed following sufficient site investigation and monitoring.

A similar large scale landslide has destroyed a segment of the IIA 137 regional road between Krupanj – Mackov Kamen (see Annex Photo 3) for which design is in progress.

Localised slope failures. This is typical of many local failures in the surrounding hills as soft material is coming off the mountain sides or from existing cut slopes along roads, and blocking the roads and railways. There is usually only a limited effect on the road as it can usually be cleared within a day.

In these situations it is more than likely that more material will slide especially with rain and typical remediation measures should include unloading earthworks and gabion type toe berms as practised already, while for houses founded near or at such locations additional measures such as piling and anchoring may be required.

Erosion. Such failures have been observed along segments of roads which run adjacent to the major rivers such as that of Krupanj – Korenita regional road IIA 139 (see Annex Photo 5). In this particular location recent floods have seriously damaged the road and local housing.

Areas at river bends are usually mostly affected due to intense turbulence eating away road embankments. Remedial solutions should consider, in addition to erosion resistance requirements, all environmental aspects as well.

Wash out. This type of failure, which was caused by fast flowing floods water, has had more of an impact on the foundations and ballast material of the railway lines, quite often being washed out from below the railway lines.

Flooded river water was easily able to move the rail ballast and some of the foundation material due to limited protection measures and there are long areas of track which are just hanging.

Bridges. It has been reported that approximately 304 roads and three railway bridges have been affected. A typical bridge damages observed is the erosion of the abutments and their access embankments, making them temporarily impassable.

It is believed that the general damages to the bridges all follow similar patterns with the damages to the piers or abutments caused by scour. The bridges would not have been designed for such a large return period flow.

### **Effects on Risks and Vulnerabilities**

Risks in major landslide locations such as that of the in Mali Zvornik have considerably increased due to the high probability of reactivation and traffic disruption if rainfall and floods events of event lesser intensity take place.

Similarly risk has largely increased for locations where railway or road embankments have been washed away as mentioned before. With many embankments weakened by the large and fast flows over them they are now more prone to further damages from either heavy rainfall or from further flows.

The risk for the local mudslides to move again has increased due to the ground already being saturated and now there is also a limited amount of vegetation on the cuttings and the embankments.

Further erosion to the river banks is now more a risk as the banks have already been weakened. Probably much of the protection has been washed away leaving the banks more vulnerable to erosion.

Many of the culverts that the roads pass over remain blocked or partially blocked which with the heavy rainfall causing further debris to flow may again become blocked and cause damages to the embankments and possible block the roads again.

Where bridges are damaged due to the high flows the foundations may be undermined or partially undermined making them more at risk from further high flows.

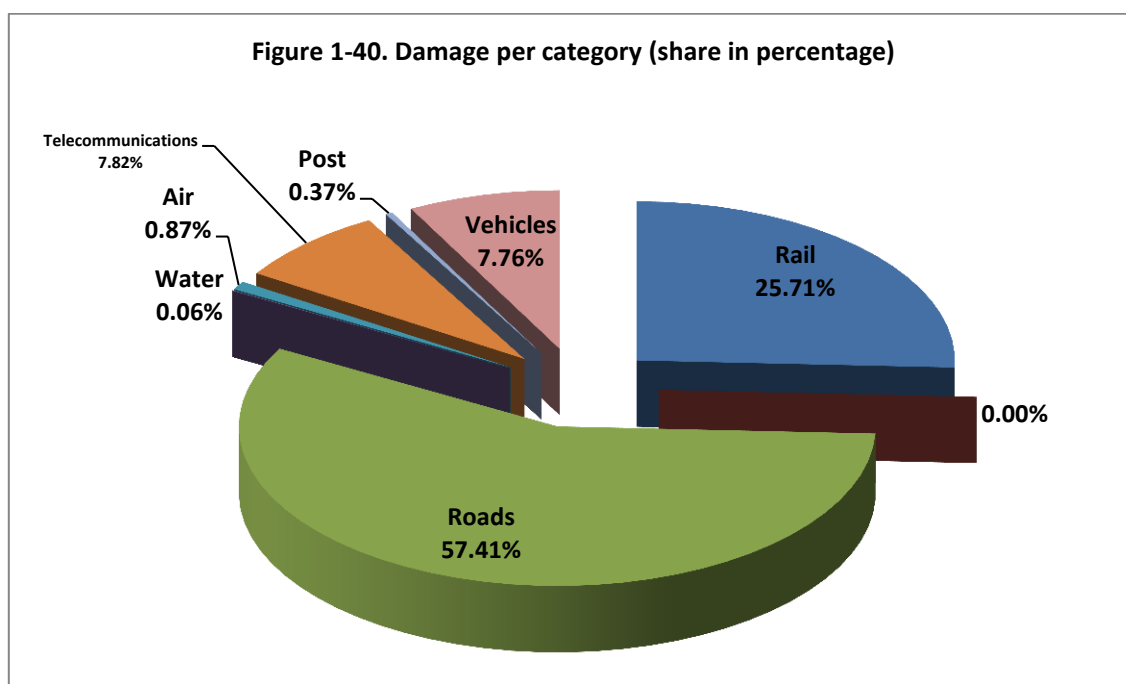
### **Value of Damages and Losses**

The damages and losses caused by the disaster had an especially severe effect on bridges, causing some to collapse and there are significant damages to other structures. Landslides caused obstructions to many roads, and many roads and railway lines were washed away due to erosion from the fast and high river currents and the washing out of ballast due the velocity of the floods water.

The following is an estimate of the physical damages to the transport infrastructure caused by the disaster and of the losses or increases in vehicular operating costs which have been incurred by users and subsector companies as a result of the unavailability of transport assets that were totally or partially affected and unusable, during the period in which they will not be in service. In this regard, the value of damages was estimated according to the costs of replacing the affected transport assets to the same level of quality and efficiency as they were before the disaster.

### Damages Assessment

The following chart illustrates the damages distribution among sectors with road sector clearly prevailing:



Costs were estimated by separately analysing each physical damages and then assessing the respective replacement costs. Estimated costs are presented in the table below:

Table 1-32. Estimated value of damages to transport and communications 1 EUR = 115.66 RSD)

Municipalities	Telecom	Post	Water	Air	Roads			Rail	Vehicles	TOTAL (million RSD)
					Main	Regional	Local			
1 Obrenovac	484	46	0	0	516	0	170		784	2000
2 Paraćin	6	0	0	0	60	15	1		0	82

3	Ub	0	0	0	0	0	6	10		2	18
4	Čačak	23	0	0	0	80	50	40		213	406
5	Krupanj	71	0	0	0	70	1083	500		1	1725
6	Šabac	1	0	8	0	68	16	230		0	323
7	Mali Zvornik	22	0	0	0	190	17	250		0	479
8	Velika Plana	0	0	0	0	0	0	0		0	0
9	Loznica	2	0	0	0	80	159	210		0	451
10	Trstenik	3	0	0	0	0	15	60		0	78
11	Jagodina	9	0	0	0	0	11	25		0	45
12	Šid	0	1	0	0	0	0	0		0	2
13	Valjevo	5	0	0	0	222	264	330		14	835
14	Osečina	4	0	0	0	72	216	170		0	462
15	Varvarin	0	0	0	0	0	0	13		1	14
16	Koceljeva	0	0	0	0	255	18	210		2	485
17	Kosjerić	16	0	0	0	75	10	15		0	115
18	Kragujevac	0	0	0	0	0	5	30		0	35
19	Kraljevo	1	0	0	0	111	32	85		0	228
20	Smederevska Palanka	22	0	0	113	0	13	0		0	148
21	Svilajnac	35	2	0	0	0	17	5		3	62
22	Ljubovija	0	0	0	0	215	75	300		0	590
23	Lazarevac	324	0	0	0	107	51	15		0	497
24	Bajina Bašta	0	0	0	0	194	246	250		0	690
<b>TOTAL (million RSD)</b>		<b>1028</b>	<b>49</b>	<b>8</b>	<b>113</b>	<b>2316</b>	<b>2317</b>	<b>2919</b>	<b>3382</b>	<b>1020</b>	<b>13152</b>

For railways the estimate provided reflects the current practice as well as the intention of the Serbian Railways to repair damages in their own capacity. The assessment team considers that this amount could increase as much as 20% in the case where those works would have to be tendered.

It is worth noting that the figures in this table include emergency expenditures that the Government may have already incurred since these cannot be separated from replacement cost because a large share of the expenditures made immediately after the disaster include both items.

It is important to note that the figures indicated in the table should not be interpreted as a definite assessment of damages. This is because some of the existing damages are being observed over time, as is often the case of small damaged structures in which the degree of deterioration cannot be measured by direct observation but by behaviour over time or certain tests.

This could be the case for several bridges and culverts initially considered not to be damaged, in which, following structural tests for example, it is concluded that the materials are suffering from fatigue or have lost their elasticity. In these cases, the rating “damaged” must be changed to “collapsed”, even though the bridges remain standing and major

damages are not observed by sight. These damages therefore should be rated as requiring reconstruction, not simply rehabilitation.

A similar case, in which the true extent of damages is not observed in its full magnitude, is that of an asset (e.g. road or rail) that remains under water or debris. In the first case it may be that after the water has receded and the pavement and foundations have been tested, it is found that some or all the layers have been significantly eroded, making it necessary to demolish and reconstruct all from the formation level.

In these cases the initial damages assessment must be changed from rehabilitation to reconstruction, with the consequent cost increases. This may be the case of many assets that could not be technically evaluated during the evaluation period. Something similar occurs with an asset subjected to the pressure of heavy debris, the real damages are only observed by tests performed in situ and in the laboratory, and may not be apparent by visible damages for some time. As such the damages cost figures are likely to be a lower bound estimate.

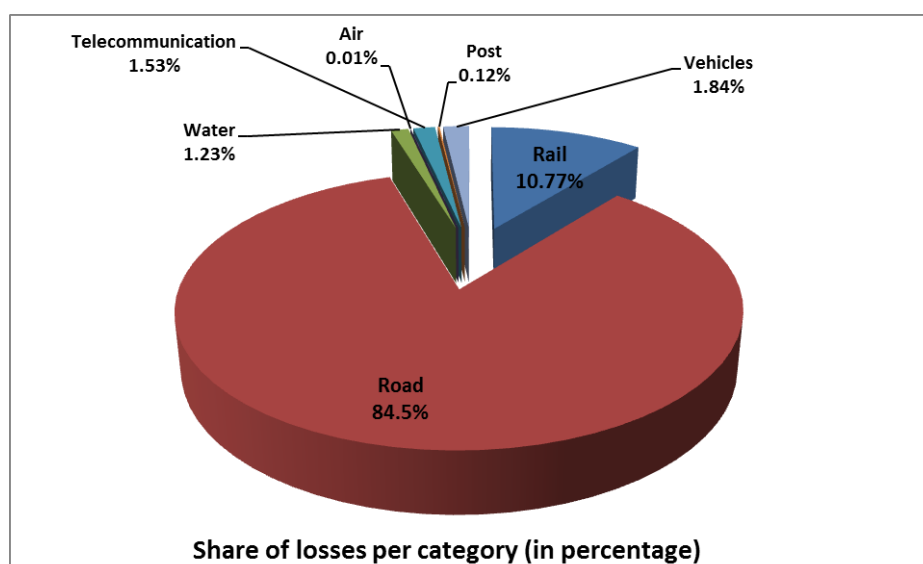
The assessment team also visited highway Corridors X and SEETO route IV and collected available data provided by KORIDORI SRBIJE. Main damages on Corridor X appear to be mostly related to unforeseen geotechnical ground profile conditions in combination with intense rainfalls, while the approximately 1500 mi RSD quoted amount for damages is considered to be underestimated.

For SEETO route IV damages on the highway embankment are directly related to the flooded Reka Dragobig River, while unforeseen geotechnical ground profile conditions in combination with intense rainfalls have triggered most of the landslides witnessed. Again the approximately 190 mi RSD quoted amount for damages is considered to be underestimated.

## Losses

Losses were estimated following a more detailed approach by the assessment team for the more important road and rail sub-sectors as described below, while those for the other sectors were provided by the relevant major public and private companies in those fields.

The following chart illustrates the losses distribution among sectors with road sector clearly prevailing:



## Roads

The losses that were observed and later quantified correspond to higher operating costs incurred by freight and passenger traffic when they have to detour from their route to others of lesser quality. This phenomenon is frequent in freight traffic because drivers need to reach their destinations or return to where they started. This occurs in the case of insurmountable obstacles; the most typical is the collapse of bridges followed by landslides that blocked the roads. Traffic that has to travel on roads deteriorated by rain or simply lesser grade roads also constitutes losses. This translates into increased operating costs for vehicles that have to travel on these roads. Another case of losses observed and quantified is increase in travel time.

In general, costs occur as a result of: (i) the need that forces drivers to resort to alternative routes in replacement of those they regularly use because traffic was interrupted or blocked by damages to the road infrastructure, and (ii) higher operating costs of traffic on routes that continued to be used after the disaster.

The assessment team observed change in Average Annual Daily Traffic (AADT) on routes in target municipalities. New, post-disaster values were extracted from a number of counters on the target network and used as one of basic inputs, others being change in road condition measured through assumed change of International Roughness Index (IRI)<sup>33</sup> after the disaster, and average passenger and freight traffic speeds on each of the road sections. Where not possible to obtain speed or traffic volume information, values have been assumed based on the known speed of traffic on another similar sections– similar in terms of road physical and traffic characteristics and the level of damage.

VOC is a function of speed and road condition and it was calculated for both passenger and freight vehicles - before and after the disaster. For traffic that continued onto existing, by disaster impacted route, losses were estimated by combining change in VOC for passenger and freight traffic with passenger and freight time loss at EUR 5 and EUR 0.18 per hour rate, respectively. For diverted traffic (total road closure), the difference in number of km and VOC

<sup>33</sup> New IRI values were assumed to enable the calculation of Vehicle Operating Costs.



on the alternative route were used to calculate losses, in addition to time monetised as above.

### Rails:

Losses for the rail industry have been estimated based on:

- the observed/recorded difference in traffic in the period **prior to** the flooding as opposed to the same period in the year 2013 (to be used as the baseline for the period following the flooding)
- the observed/recorded difference in traffic in the period **following the** flooding, until the present day (day of this Report), as opposed to the same period in the year 2013
- estimation of the additional costs due to rerouting of trains
- extrapolation of the observed/recorded differences into the period until the end of 2014, based on the assumption that the railway infrastructure would be fully repaired and brought to the normal operation until August 31, 2014

Passenger traffic. In the baseline scenario the estimated daily revenue of Serbian Railways is approximately RSD 5 million on average. From June to September the traffic volume is higher mostly due to the increase in number of passengers travelling from Serbia, Czech Republic, Hungary and Russia to Montenegro. This results in the average daily revenue of RSD 6.5 million during the summer period.

After the floods, from May 15th to June 20th 2014 the average revenues dropped by 30% to 40%. The assumption of the assessment is that the ratio of the drop in revenues would not change over the construction period. If in September 2014 the traffic flows would return to the level of the baseline scenario the estimated loss is RSD 240 million.

Freight traffic Due to floods some railway lines were closed and the capacity of railways decreased. The volume of freight transport was reduced along the following sections:

- Jajinci – Mala Krsna and Resnik – Mala Krsna
- Ruma – Sid
- Sabac – Brasina
- Lajkovac – Kosjeric

To transport the goods Serbian Railways used alternative railway routes. Consequently, the company recorded a loss of revenues and higher train operating costs of RSD 516.7 million.

In total, the losses from railway passenger and freight traffic are considered at RSD 909 million including an additional provision of 20% made for the extension of both losses onto one-year period following the flooding, and the consideration that the normal traffic would not be re-established by August 31.

Table 1-33. Estimated value of damages to transport and communications 1 EUR = 115.66 RSD)

Transport Sector	Value	Public	Private
Roads	7,126	100	0
Vehicles	155	0	100
Railways	909	100	0
Postal Services	10	100	0
Water transport	104	100	0
Air transport	1	0	100
Telecommunications	129	40	60
<b>TOTAL (million RSD)</b>	<b>8,434</b>		

### 2.2.2.11 Water and Sanitation Sector

#### Sector overview

The municipalities are responsible for establishing public utility companies (PUCs) and for meeting the obligations of the utility. The PUCs provide drinking water and disposal facilities for waste water and sewage. The pipe network for water often extends to villages near the town. As in most of the world, provision of sewerage lags behind that of water and the network may not cover the whole urban area. Treatment of water is carried out, treatment of sewage is rare.

Consumers supplied by the PUCs are charged, on average, from 40 (domestic) to 100 (commercial) RSD/m<sup>3</sup> of water used, up to 2% of household income, but this not sufficient to cover the full costs. The charges are for water, and for sewage disposal. The local authority approves the system of tariffs, which is limited by Government regulations. Up to about 50% of water abstracted is non-revenue water.

Water sources include karsts springs, drilled wells, dug wells and surface water. In rural areas outside the municipal network, water sources may be for individual or groups of dwellings. Dug wells and springs often supply a communal source. Provided these sources are protected, they do not normally need treatment. Septic tanks and latrines are often used. The utility companies are not responsible for these areas.

Water shortages occur in some municipalities in summer. Water is available but investments are needed to increase the supply and treat the additional water in urban areas. This is being addressed in part by increasing the number of regional supplies. Pre-floods water shortages in rural areas were not addressed in this assessment.

The main disaster risks in the water supply and waste water disposal sector comprise:

- Damages to infrastructures and interruption to supplies;
- Negative impacts on water quality such that additional treatment or import of drinking water are required;
- Release of sewage to the environment, posing a public health (and aquatic life) risk, which is accentuated by paucity of sewage treatment plants;
- Insufficient water due to drought.

With reference to solid waste management, the PUCs are also mainly responsible for the collection and disposal of wastes, although in rare cases a private company may hold this contract. Services include the collection of waste from households and the commercial sector, and collection of non-hazardous waste from industry, with each municipality having at least one PUC for waste management. Solid waste service coverage varies between municipalities with the pre-floods situation being from 29% to 100% coverage of the population, and an average coverage of 60%. Generally, rural areas of municipalities have much lower solid waste collection coverage due to the higher cost of collection and chargeability problems, i.e. it is difficult to get the rural population to pay for this service.

The solid waste collected, mainly by the PUCs, is typically disposed of for free (i.e. no gate fee charged at the disposal site) at the municipal identified disposal site. Except for regional sanitary (engineered) landfills in Užice, Jagodina and Sremska Mitrovica, all other municipalities included in this RNA assessment do not have a proper regulatory compliant waste disposal site. These non-compliant disposal sites do not have sound operational measures in place such as leachate collection and treatment, landfill gas collection, daily cover, control of quantities and types of waste disposal. These disposal sites, which have often been in use for decades, can be located in inappropriate locations regarding their potential negative impact on the environment. However, a new sanitary landfill is under development in Ub Municipality (pre-floods Governmental plans) which will serve four or five of the floods affected municipalities.

With reference to recycling, the typical case is that before the PUCs collect the solid waste from the streets, the informal sector will have already carried out a primary separation of the waste including the separation of paper, PET plastics, metals and aluminium. Waste treatment such as composting, anaerobic digestion or incineration is not carried out at present, and therefore waste is disposed of without any pre-treatment.

Within Serbia as a whole, the waste tax is both relatively low and often not paid, resulting in the solid waste management system being subsidised in all municipalities where PUCs operate. Taking into account the considerable challenge for financing solid waste management, municipalities with medium and small populations have been required (by the Waste Management Strategy of Republic of Serbia) to join forces and establish regional solid waste management systems, each for at least 200,000 inhabitants.

The main disaster risks in waste management sector comprise:

- Negative impact on groundwater and soil due to the uncontrolled spread of wastes caused by the flooding;
- Decrease of service provision due to damages to containers and collection vehicles;
- Higher risk to public health due to insufficiency of waste containers.

## **Assessment of disaster effects**

### **Effects on Infrastructures and Physical Assets**

The main damages to water supply and waste water disposal systems were:

- The piped network for both water and sewerage, including blockage of the sewerage system;
- Electrical components of pumping systems, especially at water sources such as well fields;
- Some wells in urban areas, which were destroyed;
- Some wells and intakes in rural and urban areas were clogged with sediment for the floods water;
- One lagoon for sewage treatment was flooded and filled with sediment.

The main damages within the solid waste management systems comprise:

- Damages and destruction of waste containers;
- Damages to the waste collection vehicles;
- Damages sustained at the solid waste disposal sites.

### **Effects on Production Flows, Access and Availability of Services**

In most of the affected municipalities the urban water supply was disrupted or not available for a few days to about 10 days. In several, the normal fees for services were not collected for about a month, and some will not be able to re-establish regular revenues for the next few months. In Obrenovac, the most affected municipality, water is available now, but it is still considered as non-potable. Higher costs were incurred for water distribution using tanker trucks, additional pumping costs, disinfection and analyses, cleaning of septic tanks and wells in rural areas, and unblocking sewage pipes.

In rural areas, outside the supply network, a number of wells were flooded and could not be used until they had been cleaned.

Short term reduction of the solid waste collection service was encountered (due to damages to collection vehicles), which coincided with a sharp increase in the quantities of waste arising from the return of residents. This lasted for several weeks after the floods. In Obrenovac, waste separation was severely constrained, which will lead to lower, mainly private sector, revenues from the sale of recyclables.

### **Effects on the environment**

There occurred some short-term contamination of surface water and groundwater with sewage.

Heavy metals were released from mine workings to the Korenita stream in Loznica Municipality when a dam broke. Individual wells in the area tap water above the level of the stream and could not be affected, as confirmed by an investigation of well water quality carried out by the Institute of Public Health of Sabac. A spring supply for Mali Zvornik Municipality was also affected by heavy metals due to the groundwater level rising into old mine workings, and had to be taken out of service.

Negative environmental impact was sustained in the Municipalities of Obrenovac, Ub, Varvarin, Koceljeva and Bajina Basta from the damages caused to waste disposal sites. All of these disposal sites are non-engineered (without liners and appropriate cover) which led to the uncontrolled disposal and spread of municipal solid waste, including electronic wastes.

The floods waters spread these wastes into the surrounding areas and impacted on groundwater and the surrounding soil.

### **Effects on Governance**

The emergency response to the flooding has put the PUCs, municipalities and central Government under stress in terms of resources and the capacity to deal with shortcomings in water supply and sewerage.

The PUCs from the waste management sector also had to engage additional resources to provide collection of solid waste during the initial peak in first weeks following the floods. This also supported a reduction in public health risks as it prevented solid wastes from being left in the public streets to decompose which would have led to health risks.

### **Effects on Risk and Vulnerabilities**

There were no significant observed effects on risk and vulnerabilities. The risk of disease from drinking poor quality water and poor hygiene was comprehensively addressed, mainly by the Institute of Public Health.

A certain part of the population of each of the affected municipalities had a shorter or longer break in the regular supply of water. This resulted in shortages of drinking water (used also for washing and hygiene), posing the greatest risk to young children. Also, some parts of the population in urban areas had a shorter or a longer disruption of the functioning of the sewerage system and solid waste disposal. The floods had only a minor impact on the normal disposal of sewage and solid waste in rural areas.

During the suspension of regular water supply, drinking water for the affected population (in urban as well as in rural areas) was/is provided by water tanks (mobile or stationary) and by bottled water. A significant contribution was made by international donors, volunteers, private enterprises and NGOs, especially the Serbian Red Cross, in cleaning up, provision of washing machines, treatment and distribution of drinking water.

The population of the most affected areas was evacuated and accommodated in collective centres. In these centres a satisfactory level of hygiene was provided and an intensive hygiene and epidemiological surveillance implemented by the Institutes for Public Health, not only in collective accommodation centres, but also in all the affected urban and rural areas. These activities included intensive health and hygiene information campaigns and awareness raising. As a result of these measures, no epidemics have been recorded, and it is considered that people from vulnerable groups (e.g. children, Roma, elderly, evacuees), potentially at more risk than the general population, were no more affected than others. In Obrenovac the situation with water supply and sewerage is still not normalized, because, comparing to other towns, infrastructure facilities and private households was most affected. Some of the evacuees are still in accommodation centres, the piped water is still considered unpotable.

There was short reduction in the waste collection services provided by the various PUCs, which for a few days resulted in significant amounts of solid waste being placed in the streets (as the waste containers were full) and sometimes in the floods water, posing a

threat to public health. Once additional resources had been mobilised by the PUCs, these wastes were quickly collected and the health risks minimised.

However, the main risk in solid waste management is linked to the flooded solid waste disposal sites in the Municipalities of Ub, Koceljeva, Varvarin, Bajina Basta and especially in Obrenovac (where 100 % of the disposal site was under water).

## **Estimation of the value of damages and losses**

### **Damages**

The total value of damages for this sector, both public and private, is estimated as RSD 1,438 million. The only private ownership was for RSD 1.1 million for garbage containers in Jagodina. The regional water system under construction in the region of Kolubara near Valjevo, sustained RSD 313.5 million of damage.

The total damages in solid waste sector is estimated as RSD 88.5 million with proportional share of 55.6 % for the damages of containers, 22.1% for the damages of vehicles and 19.4% for the damages to the solid waste disposal sites.

In regard to waste management, most of the damages occurred in the municipalities of Obrenovac (ca. 27 million RSD) and Svilajnac (ca. 14 million RSD). It is important to note that in pre-floods conditions, both the PUCs and private companies generally only provided 60% population coverage for waste collection and thus the damages sustained is lower than expected.

### **Losses**

The total value of losses for the sector is RSD 375 million, of which RSD 100 million is for solid waste management.

Losses in the water supply and waste water disposal area comprise lost revenue (36.5% of losses), additional treatment and laboratory analyses of water and use of water tanks. In rural areas, emptying of septic tanks (often needed before cleaning wells to avoid contamination of well water) and well chlorination were carried out by the local Institute of Public Health and the Water Utilities. Hence all losses related to water supply and waste water disposal were to the public sector.

In the waste management sector, 13% of losses was due to lower revenues and 83% for the higher cost of operation. Most of the losses incurred as a result of the PUCs having to engage all available resources for waste collection and transportation during the early weeks after the floods to remove the sharp increase of solid wastes from the streets.



Table 1-34. Summary of damages and losses (1 EUR = 115.66 RSD)

Municipality	Damages	Losses
	million RSD	
Obrenovac	514	216
Paraćin	3.13	7.51
Ub	16.6	13.2
Čačak	3.33	4.82
Krupanj	82.8	7.08
Šabac	11.8	2.75
Mali Zvornik	4.76	2.29
Loznica	30.6	0.00
Trstenik	11.7	52.3
Jagodina	3.36	0.252
Šid	4.08	3.09
Valjevo	412	14.0
Osečina	1.87	2.13
Varvarin	4.32	0.952
Koceljeva	15.1	2.89
Kragujevac	12.8	1.53
Kraljevo	100	3.66
Smederevska Palanka	11.4	0.00
Svilajnac	19.5	11.6
Ljubovija	1.56	1.85
Lazarevac	109	14.6
BajinaBašta	29.1	1.36
Mionica	26.7	10.5
Ljig	7.09	0.210
<b>Total</b>	<b>1,438</b>	<b>375</b>

## 2.2.3 Cross-Cutting Issues

The following sections describe disaster effects on the environment, governance and gender.

### 2.2.3.1 Environment

#### Sector Overview

The floods affected areas of south-western, western and central Serbia possesses diverse and important natural resources and environmental assets that are intricately linked to the economy and livelihoods of the population. These include large areas of arable land, forest resources, mountain springs and wildlife. The region is drained by important river systems including the Danube, Sava, Drina, Kolubara and Morava. The districts of Srem, Sumadija

and Pomoravlje have large areas under agricultural cultivation (over 60 %), while Raska and Rasina have some of the highest forest cover rates (42 %) in the country.

Important natural areas which host exceptional biodiversity include the national parks of Tara, Golija, Mokra Gora, Beljanica, as well as special nature reserves Brzansko Moraviste and Obedska Bara. There are also important mineral resources in the affected region including the substantial lignite reserves in the surface basins of Kolubara, which supplies around half of the total national thermal power production. Other important exploitation of minerals in the region includes zinc, lead and rare metals such as antimony.

Intensive agricultural production, forest degradation and land use changes associated with urbanisation account for important environmental pressures. An estimated 20-25 % of the land is considered to be vulnerable to landslides, and construction on vulnerable land is a problem. Landslide risk is considered to be particularly high in western Serbia.

Industrial activity, particularly in Sabac and Loznica, has had detrimental environmental effects. Some of the main environmental and public health risks stem from abandoned industrial facilities such as poorly stored hazardous waste at Prva Iskra in Baric. Both legacy and active mining sites such as the Stolice mine tailings and the Zajaca mining and battery recycling waste dump are also important sources of contamination risk. Prior to the floods of May 2014, debris from demolition works in Serbia was disposed of at the nearest disposal site where it was either mixed with the normal solid waste or used, in some instances, as cover material for landfill operations.

The Ministry of Agriculture and Environmental Protection is responsible for overall environmental management in the country. Its mandate includes *inter alia* management of national parks, inspection surveillance, water quality protection, chemical and waste management and acting as focal point for various multi-lateral environmental agreements (e.g. Basel Convention on Hazardous Waste). The Serbian Environmental Protection Agency (SEPA) is an administrative authority under the Ministry of Agriculture and Environmental Protection that has legal obligations in the field of environmental monitoring, data collection and management, and preparation of national reports on the state of the environment and its components. Other agencies and institutes that play an important environmental role include the Republic Hydrometeorological Institute, the Nature Protection Institute, Public Health Institutes and the Agency for Spatial Planning.

The main environmental problems emanating from the floods of May 2014 include: (i) contamination of water and land from legacy mining operations; (ii) negative impacts on surface and groundwater from poorly stored hazardous chemical waste; (iii) activation of at least 775 landslides in the 24 priority municipalities; (iv) generation of 500,000 tonnes of debris waste requiring disposal; (iv) deforestation, forest degradation and biodiversity losses; and (vi) damages to environmental monitoring equipment.

### Assessment of Disaster Effects

The record breaking rainfall that fell on south-western, western and central Serbia produced four distinct problems: (i) extensive flooding over a large area caused by the relatively gradual overflow of the Sava River and the low lying downstream sections of its main

tributaries, particularly the Kolubara River; (ii) sudden 'flash floods' in the smaller alluvial stream catchments in hilly terrain (e.g. Krupanj), characterised by high velocity and destructive flows but concentrated over comparatively small areas; (iii) localised ponding from high rainfall in relatively flat areas; and (iv) landslides and debris flows activated by saturation of the soil with water, either directly from heavy rains or by rising groundwater levels. In some cases, particularly in torrential catchments, river bank erosion also triggered landslides. These different types of hazards created a variety of environmental issues, ranging from destruction of forest cover, biodiversity losses and land degradation to large quantities of debris generation and damages of environmentally sensitive infrastructure, particularly mining operations and industrial and hazardous waste storage facilities.

### Effects on Infrastructure and Physical Assets

Structural damages to infrastructure and physical assets has created an important environmental burden in two main ways: (i) damages to industrial facilities and mining operations has released hazardous substances and waste into the environment, polluting surface and groundwater as well as land with secondary impacts on ecosystems and wildlife (e.g. fish kills); and (ii) damages to houses and buildings has generated in excess of 500,000 tonnes of debris, of which 80 % is from the strip out (i.e. household furnishings and electrical equipment) of floods affected buildings and the remaining 20 % is from demolition works (concrete, brick, roof tiles, plaster, etc.). It should also be noted that some of this debris may have been mixed with hazardous substances in the buildings (batteries, solvent, oils, asbestos, etc) which can lead to environmental degradation if disposed in an unsafe manner.

The floods affected area contains both historic and active mining operations, which were impacted by the heavy rainfall and floods. The incident at the Stolice mine tailing in Kostajnik (Krupanj) is one of the main stand-alone environmental problems emanating from this disaster. The tailing site which holds around 1.2 million tonnes of mining waste was closed in 1987 and reportedly fully stabilised prior to the flood. Extremely heavy rainfall triggered a landslide which damaged the tailing drainage collection system. This resulted in excessive amounts of water accumulating within the tailing thereby undermining the physical stability of the tailing dam, which ultimately collapsed. Over 100,000 m<sup>3</sup> of tailing slurry was consequently released into the Kostajnik stream, a seasonal tributary of the Jadar River. Downstream of the mine tailing, the flash floods covered a land area of between 50-75 meters wide with a sediment deposit ranging generally between 5-10 cm but in some cases up to 70 cm thick. Soil analysis showed the sediments to contain extremely high levels of arsenic, antimony, barium, zinc and lead requiring urgent remedial intervention. In another instance, the pumping of an estimated 200 million m<sup>3</sup> of water from the flooded Tamnava-Zapadno polje open pit coal mine is also likely to increase pollution loads and effect the aquatic environment of the Kolubara River.

Chemicals and hazardous substances stored in industrial facilities were also impacted by the heavy rainfall and flooding. Notable sites of concern include the Prva Iskra chemical plant at Baric which holds around 460 tonnes of hazardous chemical waste. A significant proportion of this waste is stored in poor and leaking containers that are only partially protected from rainfall. Although the site was not impacted by the river floods wave, contamination is likely to have occurred from rainfall overspill and rising groundwater that may have come into

contact with the chemicals. This contaminated water will either drain into the nearby Sava River or infiltrate into the groundwater.

For debris, there were no significant effects on the infrastructure to handle and dispose of the debris arising from the floods, except that the large quantities of debris contributed considerably to filling up the currently available solid waste disposal facilities. Future capacity to receive debris for disposal has therefore been seriously compromised and will require 'reconstruction' in the form of re-establishment of solid waste and debris disposal sites.

### Effects on Production Flows

Concerns over pollution of drinking water supplies and agricultural land meant that emergency testing had to be carried out to assess contamination levels and implement necessary remedial measures. Water quality of the Sava River is an issue of particular concern as it is the main source of drinking water supply for Belgrade, and acts as the collector of all the waste – including sewage, hazardous chemicals from industrial sites and agricultural pesticides - that may have been washed-out and flushed from upstream areas. In certain towns such as Obrenovac, the water is considered to be non-potable and water needs to be supplied by tankers. In other instances, additional water treatment procedures such as activated carbon had to be installed. In rural areas, thousands of wells were contaminated and had to be disinfected.

Agricultural lands were also tested for potential contamination by the Ministry of Agriculture and Environmental Protection in order to ensure that vegetables and food crops would not be contaminated with heavy metals. While generally heavy metal contamination was not found to be a problem, in some localities (e.g. Cacak, Kraljevo, Smederevo Palanka, Jagodina) concentrations of nickel, lead and chromium, were found at certain sites to be above the maximum permitted level. Other sites such as in Kosjerić and Loznica were found to have high levels of lead and arsenic. Restrictions were therefore imposed on the types of crops that could be grown, and special measures such as ploughing are required to reduce contamination levels. Although these are generally short-term measures that are unlikely to extend beyond the growing season, it nevertheless implies a loss of revenue and additional labour by farmers. Finally, lime was also observed to have been applied to help disinfect agricultural land suspected to have been contaminated with sewage.

The considerable amount of debris generated by the floods is significant compared to normal daily and monthly generation levels. As a result, local solid waste management systems have been put under considerable strain to deal with the large debris quantities.

### Effects on the Environment

In addition to the aforementioned pollution risks from mine tailings, hazardous chemicals and waste, the other major environmental impact from this disaster was the triggering of widespread landslides. Debris flows and other mass movements have caused erosion and removal of productive soils, stripped the forest cover, disturbed landscapes and wildlife habitat, and polluted rivers with excess sediments. In some streams, such as Rogacica, Jadar and Sjerac, landslides have partially obstructed water flows, impacting water quality and fish habitat. Although this remains a preliminary estimate, 775 landslides were recorded

in the 24 priority municipalities as of 1 July 2014 but the actual number is estimated by experts to likely be over 3,000 in all the municipalities affected by the floods and heavy rains. Almost 77 % of the reported landslides occurred in Bajina Basta municipality. Amongst the most vulnerable municipalities to landslides are Koceljeva, Ub, Krupanj, Loznica, Mali Zvornik and Ljubovija.

Experts from the Geological Survey of Serbia estimate that around 30 % of the landslides from this disaster are newly formed and 70 % are old reactivated landslides. In many cases, the geology and morphology of the terrain is predisposed to landslides which were triggered by the exceptional rainfall oversaturating slope soils and raising groundwater levels. Poor land use practices, including undercutting of slopes by road construction, removal of vegetation cover for agriculture, and overloading of slopes by buildings and infrastructure, were also observed to be an important cause of the reported landslides.

There are two main negative environmental impacts from the large quantities of debris arising from the floods clearance works: (i) large quantities of debris have contributed to the 'filling' up of existing solid waste disposal facilities and has therefore exacerbated the requirement for additional debris and solid waste disposal facilities in the floods affected areas; and (ii) debris is typically not sorted (especially that from strip out works in the first months following the return of residents to their homes) and thus is likely to contain hazardous wastes, which when disposed of in an uncontrolled landfill, can lead to environmental damages to groundwater and water courses. The potential negative impact of these hazards has not been documented as the total debris management work is still to be completed. Nonetheless, measures have been included in the reconstruction costs for rectifying and replacing debris (solid waste) disposal sites in the floods affected areas.

For the disposal of the hazardous waste components in debris, certain waste types should be segregated from the debris and disposed of separately. This includes gypsum (from plasterboard) as well as asbestos containing materials which should be separated out and placed in specific parts of the disposal site with suitable daily cover to prevent the spread of hazardous airborne fibres.

### Effects on Governance

The floods called for the mobilization of emergency sampling services of water and soils by several agencies including the Belgrade Public Health Institute, the Environmental Protection Agency, various laboratories mobilized by the Ministry of Agriculture and Environmental Protection, and the Ministry of Mining and Energy. This has seriously stretched the monitoring capacity of these resource strapped institutions, which in some cases had to contract external laboratories and universities to carry-out the sample analysis. Despite funding and staff shortages, the Geological Survey was able to compile a good data set on estimates of landslide occurrences but which requires to be completed by more comprehensive assessments.

Municipalities have been obliged to mobilize additional resources for debris removal and disposal. In this process, they have relied on military forces as well as called on private enterprises to support their efforts in removing debris from the streets of floods areas.

Despite the added pressure engendered, the governance system in place proved its resilience in coping with the additional debris stream created.

### **Effects on Risk and Vulnerabilities**

While no acute human exposure from toxic chemicals and hazardous waste releases were recorded from the floods, several contaminated 'hot spots' pose serious risks of localised chronic exposure in the medium to long-term. The collapse of the Stolice tailing dam and the impoundment created by water overflow into the Zajaca mining and battery recycling waste dump are two important cases in point. For example, analysis of Stira stream waters directly downstream from the Zajaca waste piles revealed it to contain extremely high levels of arsenic and antimony. Given their vulnerability to pollution, groundwater and surface water as well as aquatic life and fish will require regular monitoring particularly around suspected contaminated sites.

The floods disaster has also significantly increased the risk of landslide activation, with potentially significant socio-economic consequences from damages to housing, roads and other infrastructure.

### **Estimation of the Value of Damages and Losses**

#### **Damages**

Damages are reported based on contamination of land and water resources, destroyed assets of natural forests, destruction of environmental monitoring equipment and reconstruction of environmentally sensitive infrastructure such as the damaged tailing mine. There were also limited damages reported to buildings, roads, and other structures in protected areas and hunting reserves, including national parks Tara and Golija. The total value of damages is estimated at RSD 1,221 million. Reported damages were to the public sector. It should be noted that the full extent of damages to land and water resources is yet to be fully accounted for as clean-up costs will be determined based on monitoring test results.

#### **Losses**

The total value of losses for the environment is estimated at RSD 1,166 million. Flood-induced losses related to the environment sector fall in two broad categories: (i) suspended services normally provided by environmental assets, and (ii) losses from debris transport and disposal at designated sites. In terms of environmental service losses, this includes loss of carbon sequestration provided by almost 900 hectares of damaged forests, biodiversity losses and the protection role provided by ecosystems. It should also be noted that extensive forest areas of valuable Slavonian oak in Srem were inundated. As it is estimated that it would take up to four months for the water to withdraw, it was not possible to estimate these losses, but which are expected to be significant. Losses from increased pollution loads would also have likely been experienced but these were not possible to measure due to lack of data.

Losses associated with debris management relate to the transport of the debris from the streets of floods affected areas and their subsequent disposal at selected disposal sites by the municipality. For transport costs, an average of 10 kilometres from source of debris to



the disposal site has been used across all municipalities, and which has been costed at a rate of RSD 460/m<sup>3</sup>. For disposal costs, an indicative cost for the market is that from the main Vinča landfill site outside of Belgrade where a large part of the debris from outlying floods affected areas was taken. It was costed at the rate of RSD 180 per tonne. The disposal sites for the debris are often the same as the uncontrolled solid waste management disposal sites. Where large quantities of debris have impacted on current solid waste management systems, the losses have been captured under the solid waste management costs recorded under the Water and Sanitation sector.

Table 1-35. Damages and losses to the environment (1 EUR = 115.66 RSD)

		Estimated value, million RSD	
		Damage	Losses
<b>Damage</b>			
	Contaminated groundwater	108	
	Contaminated land	490	
	Destroyed assets of natural forests	445	
	Damaged environmental monitoring equipment	39	2
	Damaged mine tailing dams	139	13
<b>Losses</b>			
	Debris removal		152.5
	Debris disposal		97.9
	Environmental services losses		
	Carbon sequestering		151
	Biodiversity protection		56
	Eco-system protection		694
<b>TOTAL</b>		<b>1,221</b>	<b>1,166.4</b>

### 2.2.3.2 Governance

#### Overview

This section outlines the impact of the floods on the municipal structural capacity to deliver municipal services in the 24 municipalities (16 municipalities, 6 cities; and 2 city municipalities) that were seriously affected by the floods, and the potential allocations that will empower the governance sector's repair.<sup>34</sup> As the recovery of this sector is tightly linked to the overall recovery, this section does not stipulate the cost of the recovery of governance sector in isolation from other sectors, but rather focuses on physical damages done to the assets essential to the delivery of municipal services.

Serbia is administered at the national, provincial and local level. The local level is comprised of 138 municipalities and 23 cities composed of agglomerated city municipalities. Municipalities have original competences, and competences transferred to them by the national level.

<sup>34</sup> Municipalities: Paraćin, Ub, Čačak, Krupanj, Mali Zvornik, Velika Plana, Trstenik, Šid., Osečina, Varvarin, Koceljeva, Kosjerić, Smederevska Palanka, Svilajnac, Ljubovija, Bajina Bašta  
 Cities: Šabac, Loznica, Jagodina, Valjevo, Kragujevac, Kraljevo  
 City Municipalities: Obrenovac, Lazarevac

Municipalities have *inter alia* the jurisdiction to manage: development plans and programs; city planning and construction projects; the budget and final statement; communal services (water purification and distribution, sanitation, road infrastructure, landfills, parks, cemeteries); building inspection; local environmental protection and preservation; construction permits; taxi regulation; waterway transport and riverbank construction; goods reserves; institutions and organizations in primary education, culture, primary health care, physical culture, sports, child and social welfare and tourism; cultural development including museums and libraries, disaster protection/ mitigation initiatives; agricultural land development and livestock; water sources; local business development; and collecting revenues based on local fees and charges. Cities are territorial units consisting of two or more city municipalities. Cities have the same jurisdiction as municipalities as well as further rights and responsibilities as defined by the foundational agreement with the National Government.

The institutional response of the Republic of Serbia to the reconstruction and recovery after the May 2014 floods was reflected in setting up of a separate Government service – **the Office for Assistance and Recovery of the Flooded Areas** (hereafter: the Office). The Office was established by a relevant Government decree<sup>35</sup> on 22 May 2014, with an immediate effect, for a period of five years. The Office is run by the Office Director, appointed by the Government on 29 May 2014, who reports directly to the Government and the Prime Minister of the Republic of Serbia. By the founding Decree, the Office is established as an expert and administrative service, tasked with, *inter alia*, monitoring, coordinating and reporting about recovery activities in relation to the areas affected by floods.

In particular, the Office performs professional, administrative and operational tasks for the Government and the tasks that are common to the line ministries and special state organizations, relating to:

- Coordination, monitoring and reporting on the receipt and distribution of humanitarian and other aid sent to the Government for areas endangered by floods; Development of standards and criteria, and procedures for the distribution of aid; Preparation of periodic and final reports on allocated aid; Coordination and preparation of partial and single reports of damages assessment;
- Coordination of the preparation of priority, partial and unified plan of rehabilitation areas affected by floods;
- Coordination of all necessary preliminary actions and coordination of implementation, monitoring and reporting on the implementation of remediation plans areas affected by floods;
- Coordination of the preparation of priority, partial and unified plan of building area affected by floods;
- Coordination of all necessary preliminary actions and acts to implement the plans of building area affected by floods;
- Coordination, monitoring and reporting in relation to public procurement procedures necessary to carry out construction plans;

<sup>35</sup> Official Gazette of the Republic of Serbia, No. 55/2014

- Development of standards and criteria and reporting procedures in the implementation of construction plans;
- Coordination, monitoring and reporting on the finalized parts of the construction plans;
- Preparation of periodic and final reports on implementation of the construction plans, and
- All other activities related to assistance and rehabilitation of flooded areas and monitoring the performance of obligations of ministries, special organizations and Government services are related to the activities of assistance and reconstruction of flooded areas.

In the execution of its tasks, the Office cooperates with all state authorities, territorial autonomy and local self-Government, public enterprises, public agencies, institutions and organizations in the field of relief and reconstruction of flooded areas.

### **Good Governance, Transparency and Accountability Mechanisms**

The Government of Serbia is committed to maintaining the mechanisms that it has implemented in its efforts to establish good governance. These mechanisms are intended to ensure that public authority is exercised accountably and transparently and will be intrinsic in ensuring that reconstruction assistance is delivered to its intended recipients. This commitment is most notably stipulated in the *National Anti-Corruption Strategy in the Republic of Serbia for the period 2013-2018* (Strategy 2013-18) and its corresponding *Action Plan for the Implementation of the National Anti-Corruption Strategy in the Republic of Serbia in the Period 2013-2018* (Action Plan 2013-2018).

Strategy and Action Plan 2013-18 aim to ensure that public administration bodies and authorities perform their duties while adhering to the following principles:

- Rule of Law— guarantee of the legislation of proceedings, equality before law and rights of access to legal aids for all citizens. The Constitution of the Republic of Serbia, laws, and bylaws, as well as acknowledged international contracts and widely accepted rules of international law, must be enforced consistently and in full;
- “zero tolerance” to corruption – non-selective law enforcement for all forms of corruption;
- responsibility – obligation to take full responsibility for the creation of public policies and their efficient implementation, including the enforcement of this strategy and action plan;
- universality of measures and cooperation of entities – duty to enforce measures universally and consistently in all areas, with the cooperation and exchange of experience, and harmonization of proceedings of relevant entities, through all levels of authority, with good practice principles in place;
- efficiency – duty to, within its mandate and authority, uphold anti-corruption measures on a regular basis, and hold training in the goal of improving efficiency in the fight against corruption;
- Transparency – guarantee of transparency of the procedure for adopting and implementing decisions, as well as ensuring that citizens have full access to information, in accordance with the Law.<sup>36</sup>

<sup>36</sup> [http://www.anticorruption-serbia.org/component/docman/doc\\_download/66-national-anti-corruption-strategy-2013-2018-english](http://www.anticorruption-serbia.org/component/docman/doc_download/66-national-anti-corruption-strategy-2013-2018-english)

The existing mechanisms ensuring transparency and accountability in Serbia include legal safeguards which ensure that funds are utilized effectively and efficiently. Apart from the procedural safeguards in the existing legislation, Serbian institutional system has created numerous independent oversight bodies. For instance, the Anti-Corruption Agency is an autonomous and independent body whose mandate includes, inter alia, keeping a register of officials and their property and income and conflict of interest of elected officials, which is an important legal safeguard for ensuring transparency and accountability at the local level.<sup>37</sup>

The Office of the Protector of Citizens of the Republic of Serbia (Ombudsman) is an independent and autonomous public authority whose mandate is to protect the rights of citizens and to control the work of Government agencies. A further governance mechanism is the Commissioner for Information of Public Importance and Personal Data Protection, which facilitates the public's access to information of public importance held by public authority bodies institutionalizing accountability and transparency.<sup>38</sup> The Public Procurement Office (PPO) is an independent Governmental agency which works to ensure that public funds are spent in an efficient and transparent way in the procurement of goods, works and services. It fulfills its mandate by assisting the establishment of sound procurement procedures and practices. The Commission for the Protection of Rights in the Public Procurement Procedures is an autonomous and independent body that works to ensure the protection of bidders' rights and public interest in public procurement.

The State Audit Institution (SAI) is an autonomous and independent body and is the highest authority for auditing public funds in the Republic of Serbia. The purview of the SAI is wide and includes direct and indirect beneficiaries of budget funds. The effectiveness of its control increased greatly since its creation.

The Republic of Serbia shall therefore rely on these existing institutional capacities and safeguards. At present, a new special law, on alleviating the consequences of the floods is being drafted, with a view to formulating expedient procedures for reconstruction and recovery of flooded areas. Apart from instituting the National Program for Assistance and Reconstruction of Flooded Areas, this law will also stipulate the competences of the Office in more detail. Its promulgation is expected by mid-July 2014.

### **Estimation of the Value of Damages and Losses**

It should be noted that determination of damages and losses is an assessment, for the assessment depends on a series of information extrapolated over the focus area and subsequently applied to a reconstruction strategy. The damages and losses estimate is further used to determine budget allocation.

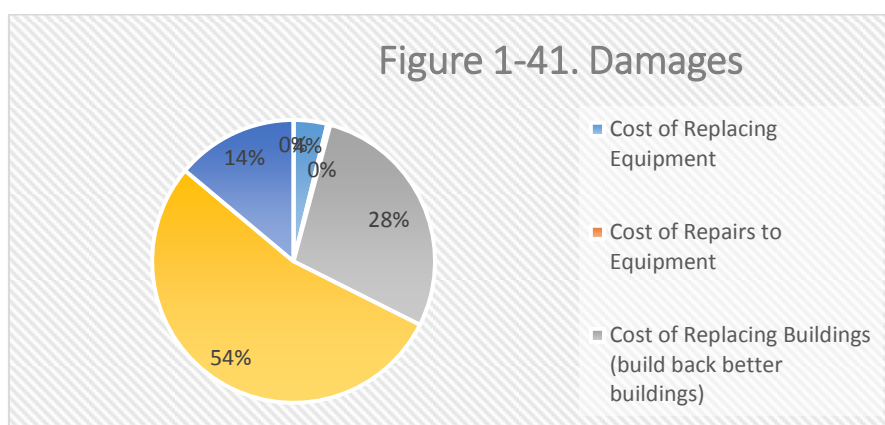
### **Process of Assessment**

The Governance Sector Assessment team benefitted from good collaboration with local and national authorities, especially in the area of data collection. The 24 municipal Governments in focus as municipalities seriously affected by the floods, collected methodized data

<sup>37</sup> [http://www.anticorruption-serbia.org/component/docman/doc\\_download/13-anti-corruption-agency-act-english](http://www.anticorruption-serbia.org/component/docman/doc_download/13-anti-corruption-agency-act-english)

<sup>38</sup> [http://www.poverenik.rs/images/stories/dokumentacija-nova/izvestajiPoverenika/2013/gizvestaj2013\\_en.docx](http://www.poverenik.rs/images/stories/dokumentacija-nova/izvestajiPoverenika/2013/gizvestaj2013_en.docx)

describing the disaster's impact on municipal capacity, buildings, and equipment. The local Governments completed a survey created and distributed by the Governance Sector Assessment Team, which divided the assessment into the damages to central and local Government buildings, equipment, and Government records. They do not include data on relief and recovery efforts during the floods, as that falls beyond the scope of the assessment. The section determining the impact on municipal buildings subdivided the buildings into their respective functions: public administration, judiciary, legislative authority, police/fire departments, and public utilities. Upon receiving the surveys from the municipal Governments, the Governance Sector Assessment team calculated the total number of buildings affected, as well as determined a monetary estimate in RSD for the damages to these buildings, their equipment and furnishings, and their records.



### Result of the Estimates

The data shows that public administration buildings incurred the most damage. Furthermore, a large majority of the buildings suffered partial damages rather than total destruction. Of the 24 municipalities, Obrenovac suffered the most damages to Government buildings. The municipalities of Kragujevac, Varvarin, Šid, Velika Plana, and Kraljevo reported no damages to Government buildings, equipment and furnishings, and records.

### Damages

According to the data received from the 24 municipalities, approximately 230 public buildings stood fully functional before the floods. Of those 230 buildings, a total of 88 buildings were affected by the floods, with 84 partially damaged and four totally destroyed. The four destroyed buildings were located in the municipalities of Obrenovac and Ub.

Taking into account the cost of materials, labour, and construction permits the estimated cost of repairs to existing buildings was estimated as 481.1 million RSD. For the four totally destroyed buildings located in Obrenovac and Ub, the eventual cost of replacing the buildings, and ultimate construction of better structures, is 252.9 million RSD. In addition to the damages to the physical structures of the municipal buildings, the floods damaged and/or destroyed municipal equipment and, in some instances, Government records. The cost of repair for equipment was estimated as 3.2 million RSD. The cost of replacing equipment is 34.4 million RSD. These costs reflect the damages to equipment and furnishings including, but not limited to vehicles, office furniture, computers, and the cost to provide additional staff.

Some municipalities sustained damages to their Government records such as Government archives. A number of these records are irretrievable, but many are salvageable. The cost of restoring and re-establishing lost registries was estimated as 63.9 million RSD.

## Losses

It was outside the scope of this data collection methodology process to determine the direct and indirect losses incurred as a result of the floods. However, it can be expected that municipalities experienced a certain amount of monetary losses due to lower productivity and limited ability of the Government to provide services as a result of the floods.

### 2.2.3.3 Gender

#### Overview

The 2009 Law on Gender Equality outlaws discrimination on the basis of gender in public and private life. Strategies on gender equality and the advancement of women's position, on combating violence against women, as well as on advancing the women, peace and security agenda, have been adopted in previous years. These legislative and policy achievements have been somewhat undermined by abolition of the Gender Equality Directorate within the Ministry of Labour, Employment, Social and Veteran Affairs in May 2014. A new national gender equality mechanism has yet to be defined.

Women account for 34 % of National Assembly members as the result of a quota introduced in the 2011 Electoral law<sup>39</sup>, however less than 25% of ministers are women.<sup>40</sup> Of 169 mayors and heads of municipalities only nine are women, none of them from the flood-affected municipalities. Legislated gender mechanisms and focal points in several municipalities are not working. The National Action Plan project has invested in gender and gender budget training at all levels of Government; in spite of this a scan of budgets from half the affected areas shows no sign of gender awareness.<sup>41</sup>

In the past, Serbian women entered education and the labour force in large numbers, and enjoyed considerable social protection in employment. However, years of conflict and transition have eroded women's rights in relation to participation, work and social protection. Traditional patriarchal attitudes are gaining ground and in rural areas, where it is increasingly difficult to promote women's leadership or participation. Roma women are especially disadvantaged, as are women refugees from other parts of the former Yugoslavia. They face difficulties in accessing employment and education, as well as healthcare and adequate housing.

## Effects of the Floods

### Roles and participation of women and men

Women were unrepresented in emergency response planning and decision-making. Many women's organizations responded immediately with assistance to affected areas, but public perception and media representation was that first responders were male. Women described

<sup>39</sup> Republic of Serbia Parliament, <http://www.parlament.gov.rs/narodna-skupstina/-narodna-skupstina-u-brojkama/polna-struktura.1739.html>

<sup>40</sup> Republic of Serbia Government, <http://www.srbija.gov.rs/vlada/sastav.php>

<sup>41</sup> Pre-flood budgets of affected municipalities made available to the Flood Affected Areas Assistance and Rehabilitation Office, June 2014.



an initial response almost entirely by “men in uniforms”, often with no attention to social considerations. For example, misunderstanding of the instruction to prioritize rescue of children apparently resulted in men forcibly separating infants from their mothers. Stereotypes of women as victims rather than as actors and service providers, was reinforced by Government calls for “one thousand strong men” to come forward as volunteers.

The most critical result of women’s exclusion from emergency response planning and decision-making has been the lack of information reaching affected women: “There is an information vacuum.” Women describe being totally dependent on men for any information about what is happening. This is especially the case for Roma women, and for women isolated by caring for children. They noted that men get out and about, go to Government offices, visit with each other and gain reassurance by interacting and gathering information. Women’s lack of participation has also meant that their needs have sometimes not been understood or met.

Contrary to media depictions, most CSOs interviewed described the initial response as chaotic. Informants described a complete lack of preparedness for the disaster, from household level to the ad hoc and confused official response and rescue. In the immediate aftermath, greatest concerns were for missing family members and those who had been split up during evacuation. Most women’s first priority was children’s needs and baby food, and after that hygiene packs. Single mothers with small children needed the most assistance. CSOs working in collective centres repeated that a main concern voiced by women was that not enough food was being distributed.

The general reluctance of Serbian men to be seen receiving aid however, compared to Roma families who have been proactively seeking assistance, has sometimes created the impression that Roma families are receiving more help. Resentful comments about the need to assist Roma were reported in communities and heard directly from informants, including Government representatives who describe Roma as “coming in packs to claim things.” There is a widespread belief that the temporary solidarity of people in times of disaster will rapidly be replaced by old patterns of discrimination and conflict. Some respondents anticipate a new wave of discrimination against Roma as they have also tended not to participate in community service and clean-up activities.

### **Employment and livelihoods**

Traditional employment roles of men and women in Serbia mean that disaster-related job losses will affect them differently. It is not yet clear what the effects will be, particularly for those working in the private sector; lack of sex-disaggregated employment data at municipal level makes it difficult to anticipate gendered impacts. All respondents identified the need for cash and income as the most immediate and ongoing priorities, particularly given mistrust of foodstuff grown in flood-affected areas.

Women in lower levels of production industries, sales and service, have definitely lost jobs at least temporarily, even though lack of data makes difficult assessing the exact magnitude of the loss. In agricultural areas, women reportedly are the majority of employees in cold stores and food processing operations which have lost almost the entire season’s harvest. In Krupanj alone, one thousand seasonal workers, mostly female, have already lost their jobs.

Women involved in business development advise that female entrepreneurs generally tenant over one third of the ground floor shops in town centres, so can be assumed affected and not currently working. Paracin informants said that two thirds of the city's small businesses, largely owned by women, have been severely damaged. Lacking collateral for commercial loans and often already indebted to family, it is unlikely they will be able to take loans to rebuild and replace losses. Women's small shops are also a main employer of women, whose earnings will have stopped at the end of May. Rebuilding has not started yet.

### **Impact on Women's Workloads**

All respondents spoke about the increase in women's unpaid work as a result of the floods. In all locations, while men contributed most to the initial removal of heavy debris, women are carrying out the bulk of ongoing cleanup work, at both their workplaces and their homes. Women's care burden has also increased dramatically with the loss of social services and day centres, including kindergartens, centres for disabled and elderly, with the result that dependents must now be cared for by them at home. In answer to questions from the assessment team, all respondents felt that the unpaid labour of women whose homes were flooded has increased markedly in comparison to unpaid work undertaken by men.

### **Housing, Land and Property**

The crisis was most severe for those who have lost their homes. Female -headed households, previously displaced and Roma families living in insecure areas were reported as having previously tried to relocate to safer places, but lacked financial resources to do so. Widows in particular tend to be less well off in rural communities, and consequently worse off during and after disaster. Women's dependent care responsibilities make them less mobile than men and less able to migrate outside the impacted area to earn income.

A major obstacle to housing reconstruction will be the absence of documentation for informal Roma settlements, and the inability of these families to provide documentation for their lost homes. Lacking identification, Roma families are completely invisible and cannot access help. Single Roma women with children are said to be in the worst situation.

### **Education, Health, Social Services**

Health and CSO volunteers say the floods will have an impact on family violence and women's health overall. They see a range of increased threats, including to women's reproductive health and their ability to access and use services. The lack of a centralized national and PHC level health database was raised as a constraint to effective service delivery. The two emergency field hospitals were not felt to have provided much benefit, and people felt resources would be better spent on properly equipping health centres and mobile health teams to reach rural women.

Krupanj, Mali Zvornik, Šid and Varvarin have the highest proportions of disabled people among affected municipalities, at ten to twelve % of the population. Women's disability organization *Out of the Circle* reported that people with physical disabilities were evacuated without their equipment or medical documentation or prescriptions, leaving them both helpless and also unable to get new medical equipment. No one is meeting the need for adult diapers. People cannot go to the doctors because they lost their prescriptions in the floods; medical documents are critical for disabled people to achieve their rights. There is no information yet on how to begin the process of replacing documents and equipment.

Lack of awareness and sensitivity of Government toward people with disabilities is a repeatedly cited concern; women with disabilities feel completely forgotten. Closure of care facilities is affecting the ability of parents of disabled children to go to work. Awareness as well as practical supports and financial help are needed.

Only those women who have been providing individual peer support to displaced women have heard disclosures of violence and sexual violence. At an institutional level, women are not reporting violence; respondents believe this is because there is little expectation of a helpful response, and there is little support available for those who do report it. Women's safe houses offered accommodation to flood-displaced women with children, but had only ten available beds. Opening safe houses to others was also raised as a concern, as it exposed prior residents to additional risk.

### Collective Centres

Women in the collective centres – almost all of them mothers – are seen to have taken on community care responsibilities, coordinating cleaning, cooking, use of water and latrines, and security, in addition to looking after their own children and household needs. Many indicated that they are also trying to generate cash income by working in the informal sector with petty sales or taking in laundry.

The situation of Roma families varies from shelter to shelter. There have been incidents of discrimination and times when aid was not equitably distributed. Women with families or other options for accommodation soon left the collective centres, however Roma women have had nowhere else to go; most do not have housing or family in Belgrade. Women with disabilities are worst off, as the shelters are not equipped to meet their needs.

Responders contend that poor conditions in the shelters will contribute to increased domestic violence. Alcohol use is a problem, and informants felt that men's feelings of helplessness and apathy will soon lead to violence. Women see a precedent in the levels of violence during the war, when women's workloads were again much heavier, and men feeling frustrated and powerless. While no one has clear information about the level of violence in collective centres, all respondents are certain that violence will increase when people return to their homes and realize the obstacles still to be faced.

### Estimation of the Damages and Loss Values

The absence of sex-disaggregated disaster impact information across all sectors makes it impossible to reliably apportion damages and losses by sex. Attributing value to women's unpaid time and labour recognizes that women's time poverty is exacerbated following disasters, decreasing their actual and potential economic activity. Compensating this lost time is one measure to limit the proportion of post-disaster poverty increase experienced by women, estimated costs are shown in Table 1-37, below.

Table 1-37. Estimation of costs of women's unpaid labour in floods recovery (million RSD) (1 EUR = 115.66 RSD)

Item	Value of Loss	Cost
Unpaid labour compensation for women: 115 (min wage) x 2 hrs x 44 days x 17,080 damaged/destroyed homes	172.8	172.8
Childcare costs during preschool closure: 5093* children x 32 day (14 May - 26 June) x 450/day	73.3	36.5

## PART 2 - IMPACTS OF THE DISASTER

### 1 INTRODUCTION

The impact of the disaster represents the consequences of the event on the national economy and on human development of its inhabitants. Analyses were carried out on the consequences of damages and losses on the production of goods and services, by estimating disaster impact on gross domestic product (GDP) and growth, on the fiscal position and on the external sector. Furthermore, estimations were conducted to ascertain the possible impact on livelihoods, employment and personal or household income decline, which led to the analysis of possible decline in overall human development of the population.

### 2 MACROECONOMIC IMPACT

The floods are estimated to have caused effects that are equivalent to 2.7 % of GDP in damages and to 2 % of GDP in losses in 2014. The hardest hit economic sectors were energy, mining, and agriculture but significant damages were also inflicted on transport infrastructure (roads, bridges and railways).

Real GDP growth in 2014 is estimated to be lower by about 1 % age point due to the floods. As a result, the Serbian economy is projected to contract by 0.5 % in 2014 from a pre-floods baseline estimate of a positive growth of 0.5 %. The floods are likely to push an already weak economy into a recession in 2014. If this projection were to be realized, it would be the third time that the Serbian economy would be in recession since 2008.

The floods are also expected to put further strains on public finances: the fiscal deficit is estimated to be higher by 1.0 % of GDP. Trade deficit and the current account deficit (CAD) are expected to worsen as well. CAD is expected to widen by about 1 % of GDP, increasing from a pre-floods baseline projection of 4.0 % to 5.1 % of GDP in 2014.

Although the economic activity will slow down and deficit would further increase as a result of the floods, availability of grant resources for reconstruction could help to accelerate economic recovery and mitigate the negative floods effects on public finance.

#### 2.1 Pre-disaster economic context

The Serbian economy grew by 2.5 % in 2013, led by a strong growth of the automotive industry (net exports) and agriculture output. Net exports contributed 5.1 % age points to the overall growth of the economy, while other components of GDP decreased. The significant growth of exports led to a reduction of external imbalances – current account deficit (CAD) reached 5 % of GDP, thus reducing the pressure on the exchange rate, as well.

The exchange rate was broadly stable through much of 2013, even without significant interventions by the National Bank of Serbia (NBS). Inflation continued on a downward path throughout 2013, reaching 2.2 % at the end of the year. Aided in part by the positive economic growth, unemployment declined from a record high level of 25.5 % in April 2012 to 20.1 % in October 2013.

The consolidated general Government fiscal deficit stood at 5.0 % of GDP<sup>42</sup> in 2013. The Government managed to reduce the fiscal deficit below the level envisaged by the supplementary budget (5.5 % of GDP) largely through strengthened control over expenditures. Even though fiscal deficit was lower in 2013 compared to 2012, it remained relatively high and was not sufficient to reverse the trend of increasing public debt. At the end of the year, the stock of general Government public debt, including guarantees, stood at 65.5 % of GDP.

The first quarter of 2014 witnessed a weak economic growth compared to the same quarter last year. Preliminary estimates indicate that GDP grew by mere 0.1 % in Q1 of 2014. The severe floods further slowed the economy. Since May 2014, there is evidence to suggest that the principal macroeconomic indicators have deteriorated due to the impact of the severe floods.

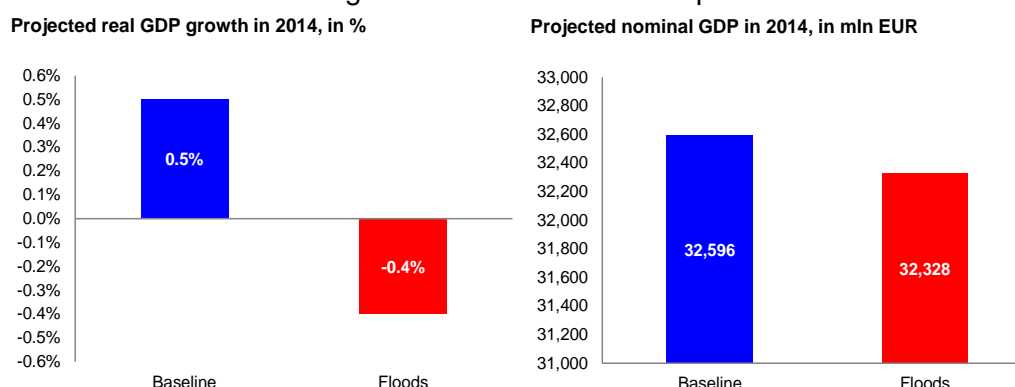
## 2.2 Disaster impact on gross domestic product (GDP)

The recent floods will push the Serbian economy into a recession. The incremental impact of the floods on economic growth is estimated at -0.9 % age points, i.e. the Serbian economy will contract by 0.4 % in 2014, rather than growing by 0.5 % as previously projected. The growth impact estimates of the floods are principally based on a production-side national accounts growth model whereby the detailed sectorial Damages and Loss Assessment (DaLA) are considered in terms of their overall impact on the economy.

The Damages and Loss Assessment (DaLA) estimates show that agriculture, electricity supply and mining have been the hardest hit by the floods; and significant damages have been inflicted on transport infrastructure including roads, bridges and railways. On the other hand, the reconstruction efforts are expected to partially offset the negative effect on economic activity through a faster growth of the construction sector. The GDP growth impact (See Figure 2-1) estimation is based on the estimated production losses at sector level, duly weighted by the sector's respective share in GDP. In nominal terms, GDP in 2014 is estimated to be lower by about EUR 268 million (Figure 2-2).

<sup>42</sup> Excluding "below the line" transactions.

Figures 2-1 and 2-2. GDP impact



Source: DaLA, MoF, NBS calculations

On the expenditure side, while there are clear data limitations, the floods are expected to hit hardest net exports, principally through a decline in electricity exports and exports of some agricultural products (primarily fruits and vegetables) and, on the import side, through an increase in imports of energy and construction materials (see the BoP section below for further details). On the other hand, damages repair and reconstruction will probably lead to a higher investment growth than previously projected although it is difficult to provide an estimate. However, if reconstruction and investment were to proceed at a faster pace with higher support from donors, the decline in GDP could be smaller.

The floods are expected to have no significant impact on inflation. Although the floods have partially disrupted agriculture and food production as well as energy supply, the expected impact on CPI (Consumer Price Index) is negligible given the current low inflation and the expectation that supply shortfalls could be met through imports. While possible energy-related price adjustments in the third or fourth quarters of 2014 could in the future impact the CPI, neither the level of adjustment nor the timeline for such price adjustments is precisely known at the moment, any impact is likely to occur in 2015. Unlike in previous cases when natural-disaster occurred (most recent one being a drought in 2012), this time it is not expected to have a soar in food prices (compared to the baseline), because unlike in 2010 and 2012, global food prices are currently at the very low level and Serbia is now almost completely open to the EU imports.

### Sectoral impacts

The floods have inflicted significant damages in some key sectors, especially in mining, electricity supply and agriculture. The share of mining and electricity sector in Serbia's economy is 1.7 and 3.5 % of GDP, respectively. Power generation and mining have been significantly disrupted; and the damages to the state-owned power company EPS have been particularly severe and costly. The total damages and losses in energy and mining contribute to 60 % of the total decline in GDP in 2014. The impact of floods on these sectors could extend to 2015 in light of uncertainty about the timeline for the complete recovery of the mining and energy production.



Agriculture, which accounts for 9.5 % of GDP, has also been significantly affected. Around 80,000 acres of arable land were flooded, affecting mainly fruit, vegetable and livestock production. Agricultural production is estimated to decline by 5.9 % in real terms compared to previous year, or around 4 % compared to the pre-floods 2014 baseline. As a result, agriculture contributes by 20 % to the overall floods related drop in GDP.

Manufacturing, which accounts for 15 % of GDP, is projected to decline 0.6 % compared to the baseline, thus contributing 11 % to the overall decline in GDP.

Transport infrastructure (roads, bridges and railways in particular) has also been damaged significantly. The total damages and losses have caused major problems for the movement of goods and people and affected businesses across the country, thus contributing to the decline in GDP. This sector is projected to decline 0.9 % compared to pre-floods projections (in real terms), thus contributing 6.3 % to the total decline of GDP.

On the other hand, reconstruction efforts are expected to modestly offset the decline in the economy by contributing to higher growth in the construction sector in the second half 2014. Construction sector, which accounts for 3 % of GDP, is expected to grow by 2.7 % compared to the baseline.

## 2.3 Disaster impact on fiscal position

The Republic of Serbia has faced significant fiscal challenges even before the floods and significant fiscal adjustment was necessary. The general Government fiscal deficit and debt, as a share of GDP, were among the highest in the region in 2013. The Government has recognized the need to reverse these trends through further fiscal adjustments, and to that effect has prepared additional fiscal consolidation measures to stabilize and eventually reduce public debt. The original plan was to implement the fiscal measures together with the supplementary budget at mid-2014. However, the catastrophic floods that have significantly affected lives and the macro-fiscal position of the country have delayed the necessary reforms. The Government stays fully committed to adopting the fiscal consolidation package and reforming key systemic laws in the fall this year.

Because of the floods, the general Government deficit is projected to increase by an additional 1.0 % of GDP. Based on the preliminary floods-impact estimates and the expected dynamics for economic recovery in the floods affected areas, it is estimated that the fiscal deficit could be higher by almost 38 billion dinars, or 1 % of GDP, relative to pre-floods baseline scenario. The increase in the fiscal deficit is both the result of expected lower revenues of RSD 15 billion and higher expenditures by additional RSD 23 billion relative to the pre-crisis baseline. The revenue loss is based on an estimated elasticity of revenues with respect to changes in economic activity (or GDP). The contraction in GDP by 1 % age point results in a revenue shortfall of about 0.4 % of GDP, or 15 billion dinars.

A more detailed revenue breakdown and analysis suggests that the biggest drop, out of the total RSD 15 billion, is expected to come from tax revenues, both direct and indirect taxes. The most impacted revenue categories will be VAT and taxes on income (personal income

tax and social contributions). VAT is estimated to be lower around RSD 4 billion and personal income tax and social contributions by about RSD 5 billion. As houses and other immovable properties sustained significant damages, such damages are expected to translate into lower income on property taxes—of about RSD 2 billion. Nontax revenues, such as administrative fees and sales of goods and services, are also estimated to be lower by around RSD 4 billion.

Budget expenditures are estimated to increase by around RSD 23 billion due to the floods. The impact on public expenditures is projected to be lower than the total damages and reconstruction cost due to the fact that extra-budgetary financial sources will also be used, such as the redirection of public companies' own resources, redirection of existing project loans, and possible grants. The breakdown of the additional public expenditure is as follows:

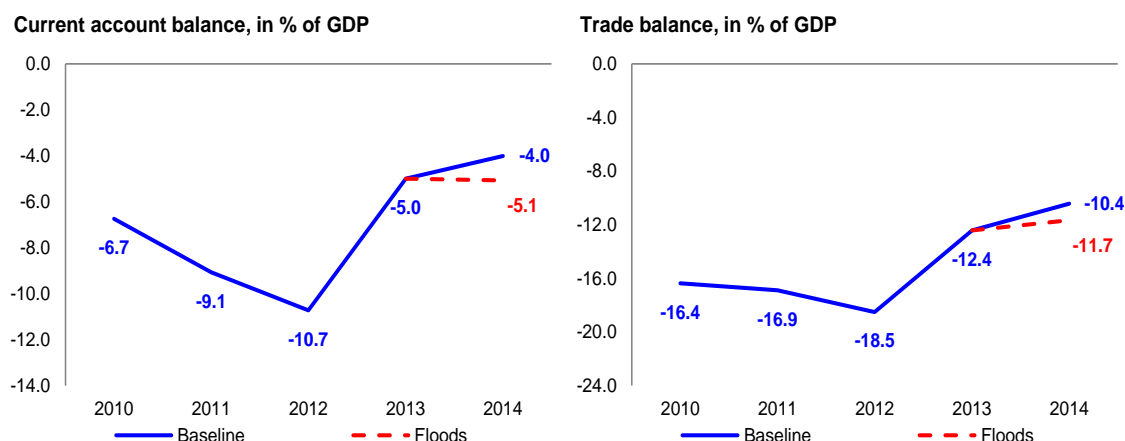
- Around RSD 9 billion is expected to be provided in subsidies to the EPS for restarting the production and partially covering additional power imports. While the estimated costs to EPS are much higher, the additional costs are expected to be covered from other sources.
- Putevi Srbije, the state company responsible for road maintenance, will similarly be subsidized in the amount of about RSD 6 billion for urgent repair of road network. Works on rehabilitation of roads will be also financed from other sources, like change of use of already arranged loans.
- In agriculture, about RSD 1 billion will be given to agricultural producers to help them recover their production as quickly as possible; about RSD 3.5 billion for immediate repair and construction of river levees and other waterworks damaged and destroyed by the floods; and about RSD 3.5 billion for building and repairing of dwellings.

It is important to underscore that the additional public expenditure will primarily be used for urgent reconstruction needs targeted to allow for a quick economic recovery (especially in agriculture, mining and electricity production) as well as regaining of decent living conditions for those who were most severely affected by the floods.

## 2.4 Disaster impact on balance of payments

The floods are projected to have a negative impact on the current account balance in 2014. The current account deficit is projected to deteriorate in 2014 by 1.1 % age points due to the floods and thereby increase from a pre-floods projection of 4.0 % of GDP to 5.1 % of GDP (See Figure 2-3). The trade balance-to-GDP ratio is expected to deteriorate by 1.2 % age points (compared to the baseline), which will, to a small extent, be offset by an increase in current transfers of 0.1 % age point this year (mainly official grants, while remittances are assumed to remain at the same level).

Figures 2-3 and 2-4. Impact on CAD and trade balance, as % of GDP



## 2.5 Risks to the near-term outlook

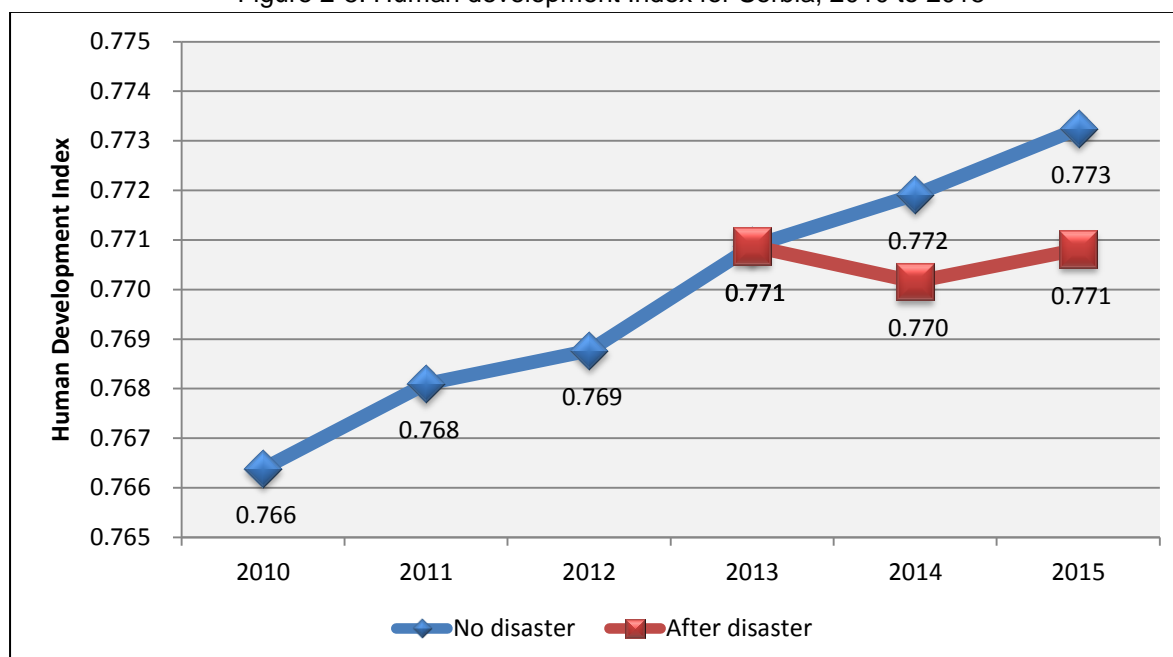
Given the data limitations, there are clearly significant uncertainties around impact estimates in this report. In addition, there are significant downside risks. First, the economy might slow down further if the reconstruction efforts are not accelerated and completed fully during this construction season. Second, the energy sector might cause much more severe impact on the rest of the economy if the two most damaged mining fields are not dewatered and fully functional before the next heating season. Possible power outages could lead to a significant drop in the industrial output and the GDP in 2014 thereafter. A rough estimate shows that in case of power outages of 6 hours a day in the last quarter of 2014, GDP could contract by additional 1.6 % age points on an annual basis (extending to 2015). Finally, the inflation might be slightly higher than what was assumed because of the impact on food prices and prices of construction materials and energy.

## 3 Human development impact

An analysis of the possible human development impact was made taking into consideration the changes caused by the disaster on personal income and on their access to health and education services. Use was made of the estimated decline in GDP growth – as described in the preceding section of this report – as well as the losses in the sectors of health and education to estimate the value of the post-disaster human development index (HDI) for the country.

The analysis shows that HDI will decline from a pre-disaster value of 0.771 as estimated for 2013 to an estimated value of 0.770 in 2014, in comparison to the forecasted value of 0.772 that was expected before the disaster (See Figure 2-5). This negative impact will remain and even increase slightly in the next few years, and the Government will be hard pushed into putting into effect special measures to recover to its pre-disaster trend in human development.

Figure 2-5. Human development Index for Serbia, 2010 to 2015



It is to be noted that disaster impact can be quite different for different groups of population. For instance, vulnerable households and individuals (such as Roma, internally displaced persons and persons with disabilities) were already at a higher risk of being poor and even though these households are covered by the social protection system in general, social assistance in particular, in line with existing assessments, appears to have relatively low coverage.

Group	Absolute poverty rate before disaster <sup>43</sup>	Average share of income from social protection
Total	8,6	9.2
Urban population	6,3	7.1
Rural population	12,0	11.3

At municipal level, HDI would decline ranging between -7,8% (in Lazarevac) and -8.0% (in Sid). It was not possible to develop time series estimates for municipal-level HDI as time series of background data are not dense enough. Constructed 'peak-to-bottom' HDI impact table should be treated as a maximum impact. In the longer term, HDI for affected municipalities should behave similarly to HDI for whole Serbia.

<sup>43</sup> Source: Statistical Office of the Republic of Serbia 2014. RSD monthly per consumer unit for 2013 was 11.020 RSD.

## 4 IMPACT ON LIVELIHOODS, EMPLOYMENT AND PERSONAL INCOME

The 2014 Floods in Serbia dealt a blow to an already fragile socio-economic context. Geographically, Serbia's economy is characterized by a significant Belgrade-province divide where the capital city operates as a magnet for economic opportunities and employment as opposed to regions (Vojvodina being an exception) suffering from scarce investments and job creation.

In the affected local economic, the sources of income originate from agriculture, small trade and social welfare to a large extent for the lower-income categories of the population. This is resulting in the largest share of the population relying on an instable income, just about covering important household needs and with a very limited capacity to make savings.

Small and medium sized enterprises and entrepreneurship account for around two thirds of the employees and realized turnover, and for more than half of GDP and exports. This indicates the significance of small and medium enterprises in strengthening of local economy. In 2012, of the total number of enterprises (317,668), entrepreneurial sector accounts for 99.8% (317,162 enterprises). SME sector generates 65.1% of employees (782,026), 65.4% of turnover (5,690 billion dinars) and accounts for 45.3% of the total employment. The labor force is characterized by an growing ratio of informal labor force and entrepreneurs amounting at 20.6% of the total active population.

The region of Šumadija and Western Serbia, most affected by the floods, has activity rate (62.6%) and employment rate (48.9%) slightly higher than the average, whereas the unemployment rate was marginally above the national average (21.9) in the first quarter of 2014.

Table 2-1. Employment, Unemployment and Informal employment rates

LFS 2013	April 2012	October 2012	April 2013	October 2013
<b>Unemployment rate</b>	25.5	22.4	24.1	20.1
<b>Employment rate</b>	34.3	36.7	36.3	39.1
<b>Informal employment rate</b>	17.0	17.9	18.2	20.3

### 4.1 Assessment of Disaster Effects

The heavy and intensive rains that flooded territories in the Central and Western regions of the country resulted in 38 municipalities temporarily placed under state of emergency<sup>44</sup>. As a result, this disaster has certainly disrupted most, if not all aspects of daily life, including the lives of citizens, their basic social and related needs, the local economic activities, functioning of public services, transportation, the production of energy, just to name a few.

<sup>44</sup> A list of 24 flood affected municipalities has been submitted by the Republic of Serbia for review to the Recovery Needs Assessment.

In the 24 flooded municipalities, approximately 1.3 million people were affected (including 668,870 women) to various extents. Some 15,680 Roma have been identified among this population. Overall, urban and rural areas seem to have been equally affected in terms of population, with 50.3% living in urban context and 49.4% in rural contexts. Among other groups of concern there is a significant category of female-headed households that makes 8.95% of the overall concerned population, i.e. 116,038 households.

Direct consultations with local actors and communities have helped provide an understanding on how the floods are shifting the livelihood outcomes of the affected populations in the short and mid-term. Livelihood strategies in the immediate post-disaster concentrated on coping with direct consequences of the floods and were characterized by a sudden halt of economic activities and income, subsistence-driven strategy involving reconstruction of livelihoods and an expected difficult but progressive resumption of income-generating activities.

In the immediate aftermath of the floods, affected community's priorities have moved from regular activity to mainly focus on the – depending on the severity of the situation – salvation, cleaning, sanitization or restoration of private and productive assets simultaneously as dealing with the several pressing needs and priorities of families and local communities. This involves providing accommodation (whether that involves temporary or durable relocation, property sanitation, etc.), accessing to essential services (water, energy, transportation, etc.). Obviously, the main challenge ahead consists of getting the local economy restarted and the longer this process takes the longer and costlier will the recovery be.

## 4.2 Effects on Infrastructure and Physical Assets

Most municipalities have suffered from limited damages or destruction of private accommodation (in the range of dozens per municipality) and of an important number of privately-owned small business workshops and shops (Obrenovac being the most severely hit in this respect). Several privately as well as publicly-owned small to medium production facilities have been flooded, and while buildings are expected to be excluded from demolition, most of the equipment and stocks are lost. In the field of agriculture, the damages differs from flat, lowland areas (mostly Central Serbia) to slope-land areas (mostly Western Serbia). Flooded lowlands have seen a majority of greenhouses destroyed (to the extent of 70% <sup>45</sup>), and some productive assets partially to fully damaged. Slope-land areas are typically subject to landslides of cultivated surfaces, significant destruction of several segments of provincial roads, which are of primary importance for economic activity in this region.

In social terms, the effects are entailing an increase in the number of vulnerable families and the number of registered social cases, for those made homeless, jobless and inactive

<sup>45</sup> Based on observation and information collected in the field.



because of housing loss, productive assets destruction, or whose activity is affected by damaged infrastructure (e.g.: truck transportation on provincial roads).

In livelihood terms, the loss of productive physical assets for small and medium business owners as well as farmers and their respective employees means this category will not be generating income until they have the funds to rehabilitate their productive facilities and resume activities. In employment terms, a chain effect has already started in which employers can no longer pay their employees and suppliers' jobs will be at risk as a consequence of the same employers made insolvent. Key informant interview with representatives of the small and micro enterprises revealed that though the companies paid salary for the month of May 2014, payment of salaries for the next month onwards will be very difficult unless the company owners are provided with temporary assistance to address this crisis phase.

### 4.3 Estimation of Income Losses

It is estimated that the floods affected directly and indirectly over 1.3 million people and livelihoods in the 24 municipalities under consideration. The assessment focused on the estimation of Income losses in industry, trade, services, agriculture, culture and informal economy as well as some non-remunerated, home-based work.

Table 2-2 Estimation of Income Losses due to Disaster (1 EUR = 115.66 RSD)

Income Losses per Sectors	Million RSD
Agriculture (already covered under agriculture sector)	10,475.8
Industry, Trade and Services	4,669.8
Culture	65.6
Informal Sector	623.6
Losses under LEER not covered by other sectors	5,359.0
<b>Total income losses across sectors</b>	<b>15,834.8</b>

#### 4.3.1 Loss of income in Agriculture

The biggest portion on income losses is indeed related to the loss of land, crops, machinery and assets that impacted on farmers and these losses are reported in the agriculture sector.

It is important to mention that 32,495 farmers, of which the big majority 26,286 are small land owners (up to 2 ha), may find themselves in a critical situation because they lost the crops, assets, and the land may have to be reclaimed. As a consequence it is very likely that they will be in need of temporary support to cope with lack of income due to crops destruction.

Another aspect that has to be taken into consideration is the lost income for those seasonal workers whom will not have the opportunity to earn their livelihoods because of the crops destruction and overall impact on the agriculture calendar after the floods. The number of affected seasonal workers should not be very relevant, nevertheless in municipalities where

the affected farmers are over 30% (Loznica, Šabac, Smederevska Palanka, Obrenovac and Ub) the impact have to be considered. A portion of those seasonal workers may probably refer to National Employment Service (NES).

#### 4.3.2 Immediate employment loss of entrepreneurs and employees in enterprises active in industry, trade and services

An estimated total of 412,565 work days were lost and not paid to workers (exclusively for self-employed or entrepreneurs) for an estimated total income loss of 535.4 million dinars. During the assessment the team received information that no employee of SME and large enterprises had an immediate interruption of the wage payment. Only some delays were experienced in the salary payments. This short term loss has been reflected in the local economies cash flow and it has caused an immediate reduction in the people's purchasing power. Due to a chain effect also the municipalities will have a reduced income through local taxes and this will further penalize their capacity to provide services especially the most needed. If this stagnancy is not tackled in the course of time, there is a likely risk of increasing dramatically the people in need of special services.

Table 2-3 Estimation of job losses by sector

	<b>Jobs lost - medium term</b>	<b>Jobs lost - immediate</b>	<b>Total per sector</b>
Agriculture		Affected farmers 32,495	32,495
Industry, trade, commerce	8,708	28,630	37,339
Culture		240	240
Informal employment	1,768	12,457	14,225
Losses covered by LEER assessment	<b>10,476</b>	<b>41,327</b>	<b>51,804</b>

#### 4.3.3 Medium-term employment loss of entrepreneurs and employees in enterprises active in industry, trade and services

The assessment indicates that, among entrepreneurs and employees of SMEs and large enterprises, 8,708 jobs were lost for a period that is likely to be longer than a year. The distribution of medium-term losses is not uniform across the different categories. In fact, the impact has been much higher on self-employed entrepreneurs (98% of which with balance sheet) and small enterprises. During field assessment entrepreneurs expressed their concern because they were forced to not renewing fixed-term contract, not because they were not willing to do so, but because they either had less business (even though not directly affected by the floods) or because they lost the business or the financial capacity to renew the contracts. Low insurance coverage is another reason why employers may not have capacity to pay salaries in the course of the next months.

Table 2-4. Medium-term jobs losses

Employer	# of jobs
Entrepreneurs	1,480
Small enterprises	6,236
Medium enterprises	580
Large enterprises	412
<b>Total</b>	<b>8,708</b>

Information collected through field visits indicates that several employers have continued paying their workers and, whilst they do not intend to dismiss them, they may be not be in the position of paying the salaries after few weeks because the business has stopped. Therefore, the risk is that more employees, especially from small enterprises may be left without salaries in a few months. If the population purchasing power is not recovered the risk is that other business, not directly affected by the floods, may drastically reduce their turnover and may be forced to dismiss some workers.

Any support to re-establish, recover these entrepreneurs' and enterprises' activities (through for instance cash grants and soft loans) will provide a benefit to the whole community. Social welfare centers from the visited municipalities signaled the increase of people in need of social assistance for food ratios as well as elderly care due to the reduced availability of resource that may lead, if active labour market measures are not implemented, to an impoverishment of the population and to a reduced quality of life in affected communities.

#### 4.3.4 Culture sector

Job losses were also identified in the Culture sector where some workers have not received salary for their first month for a total amount of 65.6 million dinars. These 214 workers are at high risk of not receiving the salary in the next months as well, but no data can confirm this. It is recommended to verify if they are back on payroll in the course of the next month.

#### 4.3.5 Informal economy

The assessment also considered the informal (or grey) economy, which is indicated by the LFS of October 2013 at 20.3%. By applying the minimum wage of 23,000 dinars/month, the assessment has come up with an impact of 623.6 million dinars for 14,225 workers (the majority of 88% of which were only affected for the first month whereas 1,768 informal jobs may have been lost for up to one year or more. Several informal workers may be forced to refer to NES and social support especially because they cannot even demonstrate they have lost a job. If not adequately supported (ex) informal workers may enter in a vicious cycle of poverty. Informal workers that used to be seasonal harvesting in agriculture sector also have to be considered when willing to halt impoverishment, especially of rural areas.

### 4.3.6 Women non-paid house work

The non-paid work that women undertook due to cleanup destroyed dwellings is to be given due consideration. Considering 17,080 affected houses, it has been estimated that by working and additional 2 hours per day for 2 months (44 days), at least 173 million RSD were lost, considering the 220 RSD minimum wage per hour.

## 5 IMPACT ON POVERTY

Using data from the 2013 SILC and the above estimates of employment losses in agriculture and other sectors, we simulated the effect of the floods on poverty. The effect amounts to an increase of 1.7 % age points in poverty at the national level, equivalent to 125 thousands of people.<sup>46</sup> Across regions, the impact is considerably higher in Šumadija and Western Serbia, where poverty increases by 4.1 % age points, and Southern and Eastern Serbia, where poverty increases by almost 2 % age points.

### 2013 SILC data

2013 SILC data can be disaggregated by region (NUTS II) and degree of urbanization level (See Table 2-5). As it is not possible to match the SILC data with the damages assessment data estimated at the municipal level, the disaggregation by urbanization level has been used to capture more closely the geographic distribution of the poverty impacts.

Table 2-5: Population Distribution According to 2013 SILC

	Degree of Urbanization			Total
	Densely Populated	Intermediate	Thinly Populated	
Belgrade	1,148,547	270,313	242,359	1,661,219
Vojvodina	523,974	795,856	608,601	1,928,431
Šumadija and Western Serbia	555,350	390,393	1,067,656	2,013,399
Southern and Eastern Serbia	352,622	523,238	672,253	1,548,113
<b>Total</b>	<b>2,580,493</b>	<b>1,979,801</b>	<b>2,590,868</b>	<b>7,151,162</b>

Source: RNA team estimates estimation based on 2013 SILC data.

The regions where the municipalities affected lie were divided according to the degree of urbanization.<sup>47</sup> Impacts on agricultural and non-agricultural jobs were simulated separately: for the impact on non-agricultural employment, the densely populated areas (cities) and intermediate urbanization areas (roughly equivalent to towns and suburbs) were used; for

<sup>46</sup> The exact number estimated is 125,098. As discussed below, the poverty impacts have been estimated with an anchored poverty line. For this, the purchasing power of the (relative) poverty line used to estimate poverty in the SILC survey (set at 60 % of the median equalized income of the pre-shock distribution) has been kept constant

<sup>47</sup> For a detailed discussion on the criteria used by EuroStat to classify the degree of urbanization, see the Degree of Urbanization (DEGURBA) methodology, available from the following website [http://epp.eurostat.ec.europa.eu/portal/page/portal/degree\\_urbanisation/methodology](http://epp.eurostat.ec.europa.eu/portal/page/portal/degree_urbanisation/methodology).

the impact on agricultural jobs, the thinly populated areas (equivalent to rural areas) were used.

Since it is not possible to determine which individuals have lost their incomes, a random shock technique was used for the simulation that yields a distribution of possible poverty impacts. More specifically:

- a) To simulate the poverty impact of losses in non-agricultural employment, a sample of people equivalent to the number of jobs lost was randomly picked, and their wage income or self-employment earnings was set to zero. To be part of the sample, the observations must have positive labour earnings, have worked at least one hour in the week before the interview and do not work in the agricultural sector.
- b) To simulate the impact of losses in agricultural employment loss, a household sample equivalent to the number of jobs lost in agriculture affected was randomly picked, and their self-employment earnings were set to zero. To be part of the sample, households must have at least one person with earnings coming from self-employment in the agricultural sector. Considering these households live in rural areas, this will closely capture farmer income.

A new welfare aggregate was estimated then, and compared to the pre-shock poverty line (i.e. 60 % of the equalized pre-shock income distribution, as calculated for the official poverty estimates using SILC). Note that adopting a relative poverty line, rather than an anchored one would have resulted in conflating changes in the shape of the distribution (inequality) with changes in poverty.

Note that the findings refer to individuals who have entered poverty. This poverty might be transitory (i.e. household members might find other jobs elsewhere) but rather than making assumptions on the duration of the job loss, the focus was placed on the increase in poverty as a direct impact of the floods. Not knowing how easily households can smooth their income over the year, this seems a reasonable way of proceeding.

## Results

Summary results by region are presented in Table 2-6 below.

Table 2-6: Simulated Effect on Poverty Due to Floods (Personal Level)

	Serbia	Belgrade	Vojvodina	Šumadija and Western Serbia	Southern and Eastern Serbia
<b>Increase in Poverty</b>					
<b>% age Points</b>	<b>1.7</b>	<b>0.7</b>	<b>0.1</b>	<b>4.1</b>	<b>1.9</b>
<b>Population</b>	125,098	10,955	1,973	83,520	28,651
<b>Baseline</b>	24.6	11.4	26.8	28.4	31.2
<b>Simulation</b>					
<b>Mean</b>	26.4	12.0	26.9	32.5	33.1
<b>Std. Dev.</b>	0.1	0.2	0.1	0.4	0.2

Source: World Bank staff estimation based on 2013 SILC and damages reported data.

## 5.1 Effects on Vulnerable Groups

Overall, a negative effect of the floods is that it has heightened the vulnerability level of a segment of the population that was living not far above poverty levels, but has also socially exposed a part of the population situated right above on the socio-economic scale, now indebted and who has lost its productive capital.

In summary, approximately 192,820 vulnerable people, or 12% of the 1.6 million people affected by floods in Serbia are members of vulnerable groups. 6,032 individuals of Roma origin are affected. Moreover, 12,457 informal workers have been largely affected by the floods. Increased vulnerability is largely based on whether or not individuals and households faced specific challenges before the floods: (a) Access to employment; (c) Lack of access to social “support” networks and (c) Low security of tenure.

The effects on the already vulnerable categories of the population inclusive of the elderly, single-headed family (included single-mother-headed families, People with Disability<sup>48</sup>, marginalized minorities such a Roma, vulnerable IDP and refugees) is two-fold: a direct deepening of vulnerability for those whose accommodation (whether illegally, legally or institutionally accommodated) has been damaged by the floods, possibly worsened by the indirect mid-term impact of reduced resources, and an increase of the social cost for social state services (Center for Social Welfare) to respond to the needs of the poorest.

Characterized with salary-levels below national average, the livelihood situation of the working population in affected areas is at risk of joining the list of those eligible to social assistance as their capitals (physical, financial) have been partly destroyed by the floods and continue to diminish as they deal with the consequences of the floods (reconstruction of assets, debts, salaries).

With scarce financial resources and overstretched service, the social welfare system is in urgent need of funds to cover the pressing needs of the list of social cases enlarged by those who have fallen into destitution as a result of the floods. The crosscutting dimension of gender should be reflected in the recovery response, recognizing the specific additional challenges faced by women, mothers who have lost incomes and who find themselves and their dependents particularly in situation of vulnerability. This situation is reflected in the RNA baseline<sup>49</sup> indicating an imbalance between active men (representing over 60% of the active population) and women (representing fewer than 40%) from the active population affected.<sup>50</sup>

### Conceptual Framework used for the analysis<sup>51</sup>

The social exclusion of the vulnerable groups is present in three interrelated domains: market, spaces and services. These domains present both barriers and opportunities for the inclusion of these groups.

<sup>48</sup> Persons with disabilities (PDWs) represent 8.1% of the overall affected population and constituted by over 60% of women.

<sup>49</sup> 2011 Census of Population, Households and Dwellings in the Republic of Serbia

<sup>50</sup> The active part of the affected population is 32.3%.

<sup>51</sup> Inclusion matters: the foundation for shared prosperity, World Bank, 2013



- **Markets:** The vulnerable groups are facing severe exclusion from society's four major markets: land and housing, labor and credit. For instance, a large share of Roma continues to live in segregated dwellings and precarious living conditions without formal property rights. Around 38% have no access to secure housing and 39% of Roma households lack access to proper sanitation<sup>52</sup>.
- **Services:** Inequalities start early and compound over the life cycle. Large gaps in pre-school enrolment exist, mainly in connection with costs; for instance, the share of Roma without primary and lower secondary education is high and educational segregation persists. Transport services that enhance mobility and connect individuals to opportunities are not always accessible to people with disabilities.
- **Spaces:** Physical spaces have a social, political, and cultural character that solidifies systems and process of exclusion. People with disabilities tend to be excluded from less accessible public space. Roma communities in Serbia are diverse and are undergoing rapid changes. They are caught between traditional values, the constraints of their economic situation. Attempts to cope with poverty and the tensions from changing social norms come with additional risks of social exclusion for the Roma.

Those underlying causes of vulnerability have been reinforced by the floods. The natural disaster has created additional stress factors for the vulnerable groups:

- **Socioeconomic stresses:** people's access to natural capital (farmers) and sources of income (seasonal work) but also the local socio economic structure (loss of jobs, difficulties in transportation, etc.) have been affected by the floods. This increased the socio-economic vulnerability of the bottom 40%.
- **Impacts on Social Relations and Cohesion:** the floods impacted to social cohesion of many communities by creating a higher level of demand on social and relief services. This affected the beneficiaries of traditional social assistance program and made more fragile the social cohesion of some local communities where there was a scarcity of resources or services.
- **Relief, Recovery & Accountability:** vulnerable groups are usually characterized by a low level of access to decision making and information. There is a risk that the most vulnerable groups (Roma, poor workers, the unemployed, and people with disabilities) are not fully involved/consulted in the decision making and the resolution of problems related to the implementation of relief and reconstruction efforts. This, in turn, can create problems of targeting and representation.

## 5.2 Findings by main vulnerable groups

### a) The Roma: 6,032 Roma individuals have been affected by the floods<sup>53</sup>.

According to the 2011 Population Census, 147,607 Roma live in Serbia, representing 2% of the total population. However, unofficial data indicates that their number ranges between 450,000 and 500,000 (6 to 6, 5% of the total population). Data received from the Roma

<sup>52</sup> UNDP/WB/EC regional Roma survey, 2011

<sup>53</sup> Report from Roma National Council, June 2014

National Council shows that 6,032 Roma in 714 households from 22<sup>54</sup> municipalities are affected. Obrenovac is most affected with 2,064 individuals distributed across 296 households. The displaced Roma moved to the Sajam temporary shelter where 250 affected population evacuated.

On average, Roma represent 2.1% of population in floods-affected municipalities of Serbia with 11% living in Kraljevo, 8% in Lazarevac, 7% in Koceljeva, 4.1% in Ub and 2.3% in Obrenovac (the mostly affected municipality with 20% incidents of internal displacement). Thus, Roma population density in Kraljevo is the highest amongst other 23 municipalities. During post-floods and evacuation period no serious incidents of discrimination of Roma were reported, however, there were precedents, that food was distributed firstly among working population, while statistically on average only 40% of Roma male and only 13% of Roma female are employed.

While chronic high unemployment in Serbia affects all social groups, the labor market status of Roma is worse than that of the general population. Around 49% of Roma are unemployed, compared to an unemployment rate of 27% among the mainstream population. Individuals from the Sajam temporary shelter, affected by the flood, reported that most of the citizens working in small enterprises in Obrenovac became unemployed as the employers' shops/small business were damaged in the floods. Some Roma, who used to make living from selling goods and collecting materials for recycling, are affected by the reduced job opportunities. On the other hand, some Roma population is known for its mobility and normally seeks employment opportunities such as fruit picking. However, their vehicles have been also damaged making the employment more difficult to find.

Moreover, the main occupation of working Roma (aged 15-64) is un- semi-skilled work in industries of public utilities (21%), followed by commercial services and mining (17% in each respectively) as well as construction (13%). This coincides with sectors, mostly damaged by floods, where both privately and publicly owned businesses were severely hit by natural disaster.

Heightened vulnerability has seen female-headed households disproportionately affected by flooding. Also, 67% of female Roma are unemployed. With damaged dwellings, the time-bound unpaid occupation at home grows disproportionally for Roma women, that face additional burdens in their roles at the household, agriculture and livelihood levels.

**b) Refugees and IDPs: 13,300 Refugees and 67,902 IDPs from the 1990s civil war have been affected by the floods.<sup>55</sup>**

Many IDPS who were integrated and had managed to be self-sustainable twenty years after the war were severely hit by the floods. These groups are normally vulnerable due to their lack of citizenship, lack of housings, issues relative to repossession of properties and limited employment opportunities. Some IDPs however managed to obtain housings, start income

<sup>54</sup> Krupanj, Ljubovija, Šabac, Ub, Lajkovac, Sremska Mitrovica, village Rakovica, Vozdovac, Grocka, Mladenovac, Marinkova Bara, Palilula, Ripanj, Lazarevac, Meljak, Municipality of Rakovica, Obrenovac, Svilajnac, Paracin, Kostolac, Pozarevac and Smederevska Palanka.

<sup>55</sup> UNHCR Report, May 2014. The number of refugees is only those that are still in status and does not include former refugees who took Serbian citizenship and ID cards.

generation activities, and started to be integrated and have become financially self-sustainable. The floods have put this integration in jeopardy. The refugees/IDPs were hit again and many lost their homes and sources of income (agricultural assets, livestock, etc.).

Among those, 788 Roma IDPs are considered as extremely vulnerable individuals. Sabac is the most affected with 1,407 refugee population, while Kraljevo is most affected with 20,448 IDPs. As a result of floods, in addition to identified pre-floods 30,000 IDP households, some additional 31,879 persons got temporary evacuated, of which more than 24,000 persons are from Obrenovac alone<sup>56</sup>.

The majority of the Obrenovac evacuees found shelter with relatives, and about 5,000 needed accommodations in shelters. While some of the evacuees will return to their partly destroyed residences to renovate them over the summer, others will stay in collective centers for uncertain period of time and may not find enough funds to re-build their houses, as almost none of them were not ensured.

**c) Disabled people: 104,798 people with disabilities are estimated to live in the affected areas.**

More than 570,000 people have disabilities<sup>57</sup> and make 8 % of the population in Serbia. In the 24 affected municipalities, 104,798 people with disabilities are estimated to live in the affected areas. The majority of them have difficulties in physical movement, sight or hearing impairments. The majority of the population with disabilities is above 60 years of age.<sup>58</sup> They have restricted mobility, limited employment opportunities and difficult access to aid distribution. The majority of disabled people are coping with the situation at the individual level rather than collectively.

The post-disaster data collection on the people with disabilities was carried out in a limited capacity. According to the data provided by National Organization of Persons with Disabilities of Serbia, 80 people are reported to have been affected. There is a huge gap between the reports and estimates because the affected are coping with the issue at individual level relying on their social network rather than public assistance. Tracing the information on how/where they cope with the situation is extremely difficult. As a majority of this group requires special assistance, relocation to their friends and relatives houses makes the overall estimation of the affected rather difficult.

On average, PWDs represent 8.4% of population (4.37% female and 3.6% male) in floods-affected municipalities. 12.5% of them live in Varvarin, 10.1% in Sid, 9.9% in Krupanj, followed by 9.5% in Velika Plana and 9.3% in Jagodina. Each of other 18 municipalities is home for 9% or less of PWDs.

<sup>56</sup> UNDAC Report, Serbia Floods, May 2014

<sup>57</sup> 2011 Census of Population, Households and Dwellings in the Republic of Serbia, Statistical Office of Republic of Serbia, page 26.

<sup>58</sup> 2011 Census of Population, Households and Dwellings in the Republic of Serbia, Statistical Office of Republic of Serbia, page 21.

Even though no schools were fully destroyed, 35 schools in floods-affected municipalities faced damages of various degree. It is not known how many of them are specialized schools for PWDs. Most of equipment, furniture and education materials/student records got partially destroyed. Restoration and replacement of education materials for PWDs (such as Braille, sonar recordings, easy-reading format etc.), will be not as easy as for general children.

In summary, interviews and focus groups carried out as a part of this work indicate that vulnerable groups have been affected differently, with potentially long-term impacts. The chart below presents these findings:

Table 2-7 Summary of effects of the floods by group of vulnerable population

Group	Effects of Flooding	Estimated number of people
<b>Roma</b>	Roma in Obrenovac have been severely affected. Some have been displaced to temporary shelter in Belgrade, and have a reduced access to incomes and job opportunities; less social capital.	6,032
<b>Refugees and IDPs from the war</b>	Resettlement; in debt to finance housing reconstruction; loss of social network; reduced access to employment; damages in land, livestock and crops.	13,300 Refugees, 67,902 IDPs, 788 Roma IDPs
<b>People with disabilities</b>	Accessibility to housing, workplaces, livelihoods; being crowded out of the labour market; barriers to access to relief efforts including temporary shelters and aid distributions; resettlement. Mobility further restricted due to disruptive road and transportation system.	104,798 people with disabilities estimated to live in affected areas.

### 5.3 Vulnerable activities and factors reinforcing vulnerability

In addition to those vulnerable groups, other categories of the activities and populations have also been affected.

#### a) Informal and seasonal workers:

Floods impacted negatively the activities and profit of many local companies and created a loss of job opportunities which particularly affected seasonal workers engaged in agro-industry. About 12,457 informal workers including youth, Roma and women, have been largely affected by the floods.

This situation is particularly acute in western Serbia, where berry farming is a main source of employment. Based on field interviews, a fruit processing factory estimate they will barely generate a third of the profit from last year. Consequently, seasonal workers have been

reduced by half. In addition, this situation also affects other businesses such as supply fertilizer, oil, chemicals, seeds, pesticides, and packaging to the factory. This is particularly true in some areas such as the municipality Krupanj where most people work in a berry farming industry, and had their income reduced by 50%<sup>59</sup>.

**Box: Case of a fruit processing factory in Krupanj**

The factory, in an average year, employs 150 seasonal workers, who are engaged in picking, freezing, and packaging the produces. These seasonal workers would have gained temporary job opportunities between June and February with earnings of 115.66 RSD per hour, and the workers are mostly the youth in the municipality and Roma from the southern Serbia who migrate for the employment opportunities. Further, the factory procures berries from middlemen who collect the produces from farmers. If the floods had not happened, the factory would have normally hired 40 middlemen who would use 22 trucks to transport berries from 15 farmers per person, while 25 middlemen will be hired this year.

**b) Increased vulnerability seems to be largely based on whether or not individuals and households faced specific challenges before the floods.**

Access to employment is a key factor when considering vulnerability of the affected population. Employment serves as an important source of income and savings to face emergency situations. The loss of employment and the lack of temporary job opportunities can marginalize some vulnerable groups into deep poverty. The floods reduced the job opportunities for the vulnerable and affected their finance resilience. Financial savings of the vulnerable have been affected also, reducing their safety net capacity. Little savings available have been used to cope with the emergency situation. The loss of job opportunities has further decreased the income levels and exacerbated households' vulnerability. For instance, people with disabilities have now more difficulties to access workplaces where recovery efforts have been delayed. The displaced Roma have lost informal and seasonal job opportunities (collecting paper, metal scraps, performing music, or selling vegetables).

Additionally, access to social networks reinforces people's resilience in the disaster affected situations. People are connected to each other within particular social groups such as family, friends and colleagues. When the affected have an access to such network, it can influence social resilience and reduce the individual vulnerabilities. Many of the identified vulnerable groups lack a strong social network which could buffer the economic shocks of the floods. However, there are also some positive examples such as the IDPs in Krupanj. The research team observed the self-help housing construction initiated by an IDP in Krupanj. This IDP is one of the first persons who started rebuilding his house without waiting for the Government assistance. The IDP largely benefitted from social network with his relatives and colleagues. They collectively worked to gather donations to compensate the initial cost, provided a temporary accommodation, and construction materials for a new house. The land was offered by one of his close friends in order for the IDP to be able to resettle in the neighbourhood.

Regarding the relevance of access to tenure, it is important to note that the majority of Roma lives in informal settlements and in lack of adequate housing conditions even before the

<sup>59</sup> Discussion from the municipality of Krupanj.

floods. Roma households show significant discrepancies in housing indicators when compared to the general population. Around 38% of Roma do not have access to secure housing (almost 4 times more than the mainstream population). Data received from the Roma National Council shows that more than 714 Roma houses of 6,032 individuals, out of which one third is children (2,598), have been destroyed or affected by the flood. Roma mostly live in informal settlements that lack construction permit and property registration. Some of their housings insufficiently meet the adequate condition to be registered as property. Also, those who used to rent a house are not able to get involved in the reconstruction of these houses. Therefore, the lack of tenure security makes their reconstruction process even harder.

Finally, vulnerabilities increased particularly when households depend on one source of livelihood. In rural areas, the poor farmers typically depend solely on farming, and lack alternative source of income. An interview with a farmer in Krupanj demonstrates a typical challenge that small-scale farmers are faced with. The interviewee used to make 2,000-EUR 3,000 annually. However, as the floods contaminated the land, damaged equipment and killed livestock, there will not be any farming benefits this and next year. Due to the disaster, the farmer has retired and provides six members of family with pension which supplies 14,000 RSD monthly. Although the family has three daughters in the United States, the alternative source of income in the form of remittance is not much expected. An alternative source of income is not sought for. The interview mentioned that there are not many people in Krupanj who can afford to lend money. As seen in the case of the farmer, those who lived with a single livelihood strategy tend to be more vulnerable in the emergency situation. 33, 428 farmers are estimated to have been affected in 24 municipalities.



## PART 3 – POST-DISASTER RECOVERY AND RECONSTRUCTION

### 1. INTRODUCTION

Post-disaster needs refer to the financial requirements to ensure recovery of social conditions and economic development to at least the same levels that prevailed prior to the occurrence of the disaster, as well as the requirements to reconstruct all destroyed assets under disaster-resilient standards within a building-back-better strategy.

Recovery needs have been grouped under five main categories that include personal or household income recovery; recovery of access to basic services; recovery in the production of goods and services; recovery of governance; and recovery of the environment. Reconstruction needs are grouped under specific sectorial subprograms.

The aim of recovery activities is to restore the path to achieve sustainable socio-economic development, while that of reconstruction activities is to reduce disaster risk to more manageable levels, with full participation of public and private sector stakeholders under the general guidance and leadership of the Government.

In that regard, the role of the Government in post-disaster activities goes beyond recovery and reconstruction of those activities under its direct purview; it includes an indispensable catalytic role to ensure private sector recovery and reconstruction as well. Without this, it is impossible to visualize full recovery and reconstruction within a relatively limited time, as all sectors must work in parallel to ensure no one is left behind in the road to overcome the negative impact of the disaster. As an example of this special role by the Government, it should make the necessary representations to the banking sector (both private and public) to ensure the availability of soft-term credit to private individuals and enterprises to finance recovery and reconstruction; without this, production and personal income may never recover to pre-disaster levels in the foreseeable future.

### 2. RECOVERY NEEDS

As mentioned above, under recovery are included many actions designed to restore the levels of production, personal wellbeing and environmental conditions that prevailed before the disaster occurred. Contrary to popular belief, recovery does not necessarily involve or require compensation to the affected persons and enterprises for their disaster-induced losses; rather, it aims to provide the necessary financial support to re-start production and restore social conditions.

## 2.1 Recovery of Personal and Household Income

Approximately 84,298 people working in enterprises and in the agriculture sector have lost income because of the disaster. In addition, a large proportion of the wage workers are at risk of losing their jobs in the coming months if employers are not able to pay their salaries. Recovering and protecting their livelihoods would imply a coherent enterprise recovery and employment promotion strategy at local level. This challenge can only be met through a joint effort of the national and local level authorities, National Employment Services, the private sector, including public and private business and financial service providers, workers' and employers' organizations, civil society organizations and international agencies in order to address the short-term, medium-term, and long-term recovery needs and priorities.

This would entail a series of targeted interventions to immediately secure jobs and to simultaneously start working on the "labor supply side" such as enhancing the financial abilities of enterprises, supporting the replacement of equipment, tools, and stocks of materials and improving the skills of workers, such as career counseling and 'start your business training' for wage workers at risk of losing their jobs to prepare them for alternative livelihood strategies such as self-employment.

On the other hand, it is necessary to start operating with a medium-term perspective, on the "demand side" to support local authorities in creating the conditions and an enabling environment for disaster-resilient enterprises to grow in number and scope, and for the local market to expand and create additional demand of labor. This should be done in consultation with public and private institutions, including public and private business and financial service providers, as well as with representatives of employers' and workers' organizations in order to formulate well targeted strategies that directly improve the business environment, with a view to ensure that the needs of future in existing micro and small businesses are taken into account.

The following table elaborates the recovery needs in the immediate, medium term and long-term. Cash for Work programs, and cash grant for small and microenterprises, is aimed at boosting local economy and creating job demand in the immediate and medium term. Long-term needs focus on building capacity of local and national authorities on disaster risk reduction; and creating of pool of needs-based skilled labor force which can be absorbed by the local market.

Table 3-1. Employment and livelihoods recovery needs (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Cash-for-work programs	1,890
Cash grants for micro-enterprises and micro-entrepreneurs	2,875
Re-training on alternative skills	500
Capacity development of national and local institutions on DRR	96
<b>Total</b>	<b>5,361</b>

## 2.2 Gender responsive recovery

The floods have further reduced the productivity of women, by increasing women's time engaged in unpaid family work such as tending to children, clearing debris, re-organizing homes and securing household assets. It should be noted that about 9% of the overall households are headed by women (116,038 households).

Foreseen recovery activities include a scheme of partial compensation for increased time of unpaid labor to women, the execution of a gender-sensitive, household assessment of disaster impact, and a program of training on gender issues in disasters. The estimated value of recovery needs is 227.5 million RSD, as shown in Table 3-2 below).

Table 3-2. Gender-responsive recovery needs (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Compensation scheme for unpaid labor of women	209.5
Gender-sensitive household-level assessment of disaster impact	3.0
Training on gender issues in disasters	15.0
<b>Total</b>	<b>227.5</b>

## 2.3 Recovery of access to and supply of basic services

### 2.3.1 Housing

Recovery needs in the housing sector include financing of temporary accommodations for those households whose homes have been destroyed or require considerable repairs, over a period of 6 months; the cost of demolition and debris and mud removal; the rescheduling of outstanding non-performing loans of the home owners; and the urgent replacement of essential household goods, as shown in Table 3-3 below. The value of recovery needs for the sector is estimated at 6,800 million RSD.

Table 3-3 Recovery needs in the housing sector (1 EUR = 115.66 RSD)

Recovery needs	# of affected	Cost, million RSD
Temporary accommodations	484 families	50.1
Demolition and debris/mud removal	419 families	69.7
Rescheduling outstanding loans	110 families	328.9
Replacement of household goods	17,261 families	6,352.0
<b>Total</b>		<b>6,800.7</b>

### 2.3.2 Health

The estimated value of recovery needs for the health sector amounts to 307.7 million RSD (See Table 3-4 below), and includes the following activities: a temporary cost of transport of dialysis patients for treatment in Belgrade until the destroyed hospital is reconstructed; the cost of providing mental counselling over six months to persons affected by the disaster; the

increase in costs of epidemiological and hygiene surveillance over the next 18 months; the cost of vaccinations and other prevention measures, especially for Roma children under 5 years of age; the urgent replacement of destroyed medicines and medical supplies; the cost of public information campaigns to reduce risk of disaster-induced disease; and the cost of laboratory analysis of food risks.

It is to be noted that vector control activities are required as well, and that the corresponding financial requirements are included under the sector of agriculture, since rodent and mosquito control activities are normally carried out by the ministry in charge of agriculture.

Table 3-4. Recovery needs in the health sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Temporary transport of dialysis patients to Belgrade	3.5
Provision of mental health counselling	25.5
Increased epidemiological and hygiene surveillance costs	188.1
Vaccination campaigns	23.9
Urgent replacement of destroyed medicines and supplies	13.4
Public health information campaigns	40.8
Food risk laboratory analysis	12.5
<b>Total</b>	<b>307.7</b>

### 2.3.3 Education

Recovery needs to reestablish normal education services are estimated at 229.2 million RSD, as shown in Table 3-5 below. These needs include the costs of cleaning up, removing debris and mud from the premises, and disinfection; the cost of replacing education materials and textbooks for children in grades 1 to 4; the provision of psycho-social support for children; and the cost of transferring children to temporary facilities while repairs are being made to the affected schools.

Table 3-5. Recovery needs in the education sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Demolition and debris/mud removal costs	14.1
Disinfection of schools	8.9
Replacement of education materials and textbooks for children, grades 1-4	14.6
Psycho-social support for children	16.8
Temporary transport costs	174.7
<b>Total</b>	<b>229.2</b>

### 2.3.4 Culture

The cost of reactivation and recovery of cultural activities are estimated at a value of 6.4 million RSD.

### 2.3.5 Water and sanitation

Total recovery needs in the water supply, waste-water and solid-waste disposal sector amount to 404.5 million RSD (See Table 3-6).

Recovery needs in water supply comprise: cleaning and disinfection of wells (rural and urban) and unblocking sewers; cleaning and disinfection of the water supply network; distribution of water using tanker trucks; the costs of additional water quality analyses; and increased costs of electricity for pumping until damaged gravity supplies are reinstated.

Recovery needs for waste management comprise: repair or replacement of containers in the areas covered by waste collection service; Repair of vehicles for collection and transportation of waste; and repair of other equipment (i.e. waste sorting plant)

Table 3-6. Recovery needs in the water and sanitation sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Temporary provision of drinking water	296.0
Temporary provision of wastewater collection and disposal	3.1
Temporary costs of solid waste collection and disposal	105.3
<b>Total</b>	<b>404.5</b>

## 2.4 Recovery of production

Under this heading of recovery are included the financial requirements to re-start production activities in agriculture, livestock, fishery, manufacturing, trade, tourism and mining/energy sectors. In most cases, these recovery requirements refer to the amounts of working capital required by the producers as well as rescheduling of outstanding loans.

### 2.4.1 Agriculture

Recovery requirements in this sector have been estimated as 4,717 million RSD (See Table 3-7 below).

The main recovery requirements are the provision of inputs (seeds, fruit-tree seedlings, etcetera) to farmers whose crops were lost due to the disaster, to ensure next year's harvest; the cost of carrying out fertility improvement of agricultural lands that received sediments; the temporary provision of animal feed to cattle, and of veterinary care to sick animals; the provision of critical inputs for fishery (fingerlings and fish feed); provision of inputs for honeybee producers; the rescheduling of outstanding non-performing loans of the farmers, and the costs of rodent and mosquito control over an 18-month period.

Table 3-7. Recovery needs in the agriculture sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Provision of seeds and other inputs for planting the next crops	2,985.6
Soil improvement/rehabilitation of lands that received sediments	921.6
Veterinary attention to sick animals	14.9
Temporary provision of animal feed	74.4
Provision of inputs for fishery	3.9
Provision of inputs for honeybee production	1.0
Rescheduling of outstanding loans	239.0
Vector control activities	476.3
<b>Total</b>	<b>4,716.6</b>

## 2.4.2 Manufacturing

In the manufacturing sector, recovery needs refer almost exclusively to the provision of working capital for enterprises so that they re-start production, outstanding-loan rescheduling, and to possible temporary tax exemptions to alleviate their situation. The estimated total recovery requirements amount to 1,915 million RSD, and include the provision of cash grants to micro-sized entrepreneurs, the availability of soft-term (low interest and long repayment periods) credit to affected small to large enterprises through the banking system, and provision of working capital to affected Government-owned industries (See Table 3-8) in 2014.

Table 3-8. Recovery needs in the manufacturing sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Cash grants for working capital to micro-enterprises	93.5
Soft-term working capital for small-sized industries	725.0
Soft-term working capital for medium-sized industries	332.3
Soft-term working capital for large-sized industries	446.9
Working capital for Government-owned industries	315.3
Rescheduling of non-performing outstanding loans	...
<b>Total</b>	<b>1,914.5</b>

It should be pointed out that the recovery needs estimation presented before is based on the responses of the managers and owners of manufacturing enterprises as well as of individual entrepreneurs which were included in the sample survey of industrial establishments conducted as part of the needs assessment.

## 2.4.3 Trade

Financial recovery requirements for the trade or commerce sector include provision of working capital so that activities may be re-initiated at the earliest possible time, the rescheduling of outstanding non-performing loans, and the possible provision of temporary tax relief to ease on their difficult financial position. The total estimated value of recovery



needs for the trade sector is 1496 million RSD, which should be made available in 2014 (See Table 3-9 below).

Table 3-9. Recovery needs in the trade sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Cash grants for micro-traders	27.4
Soft-term working capital for small traders	520.0
Soft-term working capital for medium traders	854.2
Soft-term working capital for large traders	93.9
Rescheduling of non-performing outstanding loans	...
<b>Total</b>	<b>1,495.5</b>

It should be also mentioned that the estimated recovery needs took into consideration the responses of traders which were included in the sample survey of commercial establishments conducted as part of the needs assessment.

#### 2.4.4 Tourism

Tourism sector recovery needs involve the availability of working capital to solve liquidity problems caused by the disaster, the execution of a promotion campaign to restore tourist's confidence abroad and to eliminate reputation loss, and a possible temporary tax exemption scheme. The total value of recovery needs is 58.6 million RSD (See Table 3-10), which are required in 2014.

Table 3-10. Recovery needs in the tourism sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Soft-term credit for working capital	56.8
Marketing campaign to promote tourism abroad	1.8
Temporary tax relief scheme	...
<b>Total</b>	<b>58.6</b>

#### 2.4.5 Mining and energy

Recovery of coal production is essential to ensure timely and sufficient availability of electricity supply to all consumers. Dewatering of the two flooded coal mines has already been started and would continue until April or May 2015. The estimated recovery costs amount to 24,498 million RSD, spread out in 2014 and 2015.

### 2.5 Recovery of governance

It is envisaged that to achieve the desired recovery of governance, activities would be undertaken to recover destroyed archival records and that alternative premises would be used in lieu of damaged Government buildings especially at municipal level; furthermore that

additional personnel would have to be engaged. The estimated value of such recovery needs amounts to 264.3 million RSD, as shown in Table 3-11 below.

In addition, the National Program for Assistance and Recovery of Floods Affected Areas shall define special rules to ensure an efficient and transparent mechanism for the management of public funds envisaged for post-disaster activities.

Table 3-11. Recovery needs in the governance sector (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Recovery of destroyed archival records	174.6
Temporary rental of alternative premises during reconstruction	48.1
Additional staff costs	41.6
<b>Total</b>	<b>264.3</b>

## 2.6 Environmental recovery

Two main activities are envisaged for the recovery of the environment, to be supplemented later under reconstruction or restoration of pre-disaster conditions: first, the collection, transport and environmentally safe disposal of debris and mud generated by the floods and landslides that has collected in urban areas; second, protection of the biodiversity.

The estimated cost of these recovery activities for the environment is 323.1 million RSD, as described in Table 3-12 below.

Table 3-12. Recovery needs in the environment (1 EUR = 115.66 RSD)

Recovery needs	Cost, million RSD
Removal of debris to environmentally safe sites	250.3
Biodiversity protection	72.8
<b>Total</b>	<b>323.1</b>

## 3. RECONSTRUCTION REQUIREMENTS

The occurrence of the disaster caused by the combination of floods and landslides has brought to light the fact that the country needs to carefully take stock of existing regulations concerning physical planning and land zoning, definition of construction standards and improvement of floods control measures and works, to reduce disaster risk. Absence or non-compliance with those requirements results in undesired negative impacts on overall socio-economic development and setbacks in human development, as the results of this assessment reveals.

The opportunity to improve this situation needs to be sized by the Government and the private sector to build resilience into infrastructure, productive processes and livelihoods. It is through such measures that the country and its society may be better prepared to face similar events that may occur in the future.

The above considerations are included into a “building-back-better” strategy that involves quality improvement and modernization of physical assets and productive processes, as well as the reduction of risk to more manageable levels.

### 3.1 Sector-by-sector reconstruction requirements

#### 3.1.1 Agriculture, livestock and water resources

Infrastructural damages is strongly localized and diverse in severity. Though no major destruction to farm infrastructure and machinery was reported, flooding caused significant damages to individual farming systems and the rural economy, particularly in the high-value horticultural subsector. It is of utmost importance to renew the physical assets that have been damaged in order to restore the production capacity for the affected farmers. This is present in all production sectors, but most obvious in horticulture where the largest number of farmers were involved.

Serious structural damages and loss of productivity have been noticed on 8.4 % of the total flooded surface. Much of this land lies at the river banks, as the most fertile patches were used for intensive agricultural production. This land has been exposed to various deposits of debris and sediment that have to be physically removed and safely deposited at the local landfills. The precise estimation of the needed scope of intervention has to be done locally at the particular land plots. However, the volume of work indicates that this would be a medium term activity with significant use of local mechanization resources as well as strategic disposal of the waste material. Additional follow up measures such as cultivation of fertility restoration crops, led by the advisory measures based on the soil analysis, would assist in long term restoration of the land quality.

Particular emphasis needs to be put on providing means and institutional setup for the assistance in farm and production reconstruction for farm households with elderly members living alone.

Total reconstruction needs for the sector are estimated at 12,880 million RSD, and refer to agriculture, livestock, fishery, and floods control (See Table 3-13 below).

Table 3-13. Reconstruction needs in agriculture sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Removal of sediment and mud from agricultural lands	8,450.3
Repairs to damaged floods control works	3,688.7
Repair and reconstruction of irrigation systems	1.3
Reconstruction of green houses	92.4
Re-establishment of fruit-tree nursery	220.0
Repairs to farm roads	68.0
Machinery and equipment replacement and repairs	11.1
Replacement of animal stock and facilities (soft-term credit)	268.3
Replacement of equipment for fishery (soft-term credit)	68.4
Replacement of honeybee facilities (soft-term credit)	11.2
<b>Total</b>	<b>12,879.6</b>

### 3.1.2 Manufacturing

The amount of reconstruction requirements for this sector are in correspondence to the value of destroyed assets sustained, and are more relevant for the case of micro- and small-sized units, as well as for large establishments and for Government-owned enterprises. Total reconstruction requirements for the sector are 6,160 million RSD (See Table 3-14 below), and include mainly resources to be made available to privately-owned and Government enterprises for reconstruction and re-equipping, through soft-term credit via the banking system, as well as 250 million RSD in the form of cash grants for micro entrepreneurs.

Table 3-14. Reconstruction needs in manufacturing sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Cash grants for reconstruction/re-equipping for micro entrepreneurs	250.0
Reconstruction/equipment replacement for small enterprises	3,044.4
Reconstruction/equipment replacement for medium enterprises	787.0
Reconstruction/equipment replacement for large enterprises	1,115.4
Reconstruction/equipment replacement for Government industries	965.7
<b>Total</b>	<b>6,162.5</b>

### 3.1.3 Trade

In a similar fashion to the manufacturing sector, reconstruction requirements for the trade sector are heavily concentrated on the micro- and small-sized traders whose assets were destroyed by the floods and landslides, while the corresponding needs for medium and large traders are limited. Total reconstruction needs in this sector are estimated as 16,658 million RSD, as described in Table 3-15; they refer to resources for replacement of furniture, equipment and stocks of goods to sell that perhaps should be made available through soft-term loans channelled through the banking system, as well as to cash grants for micro-traders.

Table 3-15. Reconstruction needs in trade sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Cash grants for reconstruction/re-equipping for micro traders	1,000.0
Reconstruction/equipment replacement for small enterprises	12,839.4
Reconstruction/equipment replacement for medium enterprises	2,180.2
Reconstruction/equipment replacement for large enterprises	638.9
<b>Total</b>	<b>16,658.5</b>

### 3.1.4 Tourism

Reconstruction needs for the tourism sector have been estimated as 82.1 million RSD.

### 3.1.5 Mining and energy

The cost of reconstruction for the mining and energy sector has been estimated at 23,363 million RSD.

### 3.1.6 Housing

In the housing sector reconstruction would involve introducing disaster resilience in the new housing units (through use of solid foundation and insulation materials and possibly raising the floor levels), improvement of quality in housing of poor and vulnerable families, and selected relocation of a limited number of housing units destroyed by the landslides.

It is foreseen that 80 pre-fabricated housing units may be donated to the poor (including Roma families), construction materials may be donated to low-income families for use in reconstruction of their homes, soft-term credit may be given through the banking system to 1,220 credit-worthy families.

Total reconstruction needs are estimated as 23,656 million RSD, and their breakdown is shown in Table 3-16 below.

Table 3-16. Reconstruction needs in housing sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Donation of 80 housing units to the poor	176.6
Donation of construction materials to low-income families	21,133.3
Reconstruction of 1,220 housing units (Soft-term loans)	2,295.1
Cost of relocation of housing units destroyed by landslides	50.6
<b>Total</b>	<b>23,655.7</b>

### 3.1.7 Health

The total reconstruction needs in the health sector amount to 509 million RSD, as shown in Table 3-17.

Included are the total costs for reconstruction under disaster-resilient standards of health facilities, including relocation to avoid recurrence of flooding, use of solar panels for energy supply, and provision of better access for the handicapped.

Table 3-17. Reconstruction needs in health sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Reconstruction of destroyed health facilities	18.9
Repair of partially affected health facilities	292.8
Replacement of equipment and furniture in health facilities	197.3
<b>Total</b>	<b>509.0</b>

### 3.1.8 Education

Reconstruction requirements in the education sector would include the repairs to damaged education facilities, and the replacement of destroyed furniture and equipment. In addition, repairs would include introduction of water proofing, elevating the level of libraries, storage rooms and computing equipment, improving energy efficiency, etcetera. The estimated reconstruction needs are 496 million RSD (See Table 3-18).

Table 3-18. Reconstruction needs in education sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Repairs to damaged school buildings	324.9
Replacement of equipment and furniture	170.9
<b>Total</b>	<b>495.8</b>

### 3.1.9 Culture

In the culture sector, reconstruction requirements amount to 141.2 million RSD and include repairs to endangered physical heritage, restoration and repairs to damaged heritage structures, and a rehabilitation plan for cultural heritage.

### 3.1.10 Transport

Reconstruction for the transport sector (road, railway, water and air transport sub-sectors) with introduction of disaster-resilient features would involve a combination of improving the design of assets and of introducing floods protection works near rivers and enhancing drainage capacity. In addition, reconstruction of transport and communication works destroyed by landslides would require re-alignment of the roads, telephone lines, etc.

Total reconstruction needs are estimated at 14,831 million RSD, as described in Table 3-19

Table 3-19. Reconstruction needs in transport sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Reconstruction of selected primary road sections (incl. bridges and culverts)	2,721.2
Reconstruction of selected secondary road sections (incl. bridges and culverts)	3,533.5
Reconstruction of selected local road sections (incl. bridges and culverts)	3,940.7
Reconstruction of selected railway sections (incl. bridges and culverts)	4,565.2
Reconstruction of port infrastructure	10.9
Reconstruction of airports and replacement of equipment	59.5
Replacement of destroyed airplanes	76.6
<b>Total</b>	<b>14,830.9</b>



### 3.1.11 Communications

For the communications sector, reconstruction needs have been estimated at 1,453 million RSD and include the disaster-resilient reconstruction of postal service facilities and of telecommunications transmission lines, as shown in Table 3-20 below.

Table 3-20. Reconstruction needs in communications sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Reconstruction of postal service facilities	65.5
Reconstruction of telecommunication transmission lines	1,387.6
<b>Total</b>	<b>1,453.1</b>

### 3.1.12 Water and sanitation

In the water supply, waste-water and solid waste disposal sector reconstruction requirements involve the introduction of improved standards of design for the facilities as well as disaster risk reduction features, and the replacement of destroyed equipment. The estimated value of reconstruction under those conditions is 2,774 million RSD, as described in Table 3-21.

Table 3-21. Reconstruction needs in water and sanitation sector (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Reconstruction of water supply systems	1,333.5
Reconstruction of sewage works	524.8
Reconstruction and improvement of solid waste facilities	915.9
<b>Total</b>	<b>2,774.2</b>

### 3.1.13 Environment

Reconstruction of the environment would involve the following activities: stabilization and remediation activities in landslide-affected areas, assessment and cleanup of contaminated sites; reconstruction of debris disposal sites, reconstruction of mine tailing dam and site rehabilitation, replacement of water quality monitoring equipment, and forest rehabilitation. Total reconstruction needs amount to 4,480 million RSD.

Table 3-22. Reconstruction needs in the environment (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Landslide stabilization and remediation	2,243.0
Assessment and clean-up of contaminated sites	943.0
Reconstruction of debris disposal sites	415.0
Replacement of damaged water quality monitoring equipment	58.0
Reconstruction of mine tailing dam and site rehabilitation	153.0
Damaged forest rehabilitations	667.5
<b>Total</b>	<b>4,479.5</b>

### 3.1.14 Governance

Under governance, reconstruction needs include the repair and reconstruction of Government buildings, replacement of equipment and furniture, communications and vehicles. Reconstruction requirements are estimated at 1,634 million RSD (See Table 3-23).

Table 3-23. Reconstruction needs for governance (1 EUR = 115.66 RSD)

Reconstruction needs	Million RSD
Repairs to partially damaged Government buildings	625.5
Replacement of equipment and communications for above	517.6
Reconstruction of 4 destroyed Government buildings	341.5
Replacement of equipment and communications for above	24.7
Replacement of destroyed official vehicles	83.1
Acquisition of additional vehicles	41.6
<b>Total</b>	<b>1,634.0</b>

## 4. SUMMARY OF RECOVERY AND RECONSTRUCTION NEEDS

### 4.1 Total value of recovery and reconstruction requirements

The estimated value of total post-disaster needs has been estimated at EUR 1,346.4 million for all affected sectors of economic and social activity (See Table 3-24). Of said amount, recovery requirements amount to EUR 403 million (30 % of the total), and reconstruction requirements represent EUR 943.5 million (or 70% of the total).

Table 3-24. Total recovery and reconstruction needs (1 EUR = 115.66 RSD)

Sector	Post-Disaster Needs, million EUR		
	Recovery	Reconstruction	Total*
Agriculture	40.8	111.4	152.1
Manufacturing	16.6	53.3	69.8
Trade	12.9	144.0	157.0
Tourism	0.5	0.7	1.2
Mining and energy	211.8	202.0	413.8
Housing	58.8	204.5	263.3
Education	2.0	4.3	6.3
Health	2.7	4.4	7.1
Culture	0.1	1.2	1.3
Transport	-	128.2	128.2
Communications	-	12.6	12.6
Water and sanitation	3.5	24.0	27.5
Environment	2.8	38.7	41.5
Governance	2.3	14.1	16.4
Employment	46.4		46.4
Gender	2.0		2.0
<b>Totals</b>	<b>403.0</b>	<b>943.5</b>	<b>1,346.4</b>

\*Due to rounding up some totals do not exactly add up

The individual sectors that require more recovery and reconstruction financing are mining and energy (EUR 414 million and 31 % of the total), housing (EUR 263 million and 20 %), trade (157 million and 12%) and agriculture (152 million and 11%). In terms of recovery needs alone, the mining and energy sector requires 53 % of total resources; housing (14%), employment (11%) and agriculture (10%). For reconstruction, the sectors of housing and mining/energy require 21.5 % of the total, trade (15%), transport (14%) and agriculture (12%).

## 4.2 Time distribution of recovery and reconstruction requirements

The time distribution of recovery requirements is shown in Table 3-25, which reveals that 58 % of the total recovery needs (EUR 236 million) are essential in 2014, 36 % are required in 2015 (EUR 146.4 million), and that a balance of EUR 20 million will be needed in 2016.

Table 3-25. Recovery needs 2014 to 2016

Sector	Recovery needs, million EUR			
	2014	2015	2016	Total*
Agriculture	16.4	21.1	3.3	40.8
Manufacturing	16.6	-	-	16.6
Trade	12.9	-	-	12.9
Tourism	0.5	-	-	0.5
Mining and energy	105.9	105.9	-	211.8
Housing	24.4	17.2	17.2	58.8
Education	2.0	-	-	2.0
Health	1.4	1.2	-	2.7
Culture	0.0	0.0	-	0.1
Transport	-	-	-	-
Communications	-	-	-	-
Water and sanitation	3.5	-	-	3.5
Environment	1.9	0.9	-	2.8
Governance	2.3	-	-	2.3
Employment	46.4	-	-	46.4
Gender	2.0	-	-	2.0
<b>Totals</b>	<b>236.1</b>	<b>146.4</b>	<b>20.5</b>	<b>403.0</b>

\*Due to rounding up some totals do not exactly add up.

The time distribution of reconstruction requirements is given in Table 3-26. In 2014 these requirements would amount to EUR 593 million (equivalent to 63 % of the total needs); in 2015, the needs would be EUR 290 million (31 % of the total); and in 2016 they would amount to EUR 60 million (6%).

Table 3-26. Reconstruction requirements, 2014-2016

Sector	Reconstruction needs, million EUR			
	2014	2015	2016	Total
Agriculture	44.4	50.4	16.6	111.4
Manufacturing	53.3	-	-	53.3
Trade	144.0	-	-	144.0
Tourism	0.7	-	-	0.7
Mining and energy	101.0	101.0	-	202.0
Housing	103.2	60.8	40.5	204.5
Education	4.3	-	-	4.3
Health	4.4	-	-	4.4
Culture	0.5	0.7	-	1.2
Transport	94.2	34.1	-	128.2
Communications	12.6	-	-	12.6
Water and sanitation	6.4	14.4	3.2	24.0
Environment	16.7	22.1	-	38.7
Governance	7.1	7.1	-	14.1
<b>Totals</b>	<b>592.7</b>	<b>290.5</b>	<b>60.3</b>	<b>943.5</b>

\*Due to rounding up some totals do not exactly add up.

## 5. GUIDING PRINCIPLES FOR SUSTAINABLE RECOVERY AND RECONSTRUCTION

### 5.1 Context

#### 5.1.1 Disaster Risk

Serbia is vulnerable to a wide variety of natural hazards, including floods, landslides, droughts, earthquakes, and wildfires. Most frequently, excessive rainfall leads to floods and landslides along major and smaller rivers. Estimates suggest that about 1.57 million hectares of the country is at risk of floods, particularly Vojvodina in the north and the plains east of Belgrade. The area at risk includes about 30 % of agricultural land, 512 larger settlements, 515 industrial installations, 4,000 km of roads, and 680 km of railways. Moreover, the south-east of the Pannonian Plain, the northern slopes of Fruška Gora and part of the Danube basin between Belgrade and Smederevo are particularly vulnerable to landslides.

Over the last 15 years, Serbia has been repeatedly affected by medium and large floods and landslide events. In April 2006, for example, the Danube and its tributaries reached its highest levels in 100 years due to heavy precipitation. This led to widespread flooding in various municipalities in Vojvodina and central Serbia. More than 225,000 ha was affected and an estimated 11,000 people were displaced or left homeless. The total floods damages was estimated to amount to EUR 35.7 million. One year later, in November 2007, massive floods took place in the south of the country. Torrential floods in the basin of the river Velika

Morava and its tributaries negatively affected the population and severely damaged bridges and roads. Similar events occurred in 1999, 2001, 2002, 2005, 2009, and 2010.

While floods and landslides are the most dominant hazards, earthquakes and wildfires cannot be ignored. Most recently, the 2010 earthquake resulted in 5,967 damaged structures of which 1551 were declared unsafe and required retrofitting. More generally, studies indicate that over 50 % of the country is vulnerable to 7.0 MMI earthquakes and 20 % to 8.0 MMI earthquakes. Furthermore, prolonged periods of low precipitation and higher temperatures frequently lead to wildfires. These fires cause damages to homes, forests, and farmland across the country.

### 5.1.2 Drivers of Disaster Risk

Exploitation and mismanagement of forest and agricultural land as well as uncontrolled urbanization exacerbate the impact of natural hazards such as torrential floods and landslides. Over the years, torrential floods have occurred more frequently and have become more destructive: former discharges (the volume of water flow) with recurrence interval of 100 years are now events with a recurrence interval of 20 years. Various contributing factors can be identified, including the transformation of the watershed from rural to urban land uses, as diminishing surfaces under forest vegetation and unsustainable agricultural practices.

Dramatically reduced spending in the water sector over the last 25 years has contributed to the deterioration of the country's water infrastructure. Aging infrastructure and inadequate investments in the maintenance of public infrastructure puts many floods control structures at risk of losing their functionality.

For example, the annual investment in erosion and torrent control works (ETCWs) dropped from around EUR 9.68 million in the period before the 1990s to EUR 0.35 million in the last four years. Similarly, drainage systems have not always received adequate attention and investments which has resulted in siltation and weed growth, as well as the break-down of associated structures and pumping stations.

As climate patterns change, Serbia may be confronted with more frequent and intense floods events. While the impact of climate change on the overall intensity and frequency of hydrological hazards cannot be predicted with certainty, data suggests that extreme wet and dry episodes have increased in recent years in both frequency and in amplitude. This is likely to affect river runoff and lead to more frequent occurrence of floods, especially torrential floods. Without climate-informed planning and investments, Serbia will become even more vulnerable to extreme adverse natural events.

## 5.2 Institutional, policy, and regulatory environment for DRM

Effective Disaster Risk Management (DRM) requires collective action from a wide range of key stakeholders across ministries, departments, and agencies at all levels. This requires an institutional anchor and strong inter-sectoral coordination mechanism to ensure this action is

sustainable. The following section provides an overview of (i) the roles and responsibilities of key stakeholders, (ii) policies and legislation, and (iii) institutional coordination and international cooperation.

## 5.2.1 Roles and Responsibilities

### **The Office for the Assistance to and Recovery of Flooded Areas**

The Government of the Republic of Serbia established the Office for the Assistance to and Recovery of Flooded Areas (hereinafter “The Office”) on 22 May 2014. It was established pursuant to the Article 31 point 1 of the Law on Government (“Official Gazette of the Republic of Serbia” no. 55/05, 71/05 – correction, 101/07, 65/08, 16/11, 68/12 – CC, 72/12, 7/14 – CC and 44/14).

The Office is headed by the Director, appointed for the period of five years. The Director is reporting to the Government of Serbia and the Prime Minister. The Director can propose to the Government appointment of one Deputy for the period of five years. The Office is tasked with expert and operational assignments on behalf of the Government.

In particular, it conducts expert, administrative and operational affairs for the needs of the Government and mutual affairs of the Ministries and special organizations which are related to: coordination, monitoring and reporting in regards of the reception and distribution of the humanitarian and other aid addressed to the Government for the people affected by floods; establishment of standards and criteria, as well as the procedures for the distribution of aid; establishment of periodic and final reports on the aid distributed; coordination and preparation of partial reports and of the single report on the damages assessment; coordination of the preparation of priority, partial plans and of single plan for the recovery of the areas affected by floods; coordination of all necessary preceding activities and coordination of the conduct; monitoring and reporting of the conduct of the recovery plans of the areas affected by floods; coordination of the preparation of priority, partial plans and of single construction plan of the areas affected by floods; coordination of all necessary preceding activities and acts concerning the application of the construction plans for the area affected by floods; coordination, monitoring and reporting regarding the activities of the procurements necessary for the execution of the construction plans; establishment of standards and criteria and procedures of reporting during the realization of the construction plans; coordination, monitoring and reporting regarding the finalized parts of the construction plans; drafting of the periodic and final reports on realization of the construction plans; and all other activities related to the assistance and recovery of the flooded areas and monitoring of the fulfillment of the obligations Ministries, special organizations and Government’s services have regarding the activities of the assistance and recovery of flooded areas.

A new special law is currently being drafted, with a view to formulate procedures for reconstruction and recovery of flooded areas. This law will also stipulate the competences of the Office in more detail. Its promulgation is expected by mid-July 2014.



### Ministry of Interior

Since 2011, the Ministry of Interior is leading the National Emergency Management Headquarters (NEMH) which functions as the National Platform for Disaster Risk Reduction. NEMH is mandated by law to coordinate and manage protection and rescue activities in emergencies and to mainstream disaster risk reduction policies. Within the Ministry of Interior, the Sector for Emergency Management (SEM) is the leading departmental entity which is organized along four key areas: prevention, fire and rescue, risk management, and civil protection. When an emergency is declared, the Serbian Army may contribute to SEM's relief and response efforts upon approval of the President.

### Ministry of Agriculture and Environmental Protection

The institutional mandate for floods protection lies within the Ministry of Agriculture and Environmental Protection (MAEP). The Directorate for Water (DW) under this Ministry combines the responsibility for water resource management and floods protection on "level 1" water courses, drainage, water supply and sanitation services. Three public water companies (PWCs) – Srbijavode PWC, Vode Vojvodine PWC and the Beogradvode PWC – are responsible for a wide variety of tasks, including operational management of water infrastructure, distribution of water to users, licensing of water resources, as well as hydrological monitoring and floods protection. They are also in charge with management of dams and reservoirs. Water and floods management on "class 2" water courses is the responsibility of local authorities on the territory under their administration.

### Hydrometeorology Services

Since 2003, the core responsibility for observations, forecasts, and warnings of extreme meteorological and hydrological events resides with the Republic Hydrometeorological Service of Serbia (RMHSS). RMHSS operates a comprehensive national observations network that contributes to the WMO Integrated Global Observing System (WIGOS) and adheres to the standards of the World Meteorological Organization (WMO).

## 5.2.2 Policy and legal environment

In recent years, Serbia has made progress in strengthening the legal and policy environment for emergency response and risk reduction. Key milestones include the adoption of the following: (i) the Law on Emergency Situations and Civil Protection (2009); (ii) the Law on Amendments to the Law on Emergency situations to integrate the concept of risk reduction (2011); and (iii) the National Strategy in the field of emergency management and disaster risk reduction (2011). This document called for the development of a National Action Plan within 6 months after the adoption of the Strategy, but this Action Plan has not been developed to date.

In alignment with international legislation and priorities, Serbia has enacted new legislation related to water and hydrometeorology which incorporates important elements of DRM. As a potential candidate country for membership with the European Union, Serbia has made efforts to harmonize its legislation with EU regulations. For example, the new Law on Water (2010) is largely consistent with the EU Water Framework Directive (EU WFD) as well as the EU Floods Directive (EFD). The EFD requires EU member states to establish floods risk

management plans for river basin districts which includes the development of floods hazard and risk maps. The Law on Meteorological and Hydrological activity (2010) has integrated strategic priorities of the World Meteorological Organizations (WMO). This law provides the legal framework for weather forecasting, early warning, and the use of weather and climate related information for risk assessments.

Despite progress, however, Serbia's current legislation has limitations and implementation remains slow. For example, the new Law of Water has transferred the responsibilities of the majority of torrential floods to local municipalities (as they are responsible for "level 2" water courses). These municipalities, however, often lack the technical knowledge and the financial means to comply with the Law and take the necessary actions. This, in turn, contributes to the increase of floods risk, particularly in Serbia's mountainous regions. In terms of implementation of DRM related legislation, Serbia remains focused on emergency response, while the concept of preparedness remains to be operationalized.

### 5.3 Institutional coordination during the disaster

Despite limitations in financial resources and operational capacities the Government floods response benefitted from a strong institutional framework for coordination. Authorities at national and local levels provided leadership and coordination support for participating emergency response entities to facilitate a speedy delivery of assistance to affected areas. In line with the Law on Emergency Situations and Civil Protection, the NEMH led the coordination and management of the overall floods response and coordinated the actions and deployments of multiple floods response actors and expert auxiliary and logistics units to affected areas.

At the national level the Emergency Management Sector provided the NEMH with expert, technical and operational support. NEMH convened daily emergency coordination meetings with key emergency management focal points appointed by its permanent members among line ministries, including the Ministry of Agriculture and Environmental Protection; Ministry of Defense; Ministry Health; and Ministry of Construction, Transport & Infrastructure. The Minister of Interior acted as the Commander of the NEMH while the Head of Emergency Management Sector led the day-to-day operational activities of NEMH. The coordination and management of the rescue activities were informed by key national-level experts of the scientific institutions, public utility companies, firefighting units, the ambulance service and city rescue service.

Under the direction of the national-level NEMH, municipal counterpart bodies were assigned to coordinate and manage humanitarian response activities with emergency response partners on the ground. Emergency response coordination and management were guided by pre-existing floods contingency plans that had been developed for the floods prone areas. The municipal NEMH instructed its standby members to deploy to affected areas and execute specific tasks related to the rescue activities. The police, the Serbian Army, gendarmerie and firefighter and rescue units played key roles in evacuating affected populations and providing humanitarian relief assistance to areas most in need, and coordinated closely with the municipal emergency headquarters in the planning and

execution of such tasks. Also coordinating closely with the local NEMH, the Serbian Red Cross managed the delivery, warehousing and distribution of emergency relief items to the affected population. The municipal NEMH was tasked to work alongside a variety of other specialized teams undertaking water pumping, decontamination, collection and disposal of carcasses, embankment works and the monitoring of temporary displacement centers.

## 5.4 Regional cooperation on trans-boundary waters

Serbia has demonstrated strong interest in bilateral and multilateral cooperation on trans-boundary waters. Since about 92 % of Serbia's surface water originates from outside the country's borders, the Government has a strong incentive to cooperate with other riparian countries on the development and utilization of international waters and enter into arrangements for such purposes. These agreements often include floods protection. To this end, Serbia has become a member of the International Commission for the Protection of the Danube River (ICPDR); the International Sava River Basin Commission and the Tisa River Basin Forum. Furthermore, Serbia has signed various regional agreements on water management and protection. This includes: (i) the Danube River Protection Convention; (ii) the Budapest Declaration; (iii) the Framework Agreement on the Sava River Basin; and (iv) the Convention regarding the regime of navigation on the Danube. Finally, Serbia has signed bilateral water management cooperation agreements with Bulgaria and Hungary.

## 5.5 Recommendations for DRM agenda

In the long-term, Serbia would benefit from enhancing its capacity to resist, cope with, and recover from adverse natural events. This would require the country to elevate the DRM agenda which encompasses a wide range of activities and measures, ranging from traditional risk mitigation through structural engineering measures, such as floods protection systems, to preparedness through non-structural measures such as risk-informed spatial planning, enhanced weather forecasting and early warning, and disaster risk financing and insurance solutions.

### 5.5.1 Understanding Risk

Risk information provides a critical foundation for reducing and managing disaster risk. At the community level, an understanding of hazard events can inform and influence decisions on preparedness, the location of important facilities, and life-saving evacuation procedures. Moreover, robust risk analysis can inform planning, design and construction processes to ensure the resilience infrastructure in the event of a disaster, including floods protection structures. Finally, sovereign risk financing and insurance would be impossible without a detailed understanding of annual average and probable maximum losses and analysis of uncertainty.

Serbia has limited data on the impact of past disaster events. Despite Serbia's recurrent experience with adverse natural events, the total fiscal and economic impact of these events

has not been systematically assessed. International experience shows that the inability to quantify the problem often results in an underestimation of the full cost on the economy. As such, Serbia would benefit from conducting post-disaster need assessments, including damages and losses, after every disaster.

There is a need for generating more information on risk. While a number of geographic and hazard specific assessments have been conducted (for example, in the Danube river basin to abide by the EU Floods Directive), there has been no comprehensive national level risk assessment. In addition, these assessments have only focused on flooding of larger and smaller rivers, excluding the risk of flooding caused by torrents. Effective floods risk management will require a better understanding of the causes of different types of flooding, their probabilities of occurrence, and their expression in terms of extent, duration, depth, and velocity. In this context, it will also be essential to understand how floods risk will evolve over time given the changing climate.

Sharing and communicating risk information among stakeholders remains limited. Risk assessments are inherently multi-institutional, and no single agency can be solely responsible for generating, communicating, and using risk information. This will require strengthening Serbia's institutional mechanism and policies on sharing spatial data and other risk information among stakeholders.

### 5.5.2 Risk reduction

Strong institutions, policies, and regulations provide an essential framework for integrating risk reduction considerations into land use planning and sector investment programs. While Serbia has made progress in terms of establishing an enabling policy and legal environment, the institutional capacity to facilitate risk reduction needs to be strengthened. Specific activities to achieve this objective include: (i) convening Government across ministries and agencies to reach consensus on level of risk; (ii) facilitating partnerships between Government and scientific and research institutions; (iii) supporting national and local Governments to effectively undertake its oversight and regulatory mandates, and (iv) enhancing monitoring and evaluation of public infrastructure projects.

Serbia would benefit from developing strategies to integrate risk considerations into sector investments. The objective of these strategies should be to avoid the creation of new risks and reduce existing risks to which the sectors are exposed. Examples of activities include: (i) conducting portfolio analysis of vulnerable sector-specific building stock; (ii) supporting the use of hazard/risk assessments to guide the selection of suitable site locations and prioritization of infrastructure at risk; and (iii) conducting cost-benefit analysis of potential risk reduction interventions, while considering their social and environmental impacts.

### 5.5.3 Early warning and preparedness

#### Early Warning

Serbia has made significant investments in hazard forecasting and hydrometeorological early warning systems. The Republic Hydrometeorological Service of Serbia (RHMSS) currently has a functional and relatively robust hydrometeorological monitoring network which includes: 66 surface weather stations, 97 climatological stations, 530 rainfall stations, 4 agro-meteorological stations, 1 upper air station, 2 modern weather radars, 77 surface reporting stations, 133 automatic and analog water level recording stations, 406 ground water stations, and 152 discharge measuring stations. This allows RHMSS to deliver real-time meteorological and hydrological data to the Sector for Emergency Management (SEM), including observations, various forecasts across short, medium and long timescales, and warnings.

The recent floods event shows that early warnings need to be more timely and accurate and properly reach local communities. Serbia would benefit from further strengthening of the current legal and regulatory framework to address any gaps related the dissemination of warnings of extreme meteorological and hydrological events. In addition, capacity assessment of the hydrometeorological services will be beneficial to better understand how they can be improved, including ways to issue alerts for short-term events and localize them more accurately. Furthermore, it would be important to improve operational procedures to ensure local communities can be prepared. This would require investing in reliable information and communication technologies to strengthen last-mile warning dissemination mechanism.

Moving forward, there is also a need for additional investments in RHMSS' end-to-end production system. RHMSS has the organizational and technical capacity for providing high quality service, but would benefit from further investments in the hydrometeorological observing networks, forecasting capabilities, and product delivery. This could include, for example, improving national weather radar coverage, numerical weather prediction and data assimilation capacity, operational databases, telecommunications and high performance computational resources. Moreover, with many productive sectors exposed to weather and climate, Serbia's economy would benefit from optimized production informed by better hydrometeorological information. This could include investments in the climate watch system and the agro-meteorological observing network.

#### Preparedness

Budget constraints and lack of investment in human capacity is curtailing the effective implementation of the Serbian emergency response system. Adequately trained and equipped protection and rescue personnel are essential to an effective emergency response. While the number of professional firefighters and rescue workers is still below internationally recognized minimum standards and is lacking in technical capacity, recent progress has been made. In 2013, the Government increased its roster of professional firefighters and rescue workers from 3,000 to 3,500 and established the National Emergency Training Centre to provide training for members of professional and voluntary firemen and rescue services, as well as citizens who take part in civilian protection. More investment, however, is needed to increase the number of personnel and to finance training and education.



Similarly, the lack of adequate investment in the operation and maintenance of existing equipment, as well as the replacement of old equipment is posing a serious challenge. The current inventory features equipment, such as vehicles, boats, pumps and fire protection equipment that is outdated and unreliable which leads to a slower and less effective emergency response. There is also a lack of specialized vehicles and equipment for responding to chemical accidents in road, rail and river transport. It is important to improve the personal equipment of the protection and rescue units, in particular those of the firefighting and rescue services.

#### 5.5.4 Financial protection

Even with a robust DRM approach Serbia could still be exposed to budget shocks caused by major disasters, which could erode its economic and fiscal position. A disaster risk financing strategy can help ensure that the Serbian Government, businesses, and people can access financial protection, like adequate budget reserves, and risk transfer solutions, such as insurance.

Catastrophe insurance and weather risk coverage remains almost non-existent, but efforts are underway to change this. The problem of low penetration of catastrophe insurance is caused by a number of factors, including the lack of understanding of the need for and the benefits of catastrophe insurance; the reluctance of local private insurers to offer this type insurance, the absence of reinsurance due to the high costs associated with risk modeling and the development of catastrophe insurance products, and limited technical capacity of local insurers to meet the high risk management requirements for catastrophe risk financing. In order to overcome these challenges, Serbia joined the SEEC Catastrophe Risk Insurance Facility in 2012. Pilot sales of insurance policies are expected to start this year.

Moving forward, Serbia would also benefit from establishing a national disaster funds to ensure fast disbursement and execution of financial resources in the aftermath of a disaster. Global experience shows that without appropriate post-disaster funding arrangements the adverse socioeconomic impact of disaster can be exacerbated. A dedicated financial mechanism would allow Serbia to conduct transparent and efficient post-disaster damages assessments of public infrastructure, mobilize immediate funding post disaster, and execute the funds in close collaboration with relevant line ministries and public agencies. This, in turn, would enable Serbia to better manage the budget volatility potentially associated with disasters.

#### 5.5.5 Resilient Recovery

Serbia would benefit from promoting the use of Post Disaster Damages and Needs Assessments (PDNAs) and Recovery Frameworks (RFs) to guide the recovery process. Building on the recent experience, Serbia should work on promoting the use of the PDNA methodology to guide recovery processes in the future. Serbia could focus on integrating the methodology into national and local governance systems. This would require building the capacity of national and local Government staff, private sector, academia, and civil society in conducting PDNAs. Subsequently, Serbia could also expand from the PDNA methodology to



the Recovery Framework methodology which is currently being developed by the World Bank, UNDP, and the EU.

Serbia should consider adapting a comprehensive tracking system to monitor the flow of all public spending in response to disasters, including the source of related funding. Systematic tracking systems are essential in order to effectively manage disaster response efforts, identify gaps in funding, support accountability, and draw lessons learned for potential improvements in disaster risk financing arrangements.

Strengthening the coordination of recovery actors to avoid gaps and increase focus on resilient recovery interventions should be considered. This will first require Serbia to ensure that governance models for recovery that establish roles and responsibilities for all actors include mechanisms to hold all stakeholders accountable. Second, the Government should use the recovery planning process to align all actors behind its risk reduction agenda.

# ANNEX I

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