



# BOSNIA AND HERZEGOVINA FLOODS, 2014

## RECOVERY NEEDS ASSESSMENT



WORLD BANK GROUP

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## List of Acronyms

Abbreviation	Definition
ADC	Austrian Development Cooperation
BAM	Bosnia and Herzegovina Convertible Marka
BBB	Build Back Better
BD	Brcko District of Bosnia and Herzegovina
BHMAC	The Bosnia and Herzegovina Mine Action Centre
BiH	Bosnia and Herzegovina
CDS	Country Development Strategy
CEDAW	Convention to Eliminate all forms of Discrimination against Women
CFW	Cash for Work
CSOs	Civil Society Organisations
GDP	Gross Domestic Product
DEZA	Swiss Agency for Development and Cooperation
DFID	The Department for International Development (United Kingdom)
DG ELARG	Directorate-General for Enlargement
DRR/DRM/CCA	Disaster Risk Reduction/Disaster Risk Management/Climate Change Adaptation
EC	European Commission
EEAS	European External Action Service
ECHO	Humanitarian Aid and Civil Protection of the European Commission
EFD	European Floods Directive
EP	Elektroprivreda
ELA	Employment and Livelihoods Assessment
EOD	Explosive Ordnance Disposal
EU	European Union
EUD	Delegation of the European Union to Bosnia and Herzegovina
EU FPI	Service for Foreign Policy Instruments
EUFOR	EU Force
EUD JCR	EU Joint Research Centre
ERW	Explosive Remnant of War
FAO	Food and Agriculture Organisation
FASRB	Framework Agreement on the Sava River Basin
FBiH	Federation of Bosnia and Herzegovina
GIS	Geographic Information System
GFDRR (WB)	Global Facility for Disaster Reduction and Recovery
HH	Households

HIF	Health Insurance Fund
IDP	Internally Displaced Persons
IFI	International Financial Institutions
ILO	International Labour Organisation
IMAS	International Mine Action Standards
IOM	International Organisation for Migration
IPA	Instrument for Pre-Accession Assistance
LFS	Labour Force Survey
MFIs	Monetary Financial Institutions
MHRR	Ministry for Human Rights and Refugees
MoAFWM RS	Ministry of Agriculture, Forestry and Water Management of Republika Srpska
MoFTER	Ministry of Foreign Trade and Economic Relations
MRE	Mine Risk Education
MTDS	Medium-Term Development Strategy, originally PRSP: Poverty Reduction Strategy Paper
NATO	North Atlantic Treaty Organisation
NCD	Non-Communicable Disease
NGO	Non-Governmental Organisation
NPA	Norwegian's People Aid
OECD	Organisation for Economic Co-Operation and Development
OSCE	Organisation for Security and Co-Operation in Europe
PHI	Public Health Institutes
PDNA	Post-Disaster Needs Assessment
PTSD	Post-Traumatic Stress Disorder
RNA	Recovery Needs Assessment
RS	Republika Srpska
SAA	Stabilisation and Association Agreement
SEE	South East Europe
SEETO	South East Europe Transport Observatory Network
SHA	Suspected Hazardous Areas
SIS	Social Inclusion Strategy
SME	Small and Medium Enterprises
ToT	Training of Trainers
UN	United Nations
UNICEF	United Nations Children Fund
UNISDR	United Nations Office for Disaster Risk Reduction
UNDP	United Nations Development Programme
UXO	Unexploded Ordnance
ToR	Terms of Reference

WB/IBRD	World Bank
WFD	Water Framework Directive
WHO	World Health Organisation
WHOPES	WHO Pesticide Evaluation Scheme
WMO	World Meteorological Organisation
WNV	West Nile Virus
WSS	Water Sanitation System
VET	Vocational Education and Training

## Foreword / Acknowledgements

BiH authorities at all levels prepared the present report: the Council of Ministers of BiH, with the support of the governments of Republika Srpska (RS), the Federation of Bosnia and Herzegovina (FBiH) and Brcko District of Bosnia and Herzegovina (BD). The European Union (EU), the World Bank (WB/IBRD) and the United Nations (UN) provided technical and financial support.

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Special mention must also be made of the contribution and support received from the focal points of BiH authorities at all levels and numerous other officials from institutions across Bosnia and Herzegovina.

The team shown below in alphabetical order designed, planned and consolidated the Recovery Needs Assessment (RNA).

**Government focal points at all levels:** Haris Abaspahic (Advisor to the Prime Minister of the Federation of BiH), Radmila Mihic (Assistant Minister of the Ministry of Finance of Republika Srpska), Mato Lucic (Director of the Brcko District Finance Directorate), Lazar Prkacin (Advisor to the Chair of the Council of Ministers of BiH), and Miroslav Tomic (Advisor to the Minister of the Ministry of Finance and Treasury of BiH).

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Six sectoral groups carried out sector and thematic assessments and three groups dealt with crosscutting issues. Each group integrated officials from the Council of Ministers of BiH, the governments of Republika Srpska, the Federation of Bosnia and Herzegovina, and Brcko District of Bosnia and Herzegovina and specialists from international partners. (See list in annex).



## EXECUTIVE SUMMARY

The authorities of Bosnia and Herzegovina at all levels assessed the post disaster recovery needs stemming from the devastating floods that affected Bosnia and Herzegovina 14-19 May 2014. Within the framework of the joint declaration signed in 2008, the European Union, United Nations and the World Bank supported this process by providing resources and technical advice. The assessment, conducted over three weeks from 25 May to 17 June, reflects the damage, effects, impact and needs based on the information available at the time of writing.

### ***Methodology***

The assessment made use of data from the existing secondary sources, from reports and records provided by the different levels of government and relevant sector agencies as well as information from other available sources, including maps, records and media reports. To complement and validate the collected information, primary sources on the effects and needs, including rapid surveys on livelihoods, housing and government services and facilities, were used.

The assessment undertaken covered six sectors and three thematic groups. Experts from BiH authorities at all levels as well as local institutions collaborated with international experts. A methodological training workshop familiarised all actors concerned with a common methodology based on best international practice and standards. Sector teams visited the affected areas across the country in order to consult with the entity, cantonal and municipal authorities, other relevant public/community representatives, NGOs, and other stakeholders, including UN and EU operations on the ground. No less than 26 municipalities of specific thematic or sectoral interest were visited, several of them more than once.

### ***Characterisation of the event***

Extraordinary rainfall affected Bosnia and Herzegovina between 14 and 19 May 2014, the largest level of precipitation in 120 years. The waters surpassed retention barriers of soil and slopes. The effects were aggravated by pre-existing environmental degradation factors such as deforestation, erosion of riverbeds and construction in hazardous risk exposed areas.

The whole of the watershed leading to the River Sava was overwhelmed and peaked, generating flash floods and carrying debris downstream creating a path of destruction and desolation. This accumulated downstream flow of water, mud and debris caused widespread flooding along the plain. Drainage from the plain was made impossible as the River Sava peaked, which caused the retention of water in lowland area for a long period.

A large number of municipalities immediately declared an emergency, while others did so at a later stage. It is estimated that 81 municipalities in BiH suffered damage, losses, social and/or environmental impact of varying degrees. Around 90,000 people became displaced as their houses were affected, either destroyed or damaged, and more than 40,000 took refuge in public or private shelters or moved in temporarily with relatives or friends. They continue to depend on government support and international assistance.

### ***Quantification of the damage, losses and effects***

The assessment provides a quantification of the partial or total physical destruction of assets, namely damage that will have to be repaired or reconstructed. It also provides an estimate of the related losses, including the loss of production, income, livelihood and employment as well as diminished access to services and goods, increased costs for society and government, and altered risks.

*Table 1- Summary of damage, losses and needs*

Millions of EUR	Damages	Losses	Total
Agriculture	104,349,560	82,865,075	187,214,635
Education	8,037,508	664,679	8,702,188
Energy	49,666,893	52,294,934	101,961,827
Floods protection	49,237,408	-	49,237,408
Health	5,792,937	47,130,886	52,923,823
Housing and household items	424,781,295	28,427,829	453,209,123
Livelihoods and Employment	346,553,637	446,490,748	793,044,385
Public Services and Facilities	18,365,604	9,049,866	27,415,471
Transport and Communications	261,760,991	85,937,939	347,698,931
Water and Sanitation	5,440,146	2,070,732	7,510,878
Gender	-	8,461,881	8,461,881
<b>Total</b>	<b>1,273,985,980</b>	<b>763,394,569</b>	<b>2,037,380,549</b>

In sum, the total economic impact of the disaster (destruction or severe damage to property, infrastructure and goods as well the effects of destruction on livelihoods, incomes and production, among other factors) is estimated to have reached 2.04 Billion EUR<sup>1</sup>. Most of it impacted the private sector; families, small, medium and large businesses, and agricultural producers, including an undefined number of vulnerable sectors of the population. For the Federation of Bosnia and Herzegovina the total effects (damages and losses) are 1.04 Billion EUR, with 968.30 Million EUR for Republika Srpska and 29.60 Million EUR for the Brcko District of Bosnia and Herzegovina. The level of damage and

<sup>1</sup> Exchange rate 1 USD = 1.95583 BAM

sectors affected was not homogenous amongst the municipalities, because the damage had different characteristics (landslides, floods, erosion, etc.) and touched different sectors of activity and segments of society differently.

In addition, landmines and unexploded ordnance (UXO) contaminated 70% of the flood-affected zone; floodwaters and landslides may have displaced them from their original marked locations. Similarly, mine awareness signs were also washed away. The presence of these explosives and the work necessary for their location and deactivation is expected to complicate the reconstruction tasks and severely increase the financial burden of recovery.

It is noteworthy that the major damage occurred in houses, thus having an immediate effect on human and social conditions. The fact that damage to production and economic activity, infrastructure and assets was also severe further aggravated the conditions.

Damage to other infrastructure, namely electricity and energy, was not as severe, although the energy and water distribution lines were compromised temporarily and one electricity generating plant lost its fuel stock (coal).

This destruction of or damage to material assets led to various types of impact. Firstly, there were the losses in terms of productive capacity and livelihood with the potential consequence of aggravating unemployment and increasing poverty levels amongst the most vulnerable sectors of society.

The production sector most severely affected was agriculture, as is to be expected given the extent and duration of the flooding in rural areas. The negative impact in terms of animal stock and other assets, such as farms, storage and warehouse facilities, rural roads, irrigation canals and machinery, has been intensified by the loss of crops, plantations and animal rearing, ranging from cattle to poultry and other minor species.

The important distinction between damage and losses is that the latter has dynamic implications in terms of reduced access to services and goods, increased risks and vulnerabilities and requires change to increase future resilience, namely direct actions in support of vulnerable population groups.

Furthermore, damage to public infrastructure, from municipal buildings to other public services, disrupted their activities generating negative effects for the population. However, the authorities proved to be up to the task and rapidly mobilised to respond to the emergency and assisted the population to the extent of their possibilities and means. In this context but disregarding social or other conditions, it bears emphasis that human solidarity was a positive element that arose from this crisis.

An important distinction should be made in terms of whether the damage and losses were in the public or private sector, the latter being the one that suffered most (75%). This means that it is the citizens, families, small businesses and vulnerable groups, many of which have little capacity to overcome these difficulties on their own, that have suffered the

most. This implies that they require government support in order to return to the path that the country needs to pursue: leading to jobs, growth and the goal of increased prosperity.

### ***The post disaster needs***

The nature of the disaster makes evident a series of needs that range from the reconstruction to the strengthening of the infrastructure and making it more resilient to events like the current disaster, which are more likely to occur in the future given the worldwide trend of climate change. The country has not yet completely recovered from past crisis and the accumulated vulnerabilities, such as recent floods in previous years and the remaining war-related issues, most notable the continued presence of landmines and unexploded ordnance (UXO).

In respect to the latter issue, the flooding aggravated a well-known problem and major social and international concern. These objects may have been displaced and moved carried by the torrents and may have been covered by the layers of mud, especially in landslide affected areas. A rapid action in this field impeded the tragic occurrence of deaths and/or accidents, while ongoing inspections indicate that the migration of these as well as remaining stocks of weapons under civilian possession along with the replacement of mine danger signs represents a security threat that must be addressed. There is the need to mark and clear these elements from effected locations and reinforce security measures.

*Table 2 - Summary of Recovery and Reconstruction Needs*

Millions of EUR	Recovery Needs	Reconstruction Needs
Agriculture	34,880,332	10,568,403
Education	5,317,436	8,845,350
Energy	3,415,430	60,695,459
Flood protection	-	183,451,527
Gender	47,386,532	5,792,937
Health	7,689,830	419,709,279
Housing and household items	93,893,641	442,267,477
Livelihoods and employment	10,174,708	20,630,627
Public Services and Facilities	-	353,374,271
Security	3,860,254	5,440,146
Transport	8,973,173	-
Water and Sanitation	39,717,153	
<b>Total</b>	<b>255,308,488</b>	<b>1,510,775,476</b>

These needs will spread over the short, medium and long term based on priorities established and agreed at all levels by the government of BiH and based on the mobilisation of resources, both internally in the budget and external, as agreed with the international donor community and the IFIs. An important consideration for the scheduling of expenditure and investment for the recovery and reconstruction effort is the absorptive capacity of the economy: not to alter or increase the imbalances, fiscal and commercial, that the country had prior to the disaster.

*Table 3 - Scheduling of recovery and reconstruction needs*

	Short-term	Medium-term	Long-term
Recovery Needs	131,079,900	91,730,876	32,497,712
Reconstruction Needs	521,160,837	630,414,709	359,199,930

### ***The implications of the disaster's impact and the recovery and reconstruction needs***

The floods are estimated to have caused the equivalent of nearly 15 percent of GDP in damages (9.3 percent of GDP) and losses (5.6 percent) in 2014 in Bosnia and Herzegovina (BiH). This amounts to around 1.27 Billion EUR of damages and 763.39 Million EUR of losses. The hardest hit economic sectors were agriculture, transport and productive activities. As a result, the economy of Bosnia and Herzegovina is expected to contract by 0.7 percent in 2014. The floods are expected to put further strain on public finances, raising the fiscal deficit from a baseline of 2 percent of GDP to 4.5 percent in 2014. A significant public sector financing gap of 1.7 percent of GDP has opened up, despite identified additional (to pre-floods needs) financing from domestic and international sources. The trade deficit is likely to come under pressure, widening to 34 percent of GDP in 2014 while the current account deficit is projected to increase from the baseline 7.8 to 9.7 percent of GDP in 2014.

### ***Some considerations on how the recovery is to be addressed***

Certain issues that must guide the recovery process can be indicated from the outset. The recovery strategy is to be framed within long-term programmes and plans.

Disaster risk reduction is to be introduced systematically into the country's strategic vision alongside resilience building, as new vulnerabilities and fragilities will have been created by the disaster.

This implies that previous priorities will be re-contextualised in the face of arising opportunities. As such, it must be taken into consideration that the disaster can create a

new possibility for prosperity through job creation programmes that could help jumpstart and expand growth through the recovery process and reconstruction investment.

Furthermore, an integrated perspective on security and risk reduction should be seen as a factor of competitiveness. Thus, adaptation to climatic variations and climate change generates resilience and a risk reduction factor. Energy efficiency in this context offers clean production as green development not only mitigates climate change but also generates competitiveness.

Certain strategic considerations should act as guiding principles for the recovery, such as:

- gender equality and non-discriminatory treatment generate prosperity, they are not just a factor of equity;
- disaster risk reduction is a means of competitiveness as it avoids negative impact on the economic performance of enterprises and the economy in general;
- unresolved security issues associated with landmines and UXO remain a risk in human, economic and social terms and should be addressed as a priority;
- the impact of the disaster on the public administrations, through disruption of their activities, causes temporary personal and institutional losses;
- inter-sectoral linkages create positive synergies for the recovery and reconstruction process; and
- rapid recovery of growth and economic dynamism are tied to the effective utilisation of financial mobilisation of resources.

There is a need to establish an integrated holistic perspective in the face of disaster risk reduction because it is to be seen as synergic to competitiveness.

Finally, the findings pose a challenge to the country for a number of reasons:

- the scale of the damage places pressure on the investment capacity and absorption ratio;
- the amount of losses impacts negatively on GDP;
- food insecurity poses a threat, as major agricultural areas have been affected;
- balance of payments deficit; and
- potential increase in poverty.

In the face of these challenges and observed consequences, the disaster brings certain issues that need to be addressed to the fore

- Incentives and support for the revitalisation of economic activity in affected depressed locations will generate demand and income and allow for a refocusing of goals, given the existing pre-disaster challenges and slow economic performance.

- Higher reconstruction investment costs should be seen as risk reduction considerations that will lead to more sustainable development.
- Increased resilience will reduce the vulnerabilities and risks that the disaster has exacerbated by such as:
  - better protection against flooding and integrated watershed management and control,
  - integrated early warning systems, and
  - stabilisation of slopes and improved protection of areas where landslides pose an existing or new threat.

The international community and most certainly the EU stand ready to support Bosnia and Herzegovina in these difficult circumstances and to move beyond the humanitarian emergency phase as part of their commitment. Disasters always create an opportunity for improvement and forward looking thinking. This may also be the case here.

## PART 1 - IMPACT AND EFFECT OF THE DISASTER

### 1. INTRODUCTION

On the basis of the 2008 EU, UN and the World Bank Joint Declaration to respond to crisis and requests for an assessment from Government, the three partners responded immediately to Bosnia and Herzegovina's request by deploying specialists for a floods recovery needs assessment mission. A Coordination team comprised from the three institutions and focal points from the Council of Ministers of BiH, the Federation of Bosnia and Herzegovina (FBiH), Republika Srpska (RS) and Brcko District of Bosnia and Herzegovina (BD) was formed to ensure completion of the assessment in accordance with the agreed Terms of Reference (see Annex 1). The assessment, which incorporated representatives of BiH authorities at all levels and other relevant international and national stakeholders and technical sector experts, took place from 25 May to 17 June (see table); the results are summarised in this report.

*Table 4 - Calendar for conducting the Recovery Needs Assessment*

Activity	Completion Date
Formation of the Coordination Team, collection of Baseline data	25-28 May
Orientation training on the methodology	29-30 May
Mobilisation of sector teams	30-31 May
Field visits by the sector teams	31 May - 6 June
Data analysis and preparation of sectoral reports	7-14 June
Finalisation of the sector annexes and the main report	15-17 June
Preliminary presentation of the report	18 June
Revision of some sectors	18 June – 7 July
Presentation of results at Donors Conference Preparatory Meeting (Paris)	8 July
Donors Pledging Conference organized by France, Estonia and the UE (Brussels)	16 July

The purpose of the assessment was (i) to conduct a thorough damage, loss and recovery needs assessment (including the cost of damage and losses in terms of physical structures, disruption of essential public services, alteration of community processes and disruption of the governance process) with a view to determining the socioeconomic impact of the disaster; (ii) to establish and cost the identified needs in all key sectors and (iii) to formulate a recovery strategy for early, medium and long term recovery and reconstruction. The flood related recovery needs will undoubtedly require a review and, as appropriate, revision of the existing strategies to reduce risk and build and repair in a manner that reduces the vulnerabilities exposed by the disaster. This means to 'build back better', which is an internationally recognised criteria for post disaster recovery processes. This includes the identification of new emerging activities associated with the recovery and reconstruction effort proposed after the current disaster.



Importantly, the assessment provides an analytically and quantitatively sound basis for the mobilisation and coordination of resources, including those of the European Union, the World Bank, the UN system and international donors, through the implementation of the recovery results framework, including early recovery needs. No less importantly, the assessment will be a useful guide for the country as a whole, with each level of government affected setting the priorities and sequencing for the recovery.

The assessment provides a government owned report technically supported internationally and based on internationally and well-recognised methodologies and tools<sup>2</sup>. The methodology integrates multiple methodologies for assessment of the impact of the disaster on the flood-affected areas. This includes a comprehensive assessment of the effects and impact of the disaster from the municipal to the state level, combining the social, economic and financial aspects. It takes into consideration early recovery requirements as well as longer-term rehabilitation and reconstruction needs and includes the identification of disaster risk management measures designed to mitigate the occurrence of future disasters.

The assessment made use of data from existing secondary sources, from reports and records provided by different levels of government, relevant sector agencies and information gleaned from all available sources at the time of the assessment, including maps, records and media reports. Primary sources on the effects and needs were sought in order to complement and validate secondary sources, this included rapid surveys on livelihoods, housing and government services and facilities.

Six sectors and three thematic groups were integrated<sup>3</sup> to undertake the assessment with the participation of a wide range of representatives from all levels of the BiH authorities as well as sector institutions. These groups were formed during a methodological training workshop hosted by the EU Delegation on 28-29 May and attended by more than 100 experts from all of the institutions concerned (see the list of participants in annex). As part of the assessment, selected sector teams were mobilised to visit the affected areas in both entities and BD in order to consult with cantonal, municipal and district authorities, other relevant public/community representatives, NGOs and other stakeholders, including UN and EU operations on the ground. No less than 26 municipalities were visited, several of which were visited more than once, to assess different thematic issues or sectors and validate the secondary data on the level of damage and losses (see the list of field visits in annex).

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<sup>2</sup> To be undertaken in accordance with the internationally agreed Post Disaster Needs Assessment methodology (PDNA) adjusted to the institutional and specific contextual process agreed with the Council of Ministers of Bosnia and Herzegovina.

<sup>3</sup> The sector teams combined expertise along the six priority sectors agreed: entities:

1. Transport and communications
2. Energy
3. Housing, Facilities and Services
4. Agriculture, Livestock, Fisheries, and Forestry
5. Water and Sanitation (including flood protection)
6. Livelihoods and Employment (in the relevant production sectors and commerce)

The crosscutting issues addressed through the assessment of the above-mentioned sectors were the following: gender and vulnerable groups, disaster risk reduction taking into account relevant environmental aspects, and Security and Landmines.

### 1.1 Brief description of the disaster

Extraordinarily heavy rains fell over Bosnia and Herzegovina (BiH) during the third week of May causing massive flooding in the northern, eastern and central parts of the territories bordering Croatia and Serbia. A low-pressure area designated 'Yvette' or 'Tamara' affected a large area of South-eastern and Central Europe, causing floods and landslides. These regions received more than 250 (in some areas up to 300) litres of rain per square metre, the highest amount measured in the country in the last 120 years. This rainfall caused sudden and extreme flooding of several rivers (Bosna, Drina, Una, Sava, Sana, Vrbas) and their tributaries as well as landslides. Urban, industrial and rural areas were completely submerged under water, cut off without electricity or communications and with damage to roads and transport facilities. Consequently, a vast number of houses were destroyed damaged or left underwater, leading to a significant number of displaced households. The effect on production activities and basic and social services varied; however, there was a particularly large impact on the agriculture sector and small and medium commerce and activities in urban areas, which affected livelihoods and generated a potential food supply deficit. The intensity of the rains experienced during this short period is considered to have caused the most serious natural disaster in the country in the past 120 years, affecting approximately one-third of the country and touching more than one million people (more than fourth quarter of the population of 3.8 million). The disaster affected both BiH entities and Brcko District of Bosnia and Herzegovina.

Map 1 - General view of flooded area in BiH



**Source:** UN ReliefWeb - Flooded areas by Prof. Stephen Sterco (Department of Geography, University of Zagreb)

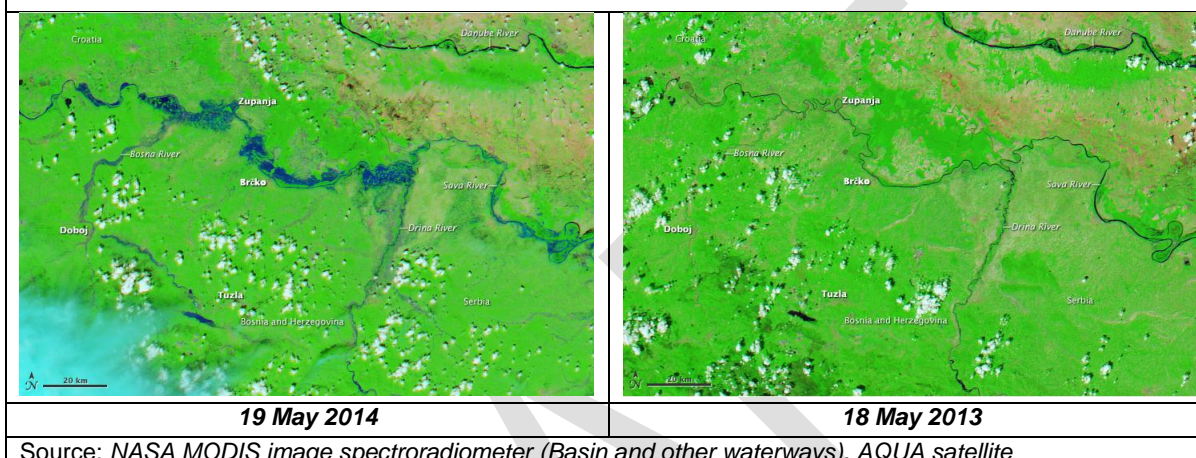
Indeed this was a regional event that spanned the whole of the Balkan region with severe but differentiated impacts also in Serbia and Croatia. The extraordinary flow and rise in river levels in all three countries evidenced the importance of enhanced flood protection and watershed management in general. The large number of landslides that occurred and the increased instability of slopes is a factor that will lead to the inhabitability of some locations and the redesign of some major roads.

In the case of BiH, an additional security hazard is linked to the fact that landmines contaminated over 70% of the flood-affected zone. Floods and landslides have caused some landmines and UXO to migrate.

Mine warning signs have been washed away or displaced. As the waters recede and the clean-up tasks are undertaken locating and deactivating landmines and UXO will enhance the difficulty and cost of the process, in some instances delaying the possibility of the early recovery of activities and the return of households to their homes.

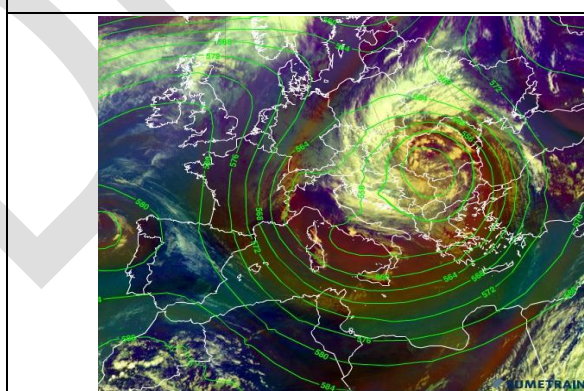
The area covered by the flood illustrates the climatic phenomenon's extraordinary character (see figure for a comparison between May 2013 and 2014).

*Map 2 - Comparison of satellite images*



The amount of rainfall in BiH and the rapidly increased water levels in the river basin flowing from the elevated part of the country to the plains bordered by the River Sava (see graphs below) was caused by a severe climatic disturbance that reached the characteristics of a hurricane.

*Map 3 - Satellite image of the storm covering the Balkans  
(15 May 2014)*



Altitudinal flow at 500 hpa on 15 May at 00 o'clock UTC time (for us +2 hours) and satellite images  
Source: EUMETSAT RGB abundance associated cloudiness and atmospheric physics

The detailed consequences of this in terms of daily and accumulated rainfall, as registered by the meteorological stations, are presented below. As the saturation of rivers began the

flow from the tributaries downstream caused flash floods and extended inundations that have not been able to drain as the major river receiving them, the Sava, still maintains above normal water levels.

Table 5 - Daily and cumulative rainfall between 12 and 20 May 2014 (mm)

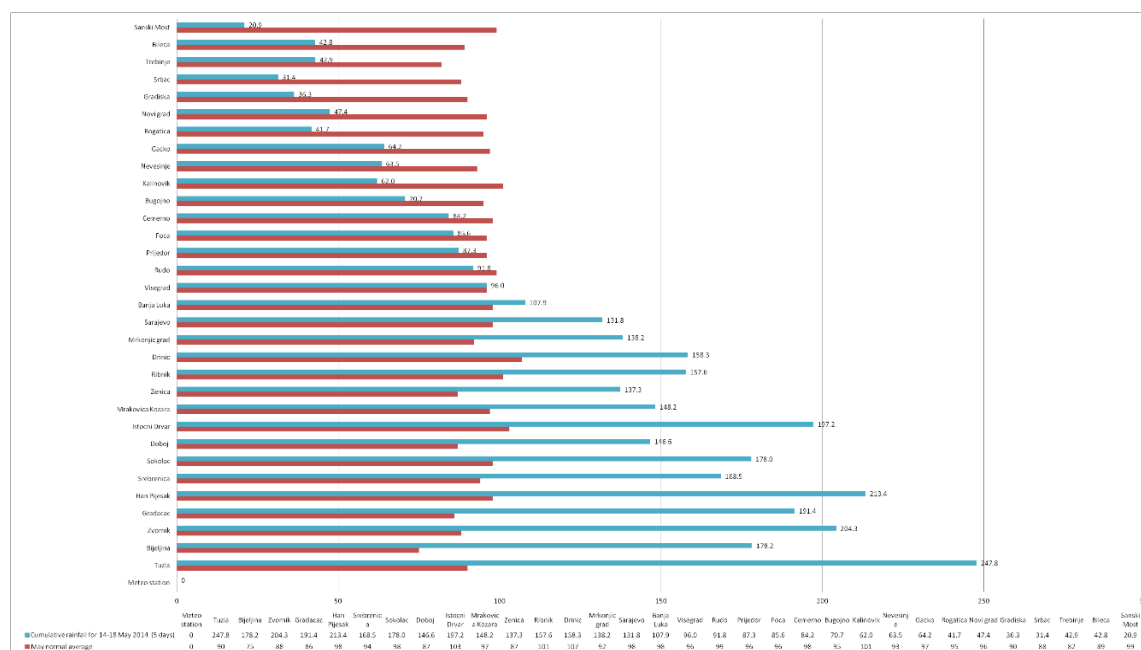
Station	12 May	13 May	14 May	15 May	16 May	17 May	18 May	19 May	20 May	Cumulative rain 12-20 May
Tuzla	4.9		48.8	94.6	89.4	15				252.7
Han Pijesak	9.3	3.5	60.5	103	41.7	6	2.2	0.4		226.6
Zvornik	7.5		50	86	60.5	7.8		5.8		217.6
Istocni Drvar	13.4	2.6	30.7	46.3	89.6	28.7	1.9			213.2
Gradaèac	3.3	0	43.6	65.5	69	13.3	0	4		198.7
Sokolac	11.2	2.4	73.4	72.3	28.1	3.6	0.6		0.2	191.8
Srebrenica	8.4	5.4	62.8	77.7	23	3.4	1.6	7		189.3
Bijeljina	0.6		26.8	89.2	45.2	17				178.8
Drinic	19.7		16.1	36.3	80.7	23.4	1.8			178.0
Ribnik	13.8	0.2	27.4	38.2	78.4	11.2	2.4			171.6
Mrakovica kozara	15.5	3.9	4.7	6.6	63.2	70.2	3.5	0.2		167.8
Doboj	4.6		32.9	61.2	30.5	22				151.2
Mrkonjic grad	11.2		23.7	36.8	66.8	8.9	2			149.4
Sarajevo	14.1	0.1	73.3	41	13.4	2.9	1.2	0	0	146.0
Zenica	4.3	0.1	47.9	51.8	31.9	4.9	0.8	0.1		141.8
Banja Luka	11.8	1.4	17.7	21.7	32.1	36	0.4			121.1
Visegrad	3.6	8.9	44.8	32.3	7.2	4.1	7.6			108.5
Prijedor	17.8	3.1	1.4	5.6	55.8	23.8	0.7	0.2		108.4
Rudo	0.3	9.2	36.1	34.1	13.2	3.1	5.3			101.3
Foca	0.8	7.8	60	19.6	2.1	1.1	2.8			94.2
Banja Mljecanica	24.5	2		1.5	32.5	30				90.5
Cemerno		5.3	57.9	8.7	3.4	5.5	8.7	0.2	0.1	89.8
Novi grad	32.4	2.6	2.5		17.6	25.5	1.8	0.3		82.7
Bugojno	5.4	0.7	43.7	10.7	14.3	1.6	0.4	0.2		77.0
Kalinovik	4	6	47	11	2	1	1		0	72.0
Nevesinje	1.5	3	51.5	0	5.5	3	3.5			68.0
Gacko		1	52.7		2	2.8	6.7	0.1	0.1	65.4
Rogatica	14	2.5		36.3		3.6	1.8	2.2		60.4
Gradiska	11.9	3.6	0.4		7.3	28.3	0.3			51.8
Bileca			32.8	0.8	2.8	5	1.4		0.4	43.2
Trebinje			17.2	12.6	0.4	0.6	12.1		0.2	43.1
Sanski Most	15.3	2.1	12.7	8.2						38.3
Srbac	3.5	1.5	4.5	3.5	8.2	15.2		0.5		36.9

Please note: Red letters indicate the day of heaviest rain recorded for that station.  
Source: Federal and RS meteorological reports

In the case of the Tuzla station, the normal rainfall for the month of May is 90 mm whereas this year over the period 14-18 May 247.8 mm was registered (normal yearly rainfall is 911 mm). In many cases, meteorological stations in the affected municipalities registered more

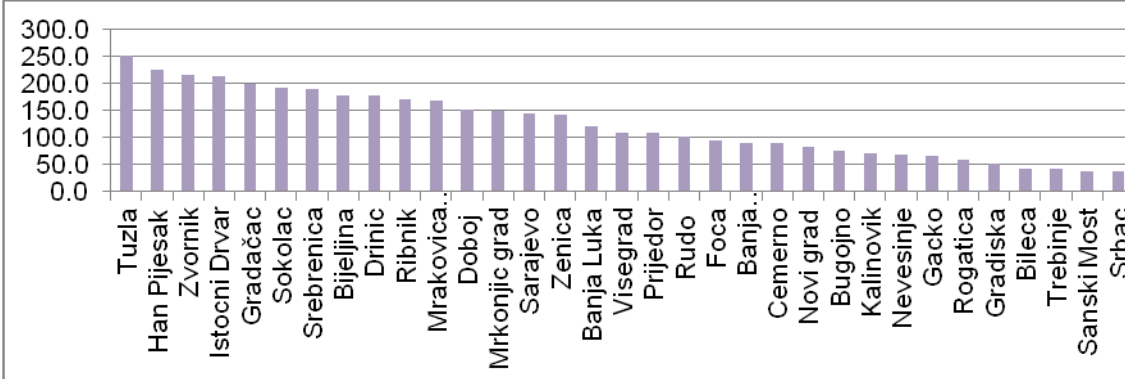
than half of their annual average rainfall over a period of five days. The graph indicates the percentage of normal average rainfall for the month of May that fell during five days this year (14-18 May 2014).

Graph 1 - Comparison of five days rainfall (14-18 May) to the monthly average



Source: Federal and RS meteorological offices. CRU CL 2.0 for averages, which is described in New, M., Lister, D., Hulme, M. and Makin, I., 2002: A high-resolution data set of surface climate over global land areas. Climate Research 21:1-25 and Aquastat

Graph 2 - Cumulative rain 12-20 May 2014 at major stations

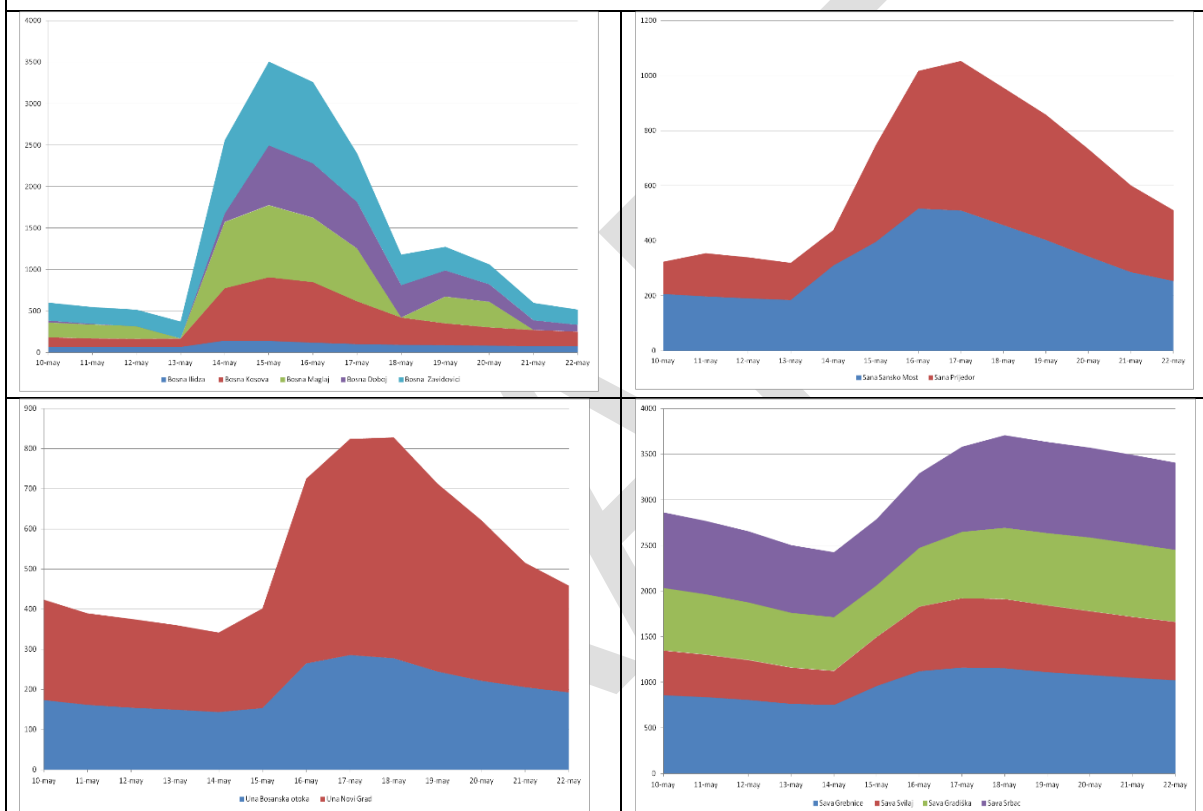


Source: Federal and RS meteorological offices



Given the country's topography, a vast number of rivers descend from higher elevations and feed into the Sava downstream. This caused sudden flash floods and extended inundations in the vast lower plains, where much of the country's food and agricultural production is concentrated. This 'cascading' effect is reflected in the days when each river peaked (reached its highest level). Water moved downstream and upon reaching the River Sana, which also received flows from its tributaries to the east, remained above normal levels for many weeks; this impeded the normal discharge and recession in the flooded areas.

*Graph 3 - Evolution of river water levels*



Source: *Federal and RS hydro meteorological reports*

The floodwaters persisted for a number of weeks in a large portion of the affected area impeded the return of the population, the resumption of economic activity and agriculture and restricted access to the affected areas. Thus a full inspection that would enable a prompt estimate of the damage, effects and needs was further complicated.

## 1.2 National and International Response

RS, FBiH and BD declared a state of emergency. A joint Operations Centre was established under the management of the BiH Ministry of Security and Civil Protection, which is responsible for consolidating data on needs assessment and the distribution of aid. The Operations Centre issued a consolidated countrywide list of needs, which is being met by international donors and domestic resources. Nevertheless, as the immediate response and emergency phase continued the Council of Ministers of BiH requested technical assistance from the international community for a Recovery Needs Assessment. This assessment does not supersede or close the emergency needs phase, as it will continue for several months. The actual reduction of the water level in some areas is ongoing, landmines and UXO and their markers have been displaced and as a consequence of landslides some slopes are unstable, which impedes the rapid return of some of the displaced population and the restarting of economic activity, particularly rapid agricultural replanting in certain areas.

The response of international organisations active in the country (the EU, EUFOR, Red Cross, NATO, OSCE, UN and bilateral actors such as the US and others) in terms of relief and life-saving needs has been massive. More than 20 Countries have contributed to the response operations.

Based on available information, up until 2 June the needs had still not been fully met; this is despite generous contributions from the international community and BiH nationals living abroad.

*Table 6 - Emergency resources required and received for the humanitarian response to the flooding*

Resources received	Million USD	Million Euro	BAM
	02 June	02 June	02 June
Estimated needs	\$153.00	€ 113.01	221.0
International cooperation received	\$60.00	€ 44.32	86.7
Provided by UN and international community (cash and in-kind)	\$30.00	€ 22.16	43.3
Private contributions and remittances	\$30.00	€ 22.16	43.3
<b>Source:</b> United Nations situation reports			

## 2. DISASTER EFFECTS

### 2.1 Affected Population

According to official statistics, 25 persons died as a result of the disaster, in spite of the fact that in some areas where the floods arrived suddenly leaving little time to salvage property or valuables. As a result, a large number of displaced persons have lost important personal documents such as identity cards, passports, property deeds etc.

At its peak 49,822 persons took refuge in either official or alternative private accommodation. As of 8 June, 55 such facilities were still open. The number of population affected is encompassed by the total inhabitants of the affected municipalities.

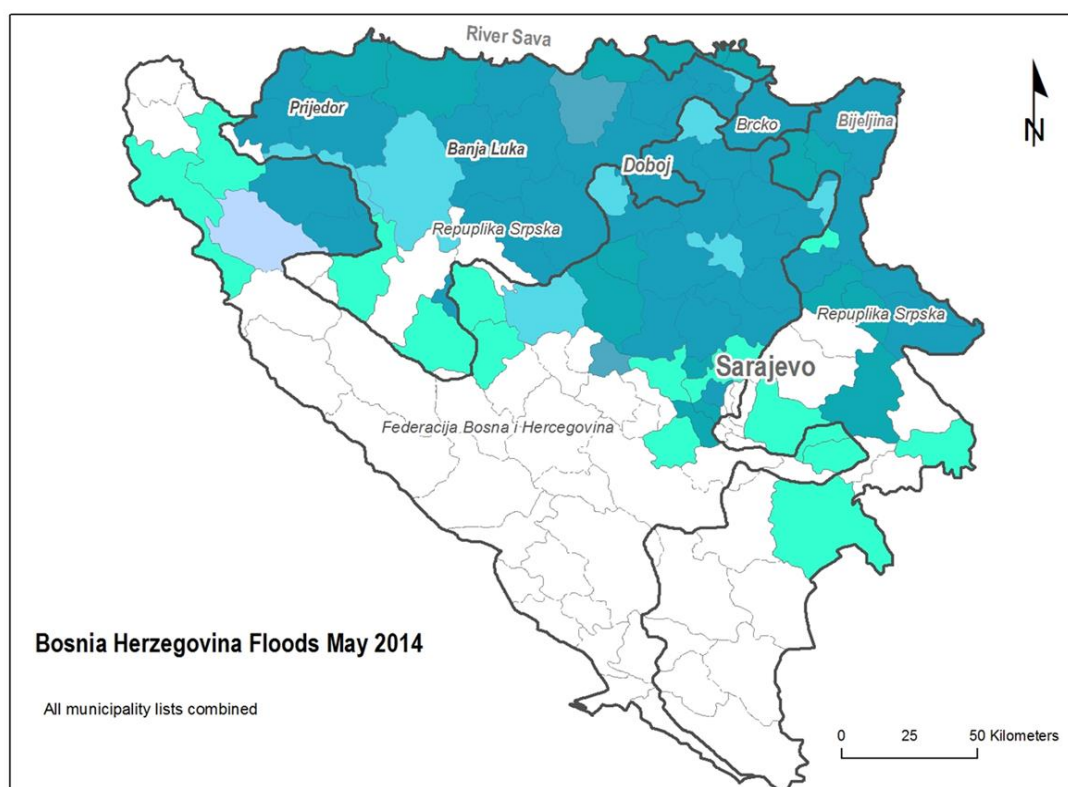
*Table 7 - Affected population*

	Total displaced persons	Total population	%
<b>TOTAL</b>	<b>89,981</b>	<b>2,583,485</b>	<b>3.48%</b>
Republika Srpska	54,956	1,093,370	5.03%
Federation of Bosnia and Herzegovina	33,779	1,397,087	2.42%
Brcko District of Bosnia and Herzegovina	1,246	93,028	1.34%
Source: Official data based on the population on houses either damaged or destroyed.			

In sum, about 3.5% of inhabitants in the affected municipalities were directly affected. In these areas, secondary or tertiary effects were suffered by the whole population. This applies in particular to those municipalities where flash floods left behind a huge amount of debris, mud and damaged personal effects, especially in areas that remained inundated for a long period impeding the salvage of goods, return to homes and a return to economic generation activities.



Map 4 - Flood affected municipalities



- Municipalities that declared a state of emergency (dark blue colour)
- Municipalities recorded by the UN as of 5 June 2014 (light blue colour)
- Municipalities communicated to the European Union Delegation as of 2 June (previous ones plus light green colour ones)

### 2.1.1 Roma Population

In terms of the Roma population, 92% of this population lived in houses with the largest number of them in Bijeljina, Tuzla, Banja Luka, Vogosca, Lukavac, Bratunac, Zavidovici, Zenica and Prijedor (IOM preliminary findings for the Roma Needs Assessment, May 2014).

They are particularly exposed due to their extremely vulnerable economic situation, limited employment prospects, the poor quality of construction materials used for their houses and houses located in areas not meant for solid housing construction. An additional problem with this population is their traditional way of life in extended families, with a large number of minors and elderly aged over 65. According to the IOM's analysis of interviews conducted with 373 Roma families affected by the floods more than one-third of the total number had 4-6 family members, while the average for BiH is 3.6.

Out of those interviewed, 40% had to leave their homes and seek temporary accommodation elsewhere, while 45% of the total number of interviewed households had their houses completely destroyed (no longer habitable) by the flooding/landslides. Of the interviewed families 80% had experienced complete or partial destruction of their furniture and other household belongings, 11% had no time during the evacuation to take their personal IDs (which were left in the flooded area), 21% had no income whatsoever and 61% were self-employed (collection of raw secondary material, agriculture and cattle breeding). Their income generation activities were severely affected with little prospect of being renewed without assistance from a third party.

## 2.2 Description of Damage and Losses

### 2.2.1 Agriculture

#### 2.2.1.1 Executive Summary

The description of the current situation in the Agriculture sector is based on overall state, FBiH, RS and Brcko District statistics supplemented by available cantonal and municipal data. All of the counterparts, entities and ministries have been associated closely and extensively and continuously consulted and informed about the process as well as the results of the data analysis. The respective focal points in each entity as well as Brcko District have approved the data.

A total of 30 municipalities in the RS and 22 municipalities in the FBiH were affected in their agricultural sector. Approximately 70,000 ha of arable and planted land were flooded affecting crops at various stages of development. In total, approximately 25,000 households have been affected: at least 13,500 households in Republika of Srpska and the rest in the Federation Bosnia and Herzegovina and Brcko District.

On average, the flooded area represents 17% of the total planted area in the affected municipalities/cantons. The share of flooded arable land per municipality/canton ranges from 1 to 50%. The flooding occurred at a critical time in the agricultural calendar: one month before the harvest of cereals and after the maize planting. Farmers producing under greenhouses had already transplanted vegetables.

Losses of cattle were very limited (below 1%) in the affected municipalities. Losses of pigs, small ruminants and in particular poultry in all of the affected municipalities were also limited; however, the effect was concentrated in certain villages where high levels of loss were recorded (up to 80% of poultry).

Farm buildings, stocks (inputs, hay, silage, etc.), equipments and roads were also damaged with various levels of severity. Most of the damage affected the private sector. A limited number of fish farms were damaged and the forestry sector faces damage to infrastructure and equipment.

The total damages are estimated to the amount of 104.35 Million EUR (46.91 Million FBiH, 53.97 Million RS and 3.47 Million BD). Most of the damage was borne by a relatively small number of rural residents that suffered significant setbacks. The damage presented in this report does not take in consideration damage to the infrastructure and assets not linked to agriculture (houses, furniture, vehicles etc). Damage to irrigation and the agro-processing industries is not accounted for in this chapter since they are estimated under other sectors.

The overall estimate of losses amounts to 82.76 Million EUR ( 16.66 Million FBiH, 65.57 Million RS and 0.63 Million BD), with a large share related to the agricultural production sub-sector, amounting to over 66.71 Million EUR (80.5%), followed by the livestock sub-sector totaled at 16.16 Million EUR (19.5%).

The overall recovery and reconstruction is estimated at 45.45 Million EUR (20.45 Million FBiH, 23.63 Million RS and 1.37 Million BD), of which 43% (19.54 Million EUR) is for immediate response and early recovery needs; 34% (15.46 Million EUR) for the rehabilitation of the sector in the medium-term; and 23% (10.45 Million EUR) for the long term. To address production recovery needs 31.14 million EUR is required, while additional needs for MT/LT 'build back better' and DRR/DRM/CCA are estimated at 6.14 million EUR mainly for institutional capacity building and strengthening at state, entity and municipal levels, including capacity building and awareness of the population.

More than 87% of the overall needs for restoring production relate to the agriculture sub-sector (cereals, fodder crops, vegetable, and fruits).

The need to cover reconstruction, including building back better and flood proofing, are estimated at 8.18 million EUR (included in recovery costs).

### 2.2.1.2 Sector Overview

In Bosnia and Herzegovina agriculture is still one of the most important sectors of the economy providing food security for large part of the population.

Large parts of the country are mountainous (66% of the territory) and only 20 per cent is suitable for intensive farming. The availability of grassland and mountainous pasture suggests a potential advantage for the production of livestock and dairy products.

*Table 8 - Agricultural land use*

Type of production	Number of Ha	% of agricultural land
Crops and Vegetables	1.023 million	47.3
Meadows	445,000	20.6
Pastures	593,000	27.4
Orchard + Vineyards	100,000	4.7

There are about 500,000 agricultural holdings (Agency for Statistics of BiH). More than 50 per cent of them are estimated to be less than 2 ha and over 80 per cent are less than 5 ha. Generally, small farms are divided into 7-9 small plots. This is regarded as one of the limiting factors to achieving a substantial increase of productivity and efficiency in the sector.

Crop production dominates agricultural production in Bosnia and Herzegovina, with livestock production representing less than one-third of the total output. The slight increase in this share in recent years is due to an increase in cow milk production. The most important sub-sectors of Bosnia and Herzegovina's agriculture economically are Dairy, and Fruit and Vegetables.

The share of the agricultural and food-processing sector in overall GDP is estimated to be around 8.5% (2011 figures) and is decreasing.

The agriculture sector employs around 20% out of all employed in Bosnia and Herzegovina and agriculture remains an important sector for employment, despite a decline in the working-age population in rural areas.

The Federation of Bosnia and Herzegovina generated 43.5 per cent of agricultural GDP in 2009, while Republika Srpska 50.7 per cent and Brcko District 5.8 per cent.

Out of Bosnia's total exports, edible preparations, beverages, fruit and vegetables account for the largest value. Export to the EU consists mainly of sugars (isoglucose), vegetables, fruits and nuts, animal or vegetable fats and oils, and raw hides and skins. The predominant fruit and vegetable products exported are frozen berries, mushrooms (fresh, chilled, dried or frozen), conserved vegetables, fresh chestnuts, cucumbers and apples.

#### **2.2.1.2.1 Pre-disaster Characteristics of the Sector**

##### **2.2.1.2.1.1 Infrastructure and Assets**

Rural infrastructure, housing and public utilities were badly damaged in the war and have inhibited growth and development efforts in the country. The bad condition of local and village level roads and related structures, such as bridges and drainage facilities, causes damage to vehicles and thereby increases transportation costs and often deterioration in the quality of the products transported (fruits, vegetables, milk, etc). This in turn adversely affects production quality, quantity and sales prices throughout the supply chain. Many rural commercial initiatives in Bosnia and Herzegovina are restricted through badly degraded infrastructure. Many of the irrigation systems and rural roads are in such a bad state of disrepair that they are unusable. Many villages lack reliable fresh water, electricity supply and proper sewerage facilities. There has also been degradation of pastures due to insufficient maintenance over the past 15 years and many of the old water points are no longer operational. Consequently, many livestock farmers are unable to graze their cattle on these pastures and productivity is adversely affected.

#### **2.2.1.2.1.2 Service Delivery**

Existing public services related to agriculture education, research and information systems are weak and do not sufficiently promote competition and quality orientation.

Agricultural statistics for sound planning and decision-making in the agriculture sector still need to be improved. Available information on ownership, size, and the operational structures of farms and the numbers of livestock and labour in agriculture remain insufficient despite efforts accomplished in the past years.

Furthermore, the extension systems are not fully functional. The existing extension systems in BiH are not yet in a position to provide the services needed to help farmers increase competitiveness and productivity, to better manage their businesses and respond to new circumstances, such as changing market requirements, food safety concerns and climate change. Their responsibilities include designing business plans and providing other advisory services for farmers. The system in Republika Srpska is still in place and includes regionally based advisors in most areas, assisted by a central support unit located in Banja Luka. Though appreciated, the service is poorly equipped, underfunded and understaffed. The system in the FBiH was established originally at the canton level with no central service. It is largely non-operational due to limited interest from the cantons. The Parliament of the FBiH adopted the Law on Extension in November 2008, which envisages the establishment of a Central Extension Agency.

#### **2.2.1.2.1.3 Production**

Yields per hectare over time have remained virtually stagnant and lower than those in the EU Member States of Southern Europe (Portugal, Spain, Italy and Greece), which have similar geographic and climatic conditions.

Significant gaps in yield levels can also be observed for other product categories, including fruit, beef and cow's milk, although notable improvements in production yields have been noted in some sectors, such as dairy milk production, and the production of raspberries and cucumbers. Agricultural labour productivity levels are lower in BiH, compared to those in Southern Europe.

#### **2.2.1.2.1.4 Access to Services and Goods**

Farmers in BiH pay more for their inputs and receive less for their outputs relative to their counterparts in neighbouring markets. Low output prices are a result of market failures such as low bargaining power, the lack of post-harvest facilities for storage and packaging, fragmented supply chains, costly logistics and limited access to affordable finance. High input prices result largely from reliance on a few dominant input traders in combination with highly regulated import markets.

#### **2.2.1.2.1.5 Governance**

Policy in the sector of agriculture, food and rural development in Bosnia and Herzegovina is broadly aligned with the objectives and requirements for preparing and joining the EU. Realisation of the SAA and implementation of the priorities of the European partnership requires radical change in society and is possible only with the active involvement of all actors in the agricultural sector in BiH. Strategies and plans for BiH membership in the EU include progressive steps to comply with and integrate the laws, institutions and industrial efforts with those of the EU. This is the biggest challenge in the sector due to the scale of the necessary legislation and institutional capacity as well as the fact the Common Agricultural Policy of the EU itself is undergoing significant reform and change. One of the key targets for the sector is the fulfilment of the requirements in terms of establishing the necessary structures and administrative procedures so that BiH is able to utilise pre-accession assistance.

The agricultural sector are the responsibility of MoFTER, which plays mostly a coordinating role. The MoFTER is also the institution that is responsible for cooperation with the EU and other international organisations relevant to agriculture, food and rural development. The organisational unit within MoFTER that conducts activities in the field of agriculture and rural development is responsible for establishing a framework for the development of sectoral strategies, policies, programs and measures, and their implementation in order to harmonise the development of agriculture across the country. Management of the agriculture sector at the entity level relates to two key bodies: the Ministry of Agriculture, Forestry and Water Management of Republika of Srpska (MoAFWM RS), the Ministry of Agriculture, Water and Forestry (FMAWMF), while in Brcko District of Bosnia and Herzegovina (BD) there is the Department of Agriculture, Forestry and Water Management of BD.

The Federation is further divided so that all 10 cantons have established administrations responsible for agriculture, veterinary medicine, forestry and water management. The entity ministries of agriculture are responsible for the management of natural resources, the development of agriculture, the food industry and related activities. They cover most of the productive sub-sectors (crop production, animal husbandry, rural development, fishing and hunting) as well as land use and management, food processing, animal feed production, water management, veterinary and phytosanitary protection, protection of public health and forestry.

#### **2.2.1.2.1.6 Risks**

Floods are the most frequent major natural hazards in Bosnia and Herzegovina affecting a large number of the population and causing significant economic losses. Other major natural hazards with significant impacts are drought, landslides, extreme temperatures, storms and wildfires. All of them are caused directly or partially by extreme weather and



water or climate conditions. In addition, a number of hazards pose risks across borders in the SEE region, especially floods and forest fires. Approximately 75% of the territory of Bosnia and Herzegovina is located in the trans-boundary Sava River Basin area and 25% of the country drains into the Adriatic Sea. The collection of data on forest fires has been minimal and therefore the risk is hard to quantify, even though fire is listed as one of the top hazards in Bosnia and Herzegovina. Forest covers approximately 50% of the territory of Bosnia and Herzegovina, divided equally between the entities. Forest fires present a problem in the Federation of Bosnia and Herzegovina and Republic Srpska, burning anywhere from 1,000 to 3,000 hectares annually.

The occurrence of landslides in the mountainous areas of Bosnia and Herzegovina is very common due to the presence of underground water flows.

The number of landslides has increased considerably over the last 15 years due to the uncontrolled exploitation of forests and minerals and because of an increase in illegal and or unplanned construction.

The severity of extreme events like drought, heat waves, forest fires and flooding has intensified over the last few decades. This trend is expected to accelerate in the future as a result of climate change, leading, together with changes in land-use patterns and increased human settlements in areas that are prone to disasters, to increased hydro-meteorological and climate-related risks in the coming years.

The risk of drought is high in the north eastern and south western parts of BiH in relation to the central mountains.

Projected climate change in the SEE region will probably worsen the frequency and intensity of droughts and floods, thus reducing the growing season for many crops.

#### **2.2.1.2.1.7 Gender Analysis**

The statistic Agency of BiH and the institutes do not provide any socioeconomic indicators on women in rural areas, but both entity statistics offices publish separate annual bulletins in which gender statistics for the total population are presented.

Demographic indicators of the gender structure of the BiH population shows that the female population is slightly higher than the male, that women have a higher average age than men, that the percentage of illiterate women and those with no education is higher than that of men and that the female unemployment rate has increased.

The number of self-employed women and female employees is lower than the same number for men, whereas the number of women as unpaid household members is higher.

The distribution of employees by type of industry shows that the largest number of women employed in non-agricultural activities or in services. Women engaged in agricultural activities vary between 32 and 39%.

*Table 9 - Gender Analysis*

2008		Employees	Self-employed	Unpaid family workers
FBiH	Women	28.4%	35%	64.3%
	Men	71.56%	64.96%	42.85%
RS	Women	35%	25%	75%
	Men	65%	75%	25%
		Agriculture	Industry	Services
FBiH	Women	38.8%	22.7%	80.95%
	Men	61.1%	81.48%	55.26%
RS	Women	32.5%	17.7%	49.7%
	Men	30.5%	33.3%	36.2%

Main limitations faced by women concerning their participation in agricultural production and rural development relate to their access to resources, in particular their lack of means for production and uneven distribution of the home budget that allocates a very low share to address their needs and interests.

Additionally, their lack of information on markets, credits and new technology and their limited access to funding and credits caused by non-existing liquidity creates serious obstacles on their way to economic development.

Low participation of women in the life of rural communities and limited decision-making power on investment in infrastructure constitute additional obstacles.

No specific measures target women within the existing agriculture and rural development strategies. Gender has to be better mainstreamed in the definition of policy and development strategies for the sector.



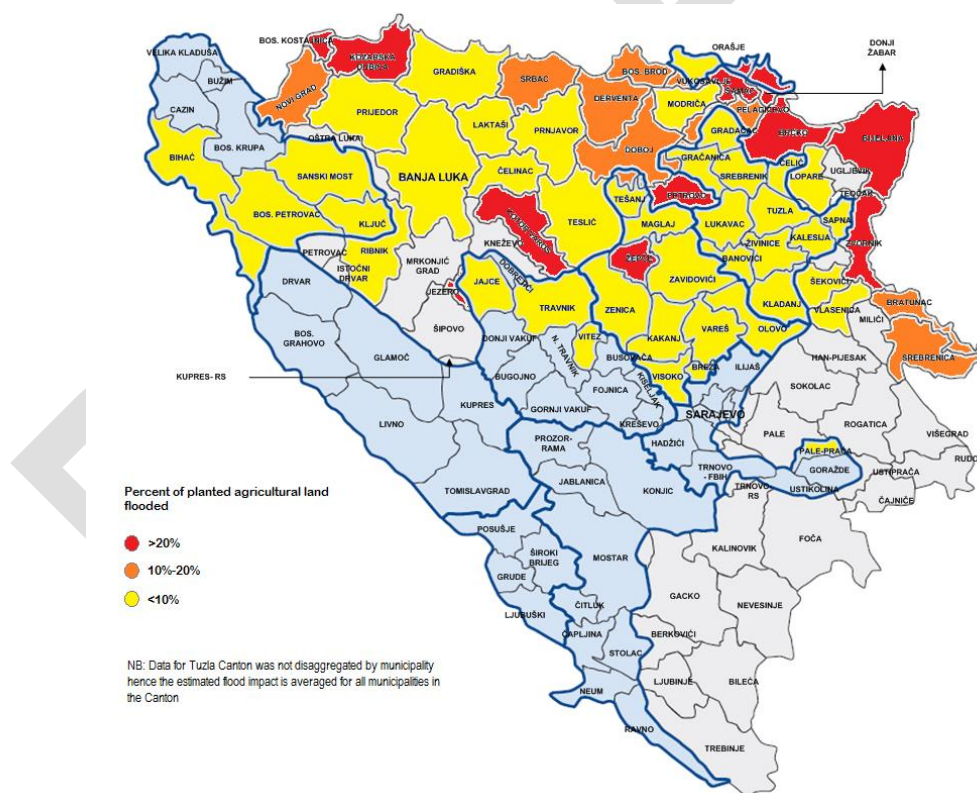
### 2.2.1.3 Assessment of the effect of the Disaster

#### 2.2.1.3.1 Introduction: General Description of the Disaster, Population and Affected Areas

A total of 30 municipalities in RS and 22 municipalities in the FBiH were affected. Approximately 70,000 ha of arable and planted land were flooded affecting crops at various stages of development. Approximately 25,000 households were affected: at least 13,500 households in Republika of Srpska and the rest in the Federation of Bosnia and Herzegovina and the Brcko District.

On average, the flooded area represents 17% of the total planted area in the affected municipalities/cantons. The share of flooded arable land per municipality/canton ranged from 1 to 50%.

Map 5 – Per cent of planted agricultural land flooded



The floods occurred at a very critical time in the agricultural calendar: one month before the harvest of cereals and after the maize planting. Farmers producing under greenhouses had already transplanted vegetables.

Food insecurity following the flooding is not likely, as the effects were moderate on most of the households; however, approximately 2,500 farming households were completely devastated.

Having in mind that most of the affected farmers were still developing and users of commercial credits their agricultural production will further decline and result in stagnation and regress in their development.

However, it is expected that the agricultural sector at country level will only suffer a mild impact with limited impact on the already established value chains. The effects are more significant in Republika Srpska given its larger agricultural production and the greater extent of damage.

As farmers will tend to repair and rebuild rather than develop the agriculture sector in the affected areas will stagnate. Smaller farmers and subsistence farmers will be more susceptible to poverty, because they will have little assets to sell and are often not credit worthy. Some will reinvest savings and will become additionally indebted in order to resume their production activities. However, with reduced yields and financially depleted many will face challenges when required to invest further for the next season(s).

#### ***2.2.1.3.1.1 Effects on Infrastructure and Physical Assets***

The loss of agricultural perishables such as agricultural inputs, e.g., stored animal feed, fertilizers, manure and plant protection, was evident. Agricultural inputs which came into contact with the floodwaters were washed away or contaminated and rendered useless. Hay and silage were most affected in those areas submerged for more than 24 hours.

Significant quantities of agricultural equipment were also affected as all items that the inhabitants were unable to move to higher ground became inundated.

Damage to agricultural machinery and equipment was often partial and not permanent, as most of this equipment does not contain electronics. In certain cases, very valuable equipment containing electronics (harvesters, tractors and trucks) were lost. Much of the equipment will have to be recovered, cleaned and restored.

Animal pens were rendered unusable for the duration of the inundation as well for the duration of the cleanup effort, due to contamination and residual moisture in the walls.

In some cases, greenhouses were swept away by passing water flows and flash floods. However, greenhouses mostly collapsed but were structurally unaffected.

Loss of assets of agricultural input suppliers and service providers were few in number, but profound in terms of value. The affect on shops, storages and warehouses with equipment and perishables will affect the service provision and supply somewhat in the affected areas.

### ***2.2.1.3.1.2 Effect on Service Delivery and Disruption of Service Delivery***

The effect on the service delivery has a dual effect that will change as the emergency phases out and the recovery begins. The structure for the provision of services was disrupted in principle but only slightly affected by the disaster.

Apart from completely submerged businesses and service centres, all other service providers (animal health, agricultural inputs, extension services, credits etc.) rushed to support the affected agriculturally active population. Yet it should be mentioned that some agriculture and veterinary service providers were affected themselves, for example, the Agriculture Institute in Banja Luka, the Agriculture Extension Service in Dobož and several veterinarian stations had their service delivery impeded.

In the immediate aftermath of the flooding, the supply chain operated with difficulty and interruptions but quickly recovered. The availability of agriculture related inputs and services was evident (in many cases through delayed payment terms), enabling farmers to recover.

A few days after the flooding a certain slowdown in service provision was evident in the most affected areas. As stored items were spent, continued service provision depended mainly on the ability to restore spent supplies.

Service provision based on delayed payments will slowly phase out as the service providers will have to cover their costs and as farmers will start accessing commercial lenders.

Many farmers went to neighbouring communities (sometimes across the border) in order to improve their access to services and inputs.

A few of the most affected businesses (service providers) which lost significant quantities of stored items will struggle to recover. They will have difficulty recovering advanced payments from the financially depleted farmers, although they will have to repay lost stored inputs and credits.

Some slowdown in the total turnover of service providers is to be expected as farmers channel their resources towards recovery rather than development.

Access to markets for agricultural products, apart from the temporary slowdown, is unaffected. The resulting decrease in the yield of agricultural production will have an impact on the income of the farmers and to a very limited extent the value chains.

It is expected that markets and in particular processors will be actively involved in the recovery of the agricultural production of the larger farmers.

Prices for live-weight animals and milk are holding at pre-disaster levels. Prices for animal feed, despite the floods in Serbia (which is the main regional provider of maize and wheat grain), are also holding. Following the flooding wholesale prices for fresh fruit and vegetables have fallen and are generally lower than the same period last year.

#### ***2.2.1.3.1.3 Effect on Production***

The effects of the inundation on agricultural production largely depended on the type of floodwaters and the retention time.

In areas where the water receded within 24 hours the damage to crops reflected in reduced yields, resulting from direct inundation and follow-up fungal and bacterial diseases.

Most annual crops were completely lost in those areas where the water stayed for 24 – 48 hours.

In areas where the water remained for more than two days at levels that varied between 0.5 and 8 meters there was a complete loss of annual crops and in some cases orchards.

Losses of animals were relatively limited, mainly affecting small and enclosed animals and incidentally cattle. Some animals were evacuated to collective centres, while others were evacuated to neighbours and relatives.

Losses of cattle were very limited (below 1%) in the affected municipalities. Losses of pigs, small ruminants and in particular poultry in all affected municipalities were also limited, although the effect was concentrated in certain villages where high level losses were recorded (up to 80% of poultry). The effect of the flooding on the poultry industry was somewhat higher than for other sectors as the losses were proportionally higher. The hatchery in Dobož faced significant losses that will slow down the industry recovery.

Stress in animals followed by health issues, such as mastitis, diarrhoea, pneumonia etc., caused an immediate but temporary disruption of productivity.

Various forms of exposure related diseases were evident (pneumonias, mastitis and diarrhoea) in animals that had longer contact with the floodwater. Loss of production due to health issues and stress in animals was immediate and accounted for at least 30%.

The subsequent treatment of the animals with antibiotics will result in further temporary discarding of milk, eggs and meat.

Recovering production levels will depend on the normalisation of the situation and could last for between a couple of weeks and a couple of months.

Turbid floodwaters in many areas hauled and deposited significant quantities of silt.

Flood deposits are not always negatively associated with productivity as they can improve the composition of the soil. In some cases, crops were completely buried and lost as a result of the flooding; however, in most instances consequential precipitation washed the plants and remedied the situation.

Faecal contamination originating from widespread manure and open septic pits was evident. The contamination affected the soil, water (surface and ground) and facilities. In areas where the water stayed for a longer period the contamination was more profound. This organic pollution also contaminated flooded harvested food and fodder products.

Faecal contamination of the soil is not expected to have a lasting effect, whereas contamination of the water (for livestock and irrigation) renders them unusable. While cleaning and disinfection of the wells and reservoirs is feasible, in many cases it will depend on the ground water table.

The effects of flash flooding were limited in size but profound, in particular on foothills and along rapid water flows. Crops were completely swept away, often with the top soil of the affected plots. In other cases, sediments such as gravel deposited up to half a metre in depth destroyed crops and rendered the production plots unusable.

Where the water has receded farmers are scrambling to cultivate the affected area (break the crust and aerate) and replant maize. It is expected that this will be ongoing until the end of June and that by the end of the maize seeding season 85-90% of the inundated /damaged area will be replanted.

Reduced yields of between 20 and 50 per cent can be expected for flooded crops compared to the local average.

The floodwaters have prevented replanting in a few villages and therefore farmers whose land will not be dry until after the maize sowing deadline will look towards winter wheat. Increased areas under wheat are typical for years with lower agricultural incomes. Farmers involved in greenhouse production will aim at the winter season.

The farmers will try to maintain the milk yield of dairy cattle, as it is the most important source of cash. Animal health has to be maintained at a high level, as the breeds used are delicate. Meat animals (cows and pigs) will be kept for as long as the feedstock lasts and then sold for slaughter, which will result in reduced income of 30-60% as optimally the animals would be kept up to the autumn.

#### **2.2.1.3.1.4 Effect on Governance**

No significant changes or disruption of governance were noted in relation to the agriculture sector although, as stated earlier, significant direct damage occurred in some agricultural

service providers, including the Agriculture Institute in Banja Luka, the Agricultural Extension Service in Doboj and several veterinary stations.

The Government reacted rapidly to the crisis. Apart from the rescue and water drainage efforts (excavation, pumping infrastructure), the authorities provide health services such as disinfection and health checks. Damage assessment teams remain on the scene.

Animal collection centres were established and food and feed provided to displaced persons and animals. In many areas, the rural population remains displaced although accommodation has been provided and the animals require daily care.

Veterinarians (state veterinarians in Brcko and private in Republika Srpska municipalities) have supported the population, providing services for free (state veterinarians) or with delayed payment (Republika Srpska).

Agricultural extension services provide advice for farmers. The Ministry of Agriculture of Republika Srpska issued flood response instructions to farmers, covering both immediate and response actions.

The last of the dead animals are being collected and transported to Serbia for incineration. A total of 17 (6 from RS, 8 from FBiH and 3 from BD) shipments included 160 tons of carcasses.

The authorities have requested that banks suspend credit repayments or decrease interest rates for affected farmers.

The Government of the Republika Srpska has obtained a total of 120 million Euros in credits from commercial lenders. It has started distribution of maize seeds (own funding) to farmers that have not replanted yet. The cost of replanting maize for those farmers that have already done so will be reimbursed based on invoices and fiscal bills.

The Government of Republika Srpska has introduced a centralised system for the gathering and distribution of voluntary cash and in kind contributions, which are then redistributed as needed.

There has been no effect on the institutional arrangement in the country for the coordination of the seed policy and control and supply.

There seems to be a consensus that commercial deforestation was a major contributing factor to the floods and landslides. This problem will keep getting worse until the evident mismanagement of this natural resource is addressed. The forestry sector, owned and managed largely by the governments, has sustained damage in terms of infrastructure and equipment.

### 2.2.1.3.1.5 Effect on Risks and Vulnerabilities

The poorest will be the most affected by the disaster, which happened one month before the wheat harvest. Many subsistence farmers will have to set priorities between repairing houses, resuming agricultural activities or job seeking. Part-time farmers and seasonal agricultural workers in particular face difficulties since they have lost both their crops and their jobs.

The likelihood of food insecurity remains very low, yet the level of rural poverty is likely to increase in the affected areas.

## 2.2.1.4 Calculating the Value of the Damage and Losses

### 2.2.1.4.1 Damage (linked to infrastructure and assets)

The flooding has a significant effect on the agriculture sector causing widespread damage. The total damage is estimated to be in the range of 104.35 Million EUR.

A relatively small number of rural residents that suffered significant setbacks have absorbed most of the damage. The damage presented here does not take into consideration damage on the infrastructure and assets not linked to agriculture (houses, furniture, vehicles etc). Damage to irrigation and the agro-business is also unaccounted for in this chapter, since this damage is estimated under other sectors.

A breakdown of the damage for each entity is summarised in the table below.

*Table 10 - Damage to agriculture*

Entity/District	Damage in Mil EUR	In % of the total
FBiH	46.90	44.94
RS	53.97	51.71
BD	3.48	3.35
<b>Total BiH</b>	<b>104.35</b>	<b>100</b>

Apart from the forestry sector and farm roads, all other damage relates to the private sector.

The most affected sub-sector is the crops sector. Details per type of production sub-sector are given in the table below.



Table 11 - Details per type of production sub-sector

Crop	Lost total Ha	Unit value(EUR/Ha)	Total EUR
Cereals	17,018	1,033.83	17,593,718.94
Maize	36,853	1,012.36	37,308,503.08
Vegetables	5,180	4,927.32	25,523,517.60
Fodder	7,754	130.89	1,014,921.06
Soya	1,550	585.94	908,207.00
Orchards	763	11,826.18	9,023,375.34
Berries	66	19,397.90	1,280,261.40
<b>Total</b>			<b>92,652,504.42</b>

Table 12 - Livestock sector damage

Type	Cattle	Small Ruminants	Pigs	Poultry	Rabbits	Beehives	Equids	Total
Number	954	1,852	8,127	219,298	264	3,678	15	
Unit value (EUR/head)	1,533.88	102.26	102.26	5.11	10.23	86.92	818.07	
<b>Total</b>	<b>1,463,321.52</b>	<b>189,385.52</b>	<b>831,067.02</b>	<b>1,120,612.78</b>	<b>2,700.72</b>	<b>319,691.76</b>	<b>12,271.05</b>	<b>3,939,050.37</b>

#### 2.2.1.4.2 Losses

The overall estimate of losses amount 82.86 million EUR and the details of losses for each entity is given in the table below.

Table 13 - Losses agriculture

Entity/ District	Losses in Mil EUR	In % of total
FBiH	16.66	<b>20.10</b>
RS	65.57	<b>79.13</b>
BD	0.63	<b>0.77</b>
<b>Total BiH</b>	<b>82.86</b>	<b>100</b>

The agricultural production sub-sector accounted for over 60.71 million EUR (80.5%) followed by the livestock sub-sector 16.16 million EUR (19.5%).

The most significant losses in the crops sector resulted from reduced yields for flooded crops and limited access to arable land, which was the cause of late planting.

The losses in the livestock sector relate to reduced productivity arising from the adverse effect of the flooding on animals and the inability to collect or market products (treated animals).



## 2.2.2 Energy

### 2.2.2.1 Executive Summary

The impact of the flooding on the energy sector was registered through damage to generation facilities, transmission and distribution networks as well as oil terminals and the coalmines that supply the thermal electricity generating plants. Damage to the distribution network occurred mostly in low lying flood-prone areas, whereas most damage to the transmission network came from devastating landslides. The impact on coalmines was the result of a mix of flooding and landslides.

The total value of damages and losses at the state level was estimated at EUR 101,961,827. At the entity level, FBiH has a share in damages and losses of 64.3% (65.55 Million EUR), RS with 35.2% (35.85 Million EUR) and BD with 0.5% (0.56 Million EUR). The reported damages and losses on TRANSCO amount to 2.2 million EUR, which are split between FBiH and the RS in accordance with the companies' shareholder ownership structure (FBiH 58.89% and the RS 41.11%).

Table 14 - Structure of damage and losses in BiH (in thousands of EUR)

In thousands EUR	Damage				Losses				Total			
	FBiH	RS	BD	BiH	FBiH	RS	BD	BiH	FBiH	RS	BD	BiH
Generation	481	-	-	481	148	-	-	148	629	-	-	629
Distribution	6,831	15,553	66	22,451	6,304	18,371	491	25,166	13,135	33,924	557	47,617
Transmission	951	665	-	1,616	348	240	-	588	1,299	905	-	2,204
Coalmining	24,291	-	-	24,291	25,227	1,023	-	26,250	49,519	1,023	-	50,541
Oil	828	-	-	828	143	-	-	143	971	-	-	971
<b>Total</b>	<b>33,382</b>	<b>16,218</b>	<b>66</b>	<b>49,667</b>	<b>32,170</b>	<b>19,634</b>	<b>490.84</b>	<b>52,295</b>	<b>65,553</b>	<b>35,852</b>	<b>557</b>	<b>101,962</b>

The extensive flooding has shown the vulnerability and high exposure of the energy sector in the country. The next steps in the recovery effort should be aimed at increasing the resilience of power utilities to worst-case scenarios. Therefore, a carefully planned recovery strategy is of the utmost importance. Recovery strategy recommendations for all affected utilities in BiH are divided into short and medium-term recovery periods, specified in accordance with the time required for execution of specific activities (see Table 15). Overall recovery needs are estimated at 64.12 million EUR.

Table 15 - Recovery needs assessment in BiH (in thousands of EUR)

In thousands EUR	12 months				13-36 months				Total			
	FBiH	RS	BD	BiH	FBiH	RS	BD	BiH	FBiH	RS	BD	BiH
Coalmining	26,362	-	-	26,362	389	-	-	389	26,751	0	0	26,751
Transmission	874	614	-	1,488	77	51	-	128	951	665	0	1,616
Distribution	5,798	13,283	818	19,899	1,089	-	-	1,089	6,887	13,283	818	20,989

Oil sector	1,038	-	-	1,038	4,244	-	-	4,244	5,282	0	0	5,282
Resilience	2,393	-	399	2,792	6,105	-	578	6,683	8,498	0	977	9,474
<b>Total</b>	<b>36,465</b>	<b>13,897</b>	<b>1,217</b>	<b>51,579</b>	<b>11,903</b>	<b>51</b>	<b>578</b>	<b>12,532</b>	<b>48,368</b>	<b>13,948</b>	<b>1,795</b>	<b>64,111</b>

### 2.2.2.2 Baseline

#### Energy Sector Overview

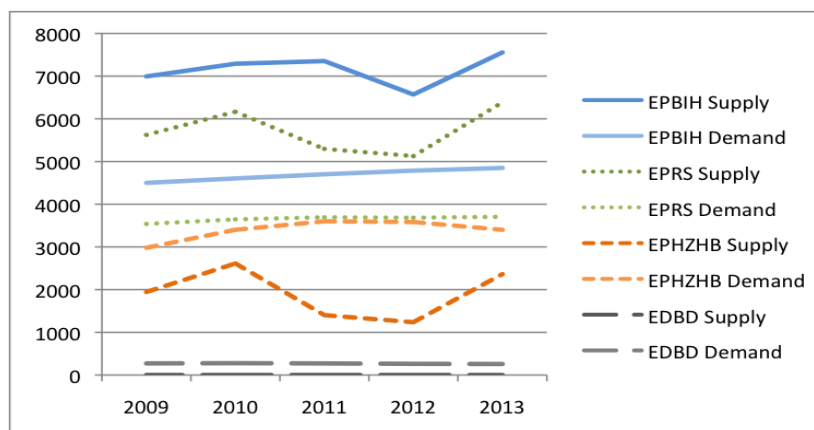
BiH energy sector policy and regulatory development is largely driven by the EU accession process and the obligations under the Energy Community Treaty<sup>4</sup>. The energy sector in BiH has recovered after a sharp contraction during the 1990s. Total primary energy supply increased by 63% and energy consumption by 48% between 2000 and 2011. The country has the possibility to become the largest and most profitable electricity exporter in the region thanks to its abundant hydropower potential. Yet BiH suffers from limited new investment and an ageing infrastructure, especially for thermal electricity generation. The latter provides the base power for the country. As a signatory party to the Energy Community Treaty BiH has an international obligation to liberalise its electricity market by 1 January 2015. This obligation not only derives from the Treaty but also from the existing respective legislative framework. The expected liberalisation would allow for supplier switching and market based competition.

BiH has an installed power generation capacity of 3,980 MW and produces 13.5 GWh on average; it consumes 11.5 GWh of electricity and exports the balance<sup>5</sup>. The generation mix consists of roughly 60% thermal and 40% hydro power plants, yet precipitation fluctuations can significantly affect those balances (see Graph 4). Whereas 2011 and 2012 were exceptionally dry years with lowered exports (2,586 GWh in 2012), 2010 and 2013 were exceptionally wet years with increased exports (5,097 GWh in 2013). The country produced a record of 16,303 GWh in 2013 (26% higher than in 2012) and consumed 12,559 GWh (a 0.5% reduction from 2012).

<sup>4</sup> The Energy Community Treaty is an international organisation that deals with energy policy. The organization was established through an international law treaty in October 2005. The Parties to the Treaty are the European Union and 8 Contracting Parties from the South East Europe and Black Sea region.

<sup>5</sup> Annual Implementation Report 2012-2013, Energy Community Secretariat (2013).

Graph 4 - Supply and Demand per year and per utility (GWh)



Source: 2013 Annual Report of the State Electricity Regulatory Commission.

The structure of major generation capacities in the country is presented in Table 16.

Table 16 - Installed generation capacity (EP BiH, EP HZHB and EP RS)

Utility Company	Type	Facility	Installed capacity (MW)	Max capacity of the transmission network (MW)
EP BiH	Hydro	Jablanica	6x30	180
	Hydro	Grabovica	2x57	114
	Hydro	Salakovac	3x70	210
	Thermal	Tuzla	715	635
	Thermal	Kakanj	450	398
<b>Total EP BiH</b>			<b>1,669</b>	<b>1,537</b>
EP HZHB	Hydro	Rama	2x80	160
	Hydro	Mostar	3x24	72
	Hydro	Jajce 1	2x30	60
	Hydro	Jajce 2	3x10	30
	Hydro	Mostarsko Blato	2x30	60
	Hydro	Pec – Mlini	2x15	30
	Hydro	Capljina	2x210	420
<b>Total EP HZHB</b>			<b>832</b>	<b>832</b>
EPRS	Hydro	Trebinje 1	2x54 + 1x63	171
	Hydro	Trebinje 2	1x8	8
	Hydro	Dubrovnik*	2x108	108
	Hydro	Bocac	2x55	110
	Hydro	Visegrad	3x105	315
	Thermal	Gacko	300	276
	Thermal	Ugljevik	300	279
<b>Total EP RS</b>			<b>1,312</b>	<b>1,267</b>
<b>Total BiH</b>			<b>3,813</b>	<b>3,636</b>

\* The electricity generated by one of the generators is used by the Republic of Croatia.

Source: 2013 Annual Report of the State Electricity Regulatory Commission.

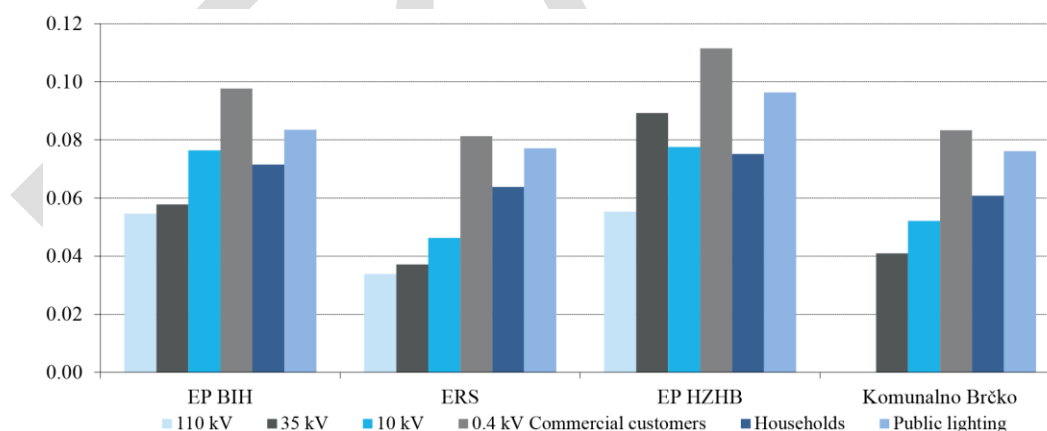
## Electricity Sector Utilities, Generation and Distribution

The electricity sector is organised along the administrative lines of the three existing utility companies (called Elektroprivreda – EP), two in the FBiH and one in RS, that perform generation, distribution, trade and supply. These utility companies account for more than 96% of the generation capacity. In terms of distribution, each parent utility company has respective subsidiaries/branches and each is responsible for a designated service area (13 in total). Distribution services in Brčko District operate within the company that is responsible for all public communal services under the ownership of the Government of Brčko District. TRANSCO operates a countrywide transmission system.

All thermal power plants in the country operate with domestic coal (lignite and brown coal), supplied mostly from open cast surface mines, also mainly owned and/or operated by the two main power utilities (EP BiH and EP RS). Besides electricity, the majority of the population primarily situated in rural areas of the country also uses wood (mostly solid) for heating purposes. Privately owned small hydro power plants (SHPP) contribute 1.5% to the total electricity generation capacity.

Electricity prices in the country are different in all utility companies and are broken down into five subcategories: 110 kV, 10 kV, 0.4 kV for commercial customers, households and public lighting (see Graph 5).

*Graph 5 - Average price by utility company and user category (EUR/kWh)*



Source: 2013 Annual Report of the State Electricity Regulatory Commission.

The number of electricity customers in BiH is about 1.5 million. Out of this number, the main share belongs to households at 91.8%, followed by 0.4 kV commercial customers with 7.6%, public lighting 0.5%, while the shares of 110 kV, 35 kV and 10 kV customers is less than 1% (see Table 17).

Table 17 - Existing customer base (EP BiH, EP HZHB, EP RS and ED BD)

Utility company	110 kV	35 kV	10 kV	0.4 kV commercial	Households	Public lighting	Total (utilities)
EP BiH	5	62	774	60,712	661,230	3,700	726,483
EP HZHB	3	1	165	14,531	173,488	1,812	190,000
EP RS	6	43	687	33,174	495,584	1,054	530,548
ED BD		1	13	4,200	32,698	414	37,326
<b>Total</b>	<b>14</b>	<b>107</b>	<b>1,639</b>	<b>112,617</b>	<b>1,363,000</b>	<b>6,980</b>	<b>1,484,357</b>

The four main electricity sector utilities active in generation, distribution and supply of electricity are shown below.

- Public Enterprise Elektroprivreda Bosne i Hercegovine JSC (EP BiH)

Based in Sarajevo under FBiH administration and majority ownership, EP BiH operates with an electricity generation surplus and accounts for 46% of production, 48% of customers and 44% of overall consumption in the country. EP BiH operates five distribution companies organised in the following regions: Sarajevo, Tuzla, Zenica, Bihac and Mostar.

- Public Enterprise Elektroprivreda Hrvatske Zajednice Herceg – Bosne JSC (EP HZHB)

Based in Mostar under FBiH administration and majority ownership, EP HZ HB operates with an electricity generation deficit and accounts for 15% of production, 13% of customers and 15% of overall consumption in the country. EP HZHB operates three distribution companies organised in the following regions: north, centre and south.

- Public Enterprise Elektroprivreda Republike Srpske JSC (EP RS)

Based in Trebinje under the RS administration and majority ownership, EP RS also operates with an electricity generation surplus and accounts for 39% of production, 37% of customers and 38% of overall consumption in BiH. RS distribution operates differently to the FBiH; in RS five independent subsidiary enterprises are organised: Elektrokrajina, ElektroDoboj, Elektrodistribucija Pale, Elektro-Hercegovina and Elektro-Bijeljina.

- Public Enterprise 'Komunalno Brčko' - Working Unit 'Elektrodistribucija' ED BD

Based in Brcko under District administration, ED BD does not produce energy but accounts for 2% of customers and 3% of overall consumption in the country.

The total length of the distribution grid in BiH amounts to 86,421 km, out of which a 28% share is medium voltage (MV) and 78% share low voltage lines and cables (see Table 18).

*Table 18 - Length of medium and low voltage distribution lines and cables in BiH*

	EP BiH (km)	EP HZHB (km)	EP RS (km)	ED BD (km)	BiH (km)
MV	8,940	3,784	10,754	523	24,001
LV	22,300	7,200	31,300	1,620	62,420
<b>Total</b>	<b>31,240</b>	<b>10,984</b>	<b>42,054</b>	<b>2,143</b>	<b>86,421</b>

Out of the total number of substations in the country (19,840), 110/x kV substations have a share of 0.6% and 35/x kV participate with a share of 0.9%, whereas the MV/LV substations have the major share of 98.5% (see Table 19).

*Table 19 - Number of substations in the distribution grid in BiH*

	EP BiH	EP HZHB	EP RS	ED BD	BiH
110/x kV	49	24	46	2	121
35/x kV	81	12	77	9	179
MV/LV	7,300	3,300	8,500	440	19,540
<b>Total</b>	<b>7,430</b>	<b>3,336</b>	<b>8,623</b>	<b>451</b>	<b>19,840</b>

## Transmission System

### *Elektroprenos-Elektroprijenos BiH JSC (TRANSCO)*

Based in Banja Luka, TRANSCO operates the BiH transmission system. The company is organised into four operational areas responsible over transmission assets (110 kV, 220 kV and 400 kV lines and substations), establishes high voltage connections and carries out the metering, transmission of data, maintenance and development of the network. Overall, the transmission system consists of about 6,300 km of 400 kV, 220 kV and 110 kV lines, 36 interconnections, over 140 substations and over 250 transformers.

## Coalmines

Bosnia and Herzegovina has four coal-fired thermal power plants in operation. All of them designed for operation with lignite or brown coal supplied by domestic mining companies, exploited by surface and underground mines around the country. Recent studies estimate overall geological coal reserves in BiH at 5.8 billion tons, with mineable reserves estimated at 1.8 billion tons. Out of twelve coalmines, nine are located in the FBiH and the remaining

three in RS. Typical calorific values of mines in BiH are in the range 8,000-12,000 kJ/kg for lignite and 14,000-17,000 kJ/kg for brown coal.

Major coalmine consortiums present in the country (see Table 20).

*Table 20 - Major coalmine consortiums in BiH*

	EP BiH							EP RS	
	Kreka	Kakanj	Zenica	Breza	Djurdjevik	Abid Lolic	Gracanica	Gacko	Ugljevik
Type	Lignite	Brown	Brown	Brown	Brown	Brown	Lignite	Lignite	Brown
Coalmines	4	2	4	2	2	1	1	1	1
Capacity (000 t/yr)	2,645	1,200	414	450	600	100	270	1,800	1,750

### Gas & Oil Sectors

BiH does not have domestic gas or oil production, liquid natural gas terminal or underground storage facilities. The country is fully dependent on the import of natural gas through a single point of entry via an interconnector with the Republic of Serbia. The company BH Gas mainly operates the gas transmission pipeline, which is approximately 200 km in length. Natural gas in BiH is used predominantly for heating purposes, with limited industrial consumption.

#### **2.2.2.3 Damage**

The utility companies went into crisis management mode as soon as the heavy rains started on 14 May and, as a preventive measure, disconnected vulnerable transmission and distribution lines and substations. As a consequence of flooding, a number of facilities were damaged or destroyed. More than one hundred thousand customers in the country were disconnected from the grid. During the period 14-19 May, where possible, the transmission and utility companies progressively re-established electricity supply; however, some areas were left without power either because the equipment was seriously damaged and/or the flood level in the area as well as landslides created a safety hazard.

Immediately after the heaviest rain stopped, wherever the structures had not been permanently compromised or there were safety concerns, the utility companies worked around the clock to restore supply. This work included drying affected facilities, restoring service through emergency and (most often) improvised repairs and replacing damaged meters.

Within ten days of the rains, TRANSCO and all four utility companies had conducted extensive site visits and had gained a fairly clear idea of the extent of damage to the generation, transmission and distribution systems.

The total value of the damage at the state level amounted to 49.65 million EUR. Out of this figure, a 48.9% share of damage applied to coalmining, 45.2% to the distribution system, 3.3% to the transmission grid, 1.7% oil terminals and 1.0% to the three small hydro power plants (SHPP) operated by the independent power producers (IPP) (see Table 21).

Table 21 - Structure of damages in BiH (thousands of EUR)

(in 000 EUR)	Transmission	Distribution				Generation	Coalmining	Oil Terminals	Total
	TRANSCO	EP BiH	EP HZHB	EP RS	ED BD	SHPPs	EP BiH	FBiH	
Total	1,616	4,095	2,735	15,553	66	481	24,291	828	49,667
%	3.3%	8.2%	5.5%	31.3%	0.1%	1.0%	48.9%	1.7%	100.0%

At the entity level, the majority share of damage was in the FBiH with 67.2% (33.39 million EUR), followed by RS with 32.7 % (16.20 million EUR) and Brcko District with 0.1% (0.05 million EUR). Damage to TRANSCO was split between the FBiH and RS in accordance with the companies' shareholder ownership structure (FBiH 58.89% and RS 41.11%).

Out of the total damage in the country, the public sector registered 99.0% and private sector 1.0%.

### Generation

None of the thermal power plants suffered direct damage during the flooding, but coal supply to TPP Tuzla was halved as a consequence of flooding at the 'Sikulje' mine. Other mines in the country provided alternative supply to TPP Tuzla. The large hydro power plants were not affected despite some exceptionally high inflows at HPP Visegrad and HPP Bocac. Only a few SHPPs were affected by river torrents and landslides (see Figure 1). SHPP 'Bistricak' in Nemila (Municipality of Zenica) was completely destroyed and, according to estimates, will not return to operation until the end of 2014. The two other SHPP operators that reported damage resumed normal electricity generation after repair works were conducted. Total damage to power generation facilities amounted to 479,440.95 EUR.



*Figure 1 - Overflow at SHPP 'Modrac' (left) and destroyed SHPP near Zenica (right)*



### Transmission System

TRANSCO reported three damaged substations: SS Doboj 2, SS Bijeljina and SS Celinac. Damage also occurred at a total of fourteen high voltage lines, including two 400 kV lines (6 towers and 2 spans), three 220 kV lines (4 towers) and nine 110 kV lines (15 towers and 3 spans). A total length of 176 km or about 3% of the length of high voltage lines in the country were disconnected. TRANSCO managed to provide continuous uninterrupted operation of the system in affected areas by activating redundancy supply. Total damage to the transmission system is estimated to be 1,616,193.64 EUR.

### Distribution System

Distribution networks suffered significant damage across the country. All distribution companies were affected, either by floods or by landslides. Damage was reported at substations, transformers and distribution lines. More than 37,000 electricity meters (predominantly on the household side of supply) were destroyed during the event, which indicates that more than 2.5% of all customers in the country sustained severe damage to their facilities. A total of 159 km of MV and 260 km of LV lines in the country was damaged during the event (0.5% of their total length). Besides the damage to their distribution grid network, all utility companies reported damage to various offices, tools and equipment as well as to numerous vehicles.

Overall damage to the distribution grid is estimated at 22.45 million EUR. The major share of this cost at the entity level was borne by RS with 69.3% (15.54 million EUR), followed by the FBiH with 30.4% (6.85 million EUR) and Brcko District with 0.3% (0.05 million EUR).

EP RS reported eight 35 kV substations, 304 10/0.4 kV transmission substations and 267 km lines (72 km MV and 195 km LV) affected, together with 25,958 destroyed meters. The total amount of damage to the EP RS distribution network is estimated at 15,553,255.13 EUR.

EP BiH reported damage to three 35 kV substations, fifteen transformers, seventeen 10/0.4 kV substations, 111 km of distribution lines (65 km MV and 46 km LV), together with

5,570 destroyed meters. It also reported damage to equipment at three small hydropower plants operated by EP BiH. The total amount of damage to the EP BiH distribution network is estimated at 4,093,300.54 EUR.

EP HZHB reported damage to one 35 kV substation, eighty-four 10/0.4 kV substations and 40 km of distribution lines (22 km MV and 18 km LV), together with 5,300 destroyed meters. The total amount of damage to the EP HZHB distribution network is estimated at 2,735,932.06 EUR.

ED BD reported damage to one 630 kV transformer and ten 10/0.4 kV transmission substation as well as 1.01 km of distribution lines together with 776 destroyed meters. The total amount of damage to the EP BD distribution network is estimated at 65,240.84 EUR.

Typical damage to the distribution systems observed is presented in Figure 2.

*Figure 2 - Flooded substation at Orasje (left) and Doboј (right)*



### Coalmining

The main impact of the flooding and landslides were at the 'Sikulje' open cast lignite mine located at the larger 'Kreka' mining area. The 'Sikulje' mine mainly supplies coal to Tuzla TPP, covering almost half of the power plant's daily requirement. The mine was completely flooded by water inflowing mainly from the River Spreca. The natural flow path of the river was originally over the mine and so the river was diverted in order to enable coal exploitation. The 'Sikulje' mine was flooded with approximately 28 million m<sup>3</sup> of water to a depth of about 55m, covering most of the equipment at the site (see Figure 3). As an emergency measure, large-scale drainage of the floodwater and mud as well replacement or fixing of mining equipment and other infrastructure is required. The direct damage to the mine and equipment is estimated at 20,949,501.75 EUR. Temporary arrangements to bring coal from alternative sites to supply to TPP Tuzla were made in order to avoid a reduction in output at the plant.

Figure 3 - Damaged heavy equipment and flooded open cast mine at 'Sikulje', Kreka



Additional damage to other mines in the FBiH has been identified (3,343,361.13 EUR), but the impact was more limited. Coalmines in RS did not sustain any direct damage.

It is noteworthy that damage estimates for coalmines represent preliminary values based on the information available at the time. Once the process of dewatering the mines is completed it is expected that these estimates will be revised and a full assessment of the damage carried out.

### Oil Terminals

Major damage to reservoirs and equipment and facilities at the liquid fuel terminal at Zivinice were reported. The direct damage to the terminal consists of a complete dismantling of all (seven) reservoirs and, due to their dislocation, caused by surges of water, and distortion it remains unclear whether these terminals can be repaired and recommence activities. The total amount of damage to the terminal at Zivinice is estimated at 828,292.85 EUR.

### **2.2.2.4 Losses**

Losses incurred by the transmission and distribution companies, coalmining companies, independent power producers and oil terminals were estimated based on the following factors: (i) business disruption (reduced capacity to supply electricity, coal and oil); (ii) increased operational expenses during the period of flooding and over the coming months, (iii) reduced metering and/or bill collection and (iv) a reduction in future demand caused by reduced economic activity in BiH.

The total value of losses at the state level amounts to 61.80 million EUR. Out of this figure, revenue expected to be lost over coming months accounts for 78% (40.75 million EUR) and increased operational expenses amounts to 22% (11.56 million EUR). As for the structure of losses by sector, 50.2% is the share of losses for coalmining, 48.1% for the distribution systems, 1.1% transmission grid, 0.3% oil terminals and 0.3% for the three small hydro power plants (see Table 22).

Table 22 - Structure of losses in BiH (in thousands of EUR)

(in 000 EUR)	Transmission	Distribution				Generation	Coalmining		Oil terminals	Total
	TRANSCO	EP BiH	EP HZHB	EP RS	ED BD	SHPPs	EPRS	EPBIH	FBIH	
Operational expenses	77	2,526	286	6,366	102	-	1,023	1,023	143	11,545
Loss of revenue	511	2,628	864	12,005	389	148	-	24,205	-	40,750
Total	588	5,154	1,150	18,371	491	148	1,023	25,228	143	52,295
%	1.1%	9.9%	2.2%	35.1%	0.9%	0.3%	2.0%	48.2%	0.3%	100.0%

At the entity level, the FBIH has the major share of losses at 61.5% (32.16 million EUR), followed by RS at 37.5% (19.63 million EUR) and Brcko District at 0.9% (0.46 million EUR). TRANSCO losses are split between the FBIH and RS in accordance with the companies' shareholder ownership structure (FBIH 58.89% and the RS 41.11%). Out of total losses, public enterprises registered 99.7% and the private sector 0.3%.

### Generation

Out of forty small hydro power plants owned by private companies just three reported losses in their income. Revenue losses incurred up until the end of the year are expected to amount to 148,620.28 EUR.

### Transmission Network

TRANSCO was able to restore redundancy supply to all damaged facilities in a short period after the occurrence. The prompt response of the company enabled uninterrupted functioning of the BiH transmission system during the entire critical period. Some substations, located in the most heavily affected areas, were restored to operation as soon as they were accessible. Out of four operational areas, most affected by the decrease in demand for electricity over the next twelve months will be the Tuzla area. The overall decrease in demand in this region is estimated at 20% of the pre-flooding period, resulting in total revenue losses to TRANSCO of 511,291.88 EUR over the next year. Given the additional increases in the operational costs of TRANSCO, total transmission losses are estimated at 587,985.66 EUR.

### Distribution Network

Distribution companies incurred losses in their operation from the first day of the flooding. Large numbers of customers were disconnected from the distribution grids for weeks after the initial flooding due to the inaccessibility of their properties caused by landslides and the slow recession of the floodwaters. The main focus of the distribution companies was to reconnect as many customers as possible in as short a period as possible, if necessary,

even without providing meters. Since this was an emergency operation, some equipment was energised after high-pressure water cleaning and rust-prevention spraying without replacement and some switchgear were bypassed because of drive mechanism malfunction and a lack of spare inventories and parts.

All this has led to a significant increase in operational expenses during the recovery period. Increased operational expenses will continue going forward due to necessity to replace affected equipment in order to secure reliable electricity supply and public safety. In addition, distribution companies are facing a significant decrease in demand for electricity in the coming months as well as a potential inability to collect electricity bill payments due to damaged metering equipment (as noted in the section 'damage', more than 37,000 meters were damaged) or inability of customers to pay.

Total losses to the distribution systems amount to 25,162,352.55 EUR. Out of this number, RS has the major share at 73.0% (18.35 million EUR), followed by the FBiH at 25.1% (6.29 million EUR) and Brcko District at 1.9% (0.46 million EUR).

### Coalmining

The majority of losses in the mining sector were caused by the complete stoppage of operations during the flooding event and reduced production in the months to come. The open cast mine 'Sikulje' was completely flooded during the recent events and was out of operation at the time of this assessment. According to optimistic estimates, it is expected to resume operation in August 2014 but at only 50% of its pre-flooding daily production capacity of 3,000 tonnes. Coal production from this mine for the full year of 2015 is expected to be at only 75% of the previously planned 1 million tonnes. The reduced production in 2014 and 2015 is estimated to reduce revenue by a total of 20.19 million EUR.

Similar losses, but to a lesser extent, have been registered by other mines in the FBiH. Landslides in the vicinity of the Ugljevik mine, located in RS, caused indirect damage to the amount of 1.02 million EUR. Total losses in the mining sector of BiH are estimated at 26,251,388.41 EUR. Out of this number, 96.1% of losses were registered in the FBiH and 3.9% in RS.

As indicated above, the estimated losses to coalmines represent preliminary values based on the information available at the time. Once the process of dewatering of the mines takes place it is expected that these estimates will be revised and a full assessment of losses carried out.

### Oil Terminals

Losses incurred by the terminal at Zivinice resulting from the flooding include labour cost for the next six-month period out of operation, the cost of cleaning the terminal and additional charges for facility and reservoir inspections. Total losses are estimated at 145,206.89 EUR.



## 2.2.3 Transport

### 2.2.3.1 Executive Summary

The majority of the damage and losses caused by the disaster of 14-19 May 2014 to the transportation sector were observed mainly in the north of the country in the flooded area as well as in mountain roads where landslides cut them at a number of points. All of this affected the movement of people and goods and required the rapid reopening of roads by means of temporary repairs and the use of alternate longer or lesser quality roads.

The estimated cost for damages in total for the transportation and communications sector is 261.76 million EUR, of which 113.03 in FBiH, 142.29 in RS and 6.44 in BD. Losses have been estimated on the basis of information available during the assessment to the total amount of 85.94 million EUR, based on the affected traffic flows due to the interruption or longer time required for travel. The breakdown of these comes in at 41.99 million for FBiH, 43.18 in RS and 0.77 in BD.

For the recovery and reconstruction process short, medium and long term needs include risk reducing measures and resilience building ('Build Back Better'), which has been estimated at 35% of the cost of the damage (approximately 92.03 million EUR). To define the exact amount needed will require in-depth studies of the soil dynamics of slopes, the estimated return period for similar level flooding and engineering studies, which are recommended to be undertaken for the long term reconstruction.

### 2.2.3.2 Sector Overview

Before the disaster the general transport infrastructure in BiH was in great need of upgrades in line with the agreed comprehensive network of the South East Europe Transport Observatory Network (SEETO)<sup>6</sup>. Considering that connectivity provides the means for emerging markets to integrate into the global economy, which would expand opportunities for business in BiH, as well as in the SEE region, to expand and develop, thereby supporting job creation, this is one of the key objectives of BiH strategy.

It needs to be said that in spite of substantial financial assistance and investment devoted to the Transport sector since 1996 (minimum 150 million EUR) progress has been limited. As highlighted in the last few Progress Reports by the European Commission, little progress has been achieved in the area of transport and legislation remains to be aligned

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<sup>6</sup> The SEETO Comprehensive Network is a multimodal regional transport network defined under the MoU, supported by the European Commission. It contemplates main and ancillary transport infrastructure in the South East Europe (SEE) as the base for the implementation of the transport investment programmes. Within the revision process of the TEN-T network, the SEETO Comprehensive Network maps are included in the TEN-T Guidelines, where they appeared as indicative, and moreover, the SEETO Comprehensive Network was defined as TEN-T Comprehensive Network in the South East Europe, and interlinks were determined. In this way, a clear perspective is given to become fully a part of the wider TEN-T network through the individual accession processes of Regional Participants.

with the *acquis communautaire* on all modes of transport, especially rail, road and maritime transport. The upgrading of the transport infrastructure needs to be intensified and the state level Transport Strategy and Action Plan have yet to be prepared, while both RS and the FBiH operate according to individual development plans passed by their respective governments and legislature.

Road transport in BiH accounts for 95% of all goods and passenger movement, whereas air transport accounts for the smallest market within the SEE region and has the lowest passengers ratio. In comparison to neighbouring Serbia and Croatia, BiH lags behind in relation to development of the railway infrastructure.

### 2.2.3.3 Baseline information and Pre-Disaster Assets in BiH

Bosnia and Herzegovina has a complex institutional organisation for the sector. The relevant institutions are shown below.

- The Ministry of Communications and Transport of BiH at the state level (MoCT), responsible for inter-entity and international transport, communications and infrastructure<sup>7</sup>.
- Ministry of Transport and Communications of RS, comprising the public enterprises 'Roads of Republika Srpska', 'Motorways of Republika Srpska', Railways of Republika Srpska' and the Communications enterprise.
- Federal Ministry of Communications and Transport of the FBiH also comprises four subsector public companies: 'Road Directorate of the Federation of BiH', the public company 'Motorways of the Federation of BiH', Railways of the Federation of BiH', and communications enterprise.
- The Government of Brcko District (roads, railways, and communications) are under the administration of the Republika Srpska).

These ministries for transport and communications are responsible for the infrastructure, including the construction, reconstruction and maintenance of the transport infrastructure. Municipalities have responsibility for local infrastructure. In the case of the FBiH, there is the additional level of administration in the cantons.

In general, the transport infrastructure has the characteristics outlined below.

#### **Roads**

<sup>7</sup> Within this organisation are the following administrative departments:

BiH Directorate for Civil Aviation;

BiH Regulatory Board for Railways

BiH Railways Public Corporation, as an inter-entity body

BiH Directorate for Roads

Directorate for Communications and Post

The total length of the road network in BiH is approximately 22,600 km, which consists of the following:

- 84 km of highways;
- 3,800 km main roads (almost 1000 km 'European roads');
- 4,800 km regional roads; and
- 14,000 km local roads.

### **Railways**

The BiH railway network extends over 1,031 kilometres.

- 605 in the FBiH
- 426 in RS

The railways in BiH historically functioned as the predominant transport mode supporting heavy industry including the mining and quarrying industries.

Due to these industrial activities urbanisation occurred along the railway corridors. Line alignments are predominantly hilly, with 174 tunnels (total length 50.5 km), 399 bridges (total length 15.3 km) and many sharp bends and steep gradients.

Table 23 - BiH railway network





### ***Air Transport***

There are four main airports in BiH, namely Sarajevo, Banja Luka, Mostar and Tuzla, each of them serving international traffic. The disaster did not affect airports badly except for Banja Luka, which suffered some minor damage. The others continued to operate effectively.

### ***Inland Waterways and Ports***

They are located alongside the River Sava, which extends over 950 km in total. It is navigable over the length of 586 km (from the Danube to Sisak) of which 332 km is in BiH. There are operational ports at Samac and Brcko, which both reported flood damage. Along its course it marks the border between BiH and its neighbouring countries: from river km 178 - 211 it is the border with Serbia and from river km 211 - 519 it is the border with the Republic of Croatia.

### ***Communications***

Three major operators have a licence for landlines. In addition to these, there are thirteen alternative operators. As for Mobile telephony, three operators own a licence for the provision of GSM services. There are also two operators registered as providers of mobile public phone services that provide mobile telephony services based on commercial contracts signed with the owners of licences for the provision of GSM services.

### ***Postal Services***

The postal services in BiH consist of legal entities registered to provide postal services, namely the 3 public and 13 private postal operators.

## **2.2.3.4 Assessment of the Effect of the Disaster**

Throughout the areas affected damage to transport infrastructure assets have been caused mainly by landslides, mudslides, torrents and flooding.

### ***Landslides***

There were approximately 3,000 landslides reported of which about 150 affected the road network. Many of them occurred on regional and local roads although there were some on main roads such as the one on the M17 at the location Kosova village.

Kosova was one of the major landslides and destroyed the M17 road for a length of approximately 250m, some 17km south of Doboj (see Figure 4).

*Figure 4 - Kosova village Landslide on M17 road*



The cause of the landslide was extreme precipitation that resulted in high pore pressures. It should be noted that the area has been deforested and cultivated unlike the surrounding forest vegetation. Following emergency earthworks the road was reopened at a higher elevation profile in order to accommodate a toe-retaining berm. This is a temporary diversion and should not be considered as a permanent solution. Reactivation of the landslide could happen at anytime following even small-scale precipitation that could directly affect the large tension cracks developed in the slide mass. It is recommended that constant monitoring using survey points is applied and, if possible, the installation of inclinometers and piezometers that should be monitored on a regular basis and will hopefully give warning of any further movement in the slide mass. A similar large-scale landslide destroyed a segment of a regional road near Tuzla (see Figure 5).

*Figure 5 - Landslide destroyed regional road near Tuzla*



### ***Mud slides and localised slope failures***

This is typical of many local failures in the surrounding hills as soft material comes off the mountainsides or from existing cut slopes along roads and blocks the roads (see Figure 6).

*Figure 6–Left (Typical localised cut slope failure), Right (Flow slide on to M-17 at the location Nemila)*



There is usually only limited effect on the road as normally it can be cleared within a day. In the current situation, it is more than likely that more material will slide especially with rain. Therefore, typical remediation measures should include unloading earthworks and gabion type toe berms as practised already. In some places, such as in Topcic Polje, local sewers and septic tanks appear to have been affected and this could cause serious health issues, while additional measures such as piling and anchoring may be required for houses situated near or at such locations.

### ***Erosion***

Such failures have been observed along segments of roads that run adjacent to the major rivers such as that of the M-17 north of Maglaj (see Figure 7) currently being repaired.

*Figure 7 - Eroded segment of M-17 north of Maglaj under repaired*



In this particular location, there was some protection in place in the form of a retaining wall although this was at a fairly low level. It has been reported that during the recent flood the wall was overtopped and the road damaged. Areas at river bends are usually the most affected due to intense turbulence eating away the road embankment. In addition to erosion resistance requirements remedial solutions should consider all environmental aspects.

### **Wash out**

This type of failure has affected more the foundations and ballast material of the railway lines and was caused by fast flowing floodwater. Samac railway (see Figure 8) is a typical example of ballast being washed out from below the railway lines.

*Figure 8 - Samac railway station complete wash out of ballast*



Although the flooded river water came from approximately 3 km away its velocity and height of 1.5m was easily able to move the rail ballast and some of the foundation material. All the ballast in the area of the station has been washed away and there are long areas of track that are just hanging. The worst of the flow must have been through this corridor as there was no visible damage further up or down the line. It was reported that about 20 trains per day utilised the lines through the station. Without major work being undertaken around this area the network will be severely limited. Similar events of railway ballast wash out were observed in many other locations and quite often combined with road embankment wash out damage (see Figure 9).



*Figure 9 - Railway ballast and road embankment wash out*



### ***Torrents***

There were many reported instances of heavy rainfall washing material off steep mountainsides and gullies and carried by streams into the valleys. An example of this can be found at Zeljezno Polje (see Figure 10) where several houses were covered with debris as well as the main road (M17) being blocked.

*Figure 10 - Effect of torrents on villages and roads*



It appears that the culvert under the road was not able to take the flow with the debris and was quite quickly blocked causing the debris to spread out along the road embankment and over the houses. The cost of clearing all the debris from the surrounding area will be high. This type of damage was reported in several areas and appears to be typical.

## **Bridges**

Reports show that approximately 20 bridges were damaged and are unusable. In one instance a bridge that crosses the River Bosna on the M17 near Doboј had its abutment and access embankment damaged, making it temporarily impassable (see Figure 11).

*Figure 11 - Doboј bridge abutment destroyed*



We believe that general damage to the bridges follows a similar pattern with damage to the piers or abutments caused by scour. The bridges would not have been designed for such a large return period flow.

## **Tunnels**

Tunnels in the affected areas should be inspected to assess their structural integrity and signs of water seepage. Following an inspection of the Vranduk tunnel, which is 1,011m long and was constructed some 40/50 years ago, it was reported that the tunnel was already showing signs of stress; however, since the flooding, more water is seeping through the lining and large pieces of the cladding/lining are failing and falling onto the road. The fractured limestone bedrock surrounding the tunnel and probable lack of insulation has allowed water to seep through its concrete lining and erode it over a number of years. Therefore, the infiltration will more than likely get worse over time and consequently there is a risk of the damage developing to a dangerous level, especially at locations such as the tunnel portal where there are visible cracks (see Figure 12).

Figure 12 - Vranduk tunnel portal with visible cracks



In general, the condition of the reinforced concrete tunnel's final lining appears to be poor with large pieces falling off and the reinforcement is corroded and exposed in places (see Figure 13).

Figure 13 - Vranduk tunnel corroded reinforcement bars of the final lining



Fabric designed to stop failing concrete was secured to the inside of the tunnel (northern end) approximately three years ago. Currently, the tunnel is not considered safe for traffic and a closure should be considered.

#### **An example of short-term recommendations: the Vdanduk tunnel**

- *Introduce speed limits to slow traffic to a set speed (e.g., 30 kph) below the limit in place of 60 kph, traffic was observed travelling in excess of 100 kph through the tunnel.*
- *A visual inspection should be undertaken to ascertain the scale of the damage.*
- *Continuous monitoring should be undertaken and if the condition deteriorates rapidly then closure should occur and traffic diverted to alternative routes.*
- *Core samples should be taken to determine the condition and strength of the concrete linings.*

- *Analysis to determine the current strength should be conducted using information from the original design.*
- *Remedial works should be designed and undertaken.*

*Traffic management (lane closure) will be required and possible road closure in order to undertake this work. The survey and sampling could be undertaken at night.*

### **2.2.3.5 Effect on Risks and Vulnerabilities**

The risks of major landslides in locations such as that of the M17 in Kosova village have considerably increased due to the high probability of reactivation. Disruption of traffic will occur if rainfall and flood events of lesser intensity take place. Similarly, the risk level has largely increased for locations where railway or road embankments have been washed away, such as the Samac railway station discussed earlier. With many embankments weakened by the large and fast flows that passed over them, they are now more prone to further damage from either heavy rainfall or from further flows. The risk of local mudslides moving again has increased due to the ground already being saturated and now there is a limited amount of vegetation on the cuttings and the embankments. Further erosion of the riverbank is now more a risk as the banks have already been weakened. Much of the protection has probably been washed away leaving the banks more vulnerable to erosion. Many of the culverts that the roads pass over remain blocked or partially blocked and if heavy rainfall causes further debris to flow could again become blocked and/or cause damage to the embankments and possibly block roads again.

Bridges damaged by the high flows may have undermined or partially undermined foundations that place them at greater risk from further high flows.

Tunnels that were already vulnerable are now much more at risk due to the larger volumes of water building up above them and flowing through their structure, walls and linings. This flow of water is increasing and therefore the cracks and segments of tunnel are likely to fall off and this could lead to catastrophic accidents.

### **2.2.3.6 Calculating the Value of the Damage and Losses**

The damage caused by the disaster had a particularly severe effect on bridges, causing some to collapse, and caused significant damage to other structures. Landslides increased costs and created obstructions closing many roads, while erosion caused by the fast high river currents and the velocity of the floodwaters washed out ballast from railway lines.

Losses or increases in vehicular operating costs incurred by users and subsector companies have been estimated based on 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 the damage was estimated according to the cost of



replacing the affected transport assets to the same level of quality and efficiency as they were prior to the disaster.

#### ***2.2.3.6.1 Damage Assessment***

The assessment is based on official information received and field visits undertaken during the mission. The MoCT prepared documents that were sent out to the two Entities and Brcko District for them to compile the cost of the damage, losses and also the cost of rebuilding better. These documents were issued to the entities before the EU, World Bank and United Nations transport experts arrived in Bosnia and Herzegovina.

In each entity and Brcko District there was a team of engineers who were responsible for different aspects of the task. In certain cases, the engineers had to consult with the municipalities to obtain the costs for local damage and failures such as damage to local roads. All of these engineers plus experts from the World Bank and European Union attended the disaster conferences and workshops held on the 29 and 30 May 2014. Meetings were held in order to go through the forms and the requirements that would be needed to complete the assignment. By the end of the 30 May all agreed on the requirements and the leaders agreed to meet again on 4 June 2014 in order to discuss the level of progress.

A site visit was undertaken on 3 June 2014 to see some typical damage. The Ministry of Transport and Communication of BiH arranged the visit, which took place in damage areas in both entities. Photographs are included in annex and brief descriptions are included in the text. EUFOR in BiH provided the aerial photos.

The entities and Brcko District collated the gathered information on the damage and then forwarded it to the Ministry of Transport and Communication of BiH to produce figures for the whole of the country. Most of the costs for the damage were provided by 6 June and the remainder by 10 June 2014.

An estimate on the cost of the losses was submitted for some sectors on 9 June 2014, although this figure is far less accurate as the information was not readily available as stated previously. The remaining figures for losses were submitted on 10 June 2014.

The MoCT provided regular updates and the figures were finalised with them on 11 June 2014. The cost for building back better is a harder figure to obtain as until a survey of the damage affected area has been undertaken and decisions have been made on a better design these costs are really an estimate. We have looked at other reports and believe that a percentage uplift is reasonable, as an early figure, for the cost estimate for the damage.

We maintained a dialogue with the Ministry of Transport and Communication of BiH at all stages throughout the assessment and, where appropriate, they checked the figures supplied by the two entities and Brcko District.

Costs were estimated through separate analysis of each physical damage and then by assessing the respective replacement cost. The obtained results are presented in the table below.

*Table 24 - Damage to the transport and communication sector*

SECTOR	BD	FBIH	RS	TOTAL (EUR)
1. Railways	Included in the figure for the Entities	20,451,675.25	29,399,283.17	49,850,958.42
2. Main roads	511,291.88	21,474,259.01	29,654,929.11	51,640,480.00
3. Regional roads	1,022,583.76	17,895,215.84	46,016,269.31	64,934,068.91
4. Local roads	1,789,521.58	47,550,144.95	15,338,756.44	64,678,422.97
5. Bus stations	-	28,632.35	-	28,632.35
6. River ports	1,585,004.83	-	153,387.56	1,738,392.40
7. Sava River Waterway		-	-	4,090,335.05
8. Airports		-	255,645.94	255,645.94
9. Post	Included in the figure for the Entities	1,789,521.58	1,789,521.58	3,579,043.17
10. Telecommunications	Included in the figure for the Entities	2,812,105.35	18,150,861.78	20,962,967.13
<b>TOTAL (EUR)</b>	<b>4,908,402.05</b>	<b>112,001,554.33</b>	<b>140,758,654.89</b>	<b>261,758,946.34</b>

Emergency expenditure utilised to reopen roads is included in the table above. It is very important to note that the figure indicated in the table should not be interpreted as a definite assessment of the damage, because more will appear over time; as is often the case with small damaged structures deterioration cannot be measured by direct observation. This could be the case with several bridges and culverts initially considered not to be damaged. Following structural tests, for example, it could be concluded that the materials are suffering from fatigue or have lost their elasticity. In such cases, the rating 'damaged' must be changed to 'collapsed', even though the bridges remain standing and the major damage is not visible externally. Therefore, this damage should be rated as requiring reconstruction and not simply rehabilitation.

A similar case, in which the true extent of the damage 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 tested it is

found that some or all of the layers have been significantly eroded. This makes it necessary to demolish and reconstruct from the formation level.

In such cases, the initial damage assessment must be changed from rehabilitation to reconstruction together with the consequent increase in cost. This may apply to 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 where the real damage is only ascertainable through tests performed in situ and in the laboratory, and may not be apparent through visible inspection of the damage for some time.

#### **2.2.3.6.2 Losses Estimate**

Losses occurred because of the need for drivers to resort to alternative routes as traffic on those they roads the regularly use was interrupted or blocked due to damage to the road infrastructure.

It should be noted that, among others of less importance, the above-mentioned losses occurred in the following situations: detours by drivers who decided to use alternative routes and traffic suppression. The assessment team observed situations (e.g., freight convoys bypassing at very low speed the Kosova landslide on M17) that showed the occurrence of this type of cost, which are losses to the national economy. However, it is therefore difficult to quantify these costs unless accurate traffic flows are available.

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 destination 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 block 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 observed losses is increased travel time and costs incurred on roads that, because they attract traffic, end up being saturated and cause typical traffic congestion. Once again, without accurate traffic data these losses are difficult to quantify.

Long waiting times due to involuntary stops also constitute losses. These stops generate costs corresponding to immobilised capital (the value of the vehicle plus the value of the freight plus the value of the time of the drivers and passengers).

Losses due to immobilised capital are also not included because there was no information on vehicles trapped for a considerable length of time during or after the disaster.

Losses for road transport are based on figures supplied by freight and passenger companies and compiled by the MoCT. These transport companies analysed their losses

from the beginning of the disaster up until the second week in June, approximately one month. This figure is currently approximately 3.12 million EUR and it has been used to estimate the losses, considering that the disruption will last for longer than one year but will decrease over time; therefore, a figure for twelve months total disruption has been allowed.

Losses to the railway industry were calculated based on the expected loss of revenue for the period from the disaster to mid June 2014. These losses will continue for many months but will decrease on a regular basis until all of the lines are operational. An allowance was made for this based on losses to date of approximately 2.91 million EUR per month extending over a period of one year.

Losses to the postal services have been estimated for the period of the flood. This loss will probably increase over the year until the restoration of all means of transport.

Losses to the communication sector are based on the estimated losses for the period of the flood. These losses will also probably increase until normal service is restored.

At the time of writing this report the communications and post teams, who are responsible for calculating both the damage and losses, had not completed their site inspections, hence it is expected that the cost of these losses will increase.

*Table 25 - Estimated losses in the transport and communications sector*

SECTOR	FBiH	RS and BD	TOTAL
Railways	23,008,134.65	12,271,005.15	<b>35,279,139.80</b>
All road losses(transport companies)	17,895,215.84	20,451,675.25	<b>38,346,891.09</b>
River ports, Sava River Waterway	-	-	
Airports	-	-	
Post	61,355.03	184,065.08	<b>245,420.11</b>
Telecommunications	1,022,583.76	9,714,545.74	<b>10,737,129.50</b>
<b>TOTAL</b>	<b>41,987,289.28</b>	<b>42,621,291.22</b>	<b>84,608,580.50</b>

## 2.2.4 Water and Sanitation

### 2.2.4.1 Executive summary

Because of the intensive rains and flooding, access to clean water was compromised and limited damage suffered by the water utilities that serve 60% of the population (estimated at 73% in the FBiH and 46%, in RS, while in BD it was above the national average). As the flooding affected a large rural area households not connected to water utilities faced the potential intrusion of raw sewage and brown waters into their normal underground water sources. The damage and reduced access to water and proper sanitation caused by the extraordinary rains and flooding has to be seen against a background where the quality of potable water from the water supply system is not always at the required level; due to the low level of water treatment water resources are increasingly polluted. At the same time, the water management and flood protection sectors remain seriously underfunded and fragmented due to the complex governance structure.

The impact on the facilities has been estimated at 7.51 million EUR, of which 3.36 is in the FBiH, 3.49 in RS and 0.64 in BD. Of that total the most part applies to damage at 10.64 million EUR and losses estimated at 2.07 million, due to service interruption caused by damage to pipelines and pumps. The decrease in demand from affected households and industrial customers increased the impact of the losses. Approximately 9.30 million EUR is required to fully restore the water supply and sanitation infrastructure and resume full service delivery by the public water utilities at improved standards and quality.

The damage to the supply coming from wells and users not on the grid was not estimated and may be partially reflected in the estimate of damage to other sectors, such as housing, agriculture and other productive activities.

### 2.2.4.2 Sector Overview

#### 2.2.4.2.1 Governance: Legislative and Institutional Framework for Water Management

The Constitution of Bosnia and Herzegovina places water supply and management under the responsibility of the entities. In the FBiH, some responsibilities are devolved to the cantonal level. A set of new water laws adopted in 2006 replaced the previous laws in both entities that were adopted in 1998 and 2002-2003, which included overlapping competencies. The new entity water laws include both water protection and water management segments and are harmonised to the largest extent possible with the EU Water Framework Directive. Under the terms of the Federal Law on Waters, the following institutions are responsible for water management in the FBiH: the Ministry of Agriculture, Water Management and Forestry of the FBiH; two public water management corporations for catchment areas (Sava River Basin and Adriatic Sea basin), the cantonal ministries of agriculture, water management and forestry, and the municipal authorities responsible for

water management. The municipal and town councils are responsible for water supply, sewerage and the treatment of wastewater.

In Republika Srpska, under the terms of the Law on Waters of RS, the Ministry of Agriculture, Forestry and Water Management of RS and the public institution 'Vode Srpske' are the public institutions that manage water. This includes public water resources and hydro-technical facilities and systems, rivers, streams and lakes in the manner prescribed by Law in the territory of RS and in accordance with the provisions of the Law on Water and other relevant regulations. The Ministry of Spatial Planning, Civil Engineering and Ecology of RS is an independent state agency that has jurisdiction over the monitoring of public utilities. The municipalities are responsible for water supply and sewerage systems, while public utilities come under the responsibility of the Ministry of Regional Planning, Construction and the Environment.

There is no institution at the state level in charge of countrywide water management, but the Department for Environment within the Ministry of Foreign Trade and Economic Relations of BiH is responsible for overall co-ordination of policy and serves as an interface for the country's international presence. Given the fact that rivers in BiH cross from one entity territory into another, these are considerably complex arrangements that do not provide for joint or regional approaches to water supply or watershed management.

#### **2.2.4.2.2 Service Delivery of Water Supply and Sanitation Services**

Water supply services in BiH come under the direct jurisdiction of local government through the institutions of municipalities. The exceptions are the Sarajevo Water Utility, owned by Sarajevo Canton, and the water utilities in Mostar and Banja Luka owned by the respective cities. There are a total of 142 municipalities and each controls a public water utility or other such form of water or wastewater organisation. Consumers not covered by the central municipal water supply system depend on their own local water supply systems or on individual wells. It is estimated that before the war (1992-1995) approximately 60% of the B&H population was served by a safe water supply systems (90% in urban areas and 40% in rural areas). It is estimated that a total of 89% of BiH water supply comes from groundwater, while the remainder comes from rivers and natural lakes (10.2%) and artificial reservoirs (0.8%). The events of the 1992-1995 war in BiH resulted in damage to many of the facilities for water resource management. Due to foreign aid, it is estimated that since the end of the war about 90% of the damage to the water supply sector had been repaired. However, given the lapse of time since the water supply systems were built, many no longer meet consumer needs in terms of quantity and/or the quality of water, particularly during dry periods. Some portions of the water supply system, particularly networks in urban areas, remain damaged or poorly maintained and therefore water losses are high.

About 73% of the population within the territory of the FBiH is connected to the central water supply system, where water is mainly controlled for health standards. However,

chemical and microbiological analyses of water samples taken from 70 local water utility companies indicate that 21% of samples did not fulfil the conditions of the Rulebook on Sanitary Standards for Drinking Water. In the territory of the Una-Sana, Herzegovina-Neretva, Zenica-Doboj, Tuzla, West Herzegovina, Canton 10 and Posavina Canton the hygiene and sanitary state of the water facilities and the system of public health control of drinking water is not always satisfactory. Total water consumption in 2012 (organised supply) was 150,278,000 m<sup>3</sup>. There are 80 municipality owned water utilities that serve an estimated 2.8 million consumers. The utility company mostly propose the water tariffs, which are approved by the municipal and cantonal authorities. The average water supply tariff is 0.43 EUR and the wastewater tariff is 0.18 EUR, but there are significant differences across the FBiH. The level of metered consumers is very high (nearly 100%), while on average more than 85% of all billed water is collected.

Most municipalities in Republika Srpska organise their supply through the central municipal water system, but also through a large number of local community water systems as well as small rural group and individual systems. Of the total population in Republika Srpska (over 1,491,000), approximately 686,000 (46%) are connected to the water distribution systems of municipal centres, while around 164,000 or (11%) are connected to the water supply systems of local communities. Thus, there is organised water supply for around 850,000 residents (57%). The remaining population (approximately 641,000 or 43%) is supplied by local systems (rural and communal water supply systems with abstraction from wells, springs or similar sources). There are a total of 51 water utility companies in RS. The municipal sewerage system covers 67% of the organised water supply for inhabitants, which is about 33 % of the total population. The price of water amongst water supply companies in RS varies and is in most cases depends on the development level and financial status of municipalities. Taking into account this fact, the price of water in Bijeljina is 0.77 EUR/m<sup>3</sup> while the price in some municipalities in eastern Herzegovina is 0.31 EUR/m<sup>3</sup>. The Municipal Assembly and City Assembly in the territory where the utility company operates determine the nominal price of water; however, the set price typically does not reflect the real economic cost. The level of water losses vary significantly amongst the different utilities and ranges between 40-70%, while individual water consumption varies between 140 - 170 l/cap/day.

### Flood Protection Facilities

The average annual precipitation in BiH is about 1,250 mm, while the outflow from the territory of BiH is 1,155 m<sup>3</sup>/s or 57% of the total precipitation. Yet these volumes of water are not distributed evenly, either spatially or temporally.

The intensive development of water resource management in BiH began in the 1950s, when the system of flood protection facilities was constructed along the Sava and Neretva rivers. It consisted of 170 km of dikes along the rivers and 25 pumping stations with a total capacity of 120 m<sup>3</sup>/s. It was intended, amongst other things, to act as a defence against underground waters, to regulate 76 km of riverbed and strengthen the 55 km of riverbank.



During this period, 28 reservoirs were constructed in BiH. The total volume was around  $3.6 \times 10^9 \text{ m}^3$  for power generation purposes, flood protection and to secure water supply for households, industry and agriculture. Following the destruction and damage caused during the war period, provisional repairs were made to the water management and flood protection structures in the late 1990s and 2000s; however, serious no serious upgrade has taken place due to the ever-present shortage of funds for this purpose. As a consequence of long years of neglect and lack of maintenance, the condition of the flood protection facilities is generally unsatisfactory. The risk from those is particularly present for towns and settlements along the River Sava. Yet the situation is not much better in other parts of the country. One clear example are the floods in Tuzla Canton in early 2000 when major damage estimated at more than 30.68 million EUR was inflicted on crops, housing and infrastructure as well as through the erosion of arable land and increased incidence of landslides. The problem of flood protection in urban areas was also encountered during past decades in RS in Banja Luka, Čelinac, Prnjavor, Derventa, Modriča, Janja, Zvornik and elsewhere.

The overall diagnosis of the water sector is that a lack of investment and an infrastructure maintenance backlog has led to a situation where the quality of potable water from the water supply system is not always at the required level; water resources have become increasingly polluted due to the low level of water treatment. At the same time, the water management and flood protection sectors remain seriously underfunded and fragmented by the complex governance structure. Sustainable development in the field of water management is only possible with the implementation of the principles of 'integrated water resources management', by joint problem-solving in the main segments of water management, specifically in exploitation, protection of waters and protection from the damaging effects of waters. Bosnia and Herzegovina possesses considerable water resources and in the future water may become one of the foundations of the general economic development in many areas. Yet the damage inflicted during the war combined with insufficient maintenance and an inadequate regulatory framework has brought water management, just like other sectors of the BiH economy, into a difficult situation.

#### **2.2.4.3 Damage to Water Supply and Sanitation (Effects on Infrastructure and Physical Assets)**

Flood-related damage to the water supply and sanitation infrastructure in affected area was relatively limited. In the case of water supply systems, physical damage was mainly limited to (i) electrical components and equipment in pumping stations or water treatment plants; (ii) administrative and laboratory buildings, and office equipment, records and laboratory equipment and (iii) motor vehicles, that were exposed to the water over an extended period of time. In the case of wastewater structures, damage was linked to (i) electrical components in pumping stations, (ii) administrative buildings and (iii) manhole covers, waste containers and similar elements. Landslides had an impact and led to physical damage in the landslide areas, but this damage was minor in length and affected service provision for relatively small numbers of the population.



Basic data collection was done by the FBiH, RS and BD. Governmental focal points played a coordination role in the distribution of data collection tables and the forwarding of data to the assessment team. Data was collected from individual water utilities. It included the Ministry of Agriculture, Water and Forestry of the FBiH, the Ministry of Agriculture, Forestry and Water Management of Republika Srpska and the relevant Brcko District water utility authorities. The Assessment Team conducted field visits to particularly affected utilities that had not delivered their data, thus filling in the existing data gap. It also conducted data validation based on existing water tariffs, operational service values and market prices. It should be pointed out that the level of accuracy remains dependent on the quality of the data delivered by the utility sources, which in such short time could not be systematically checked. Instead, the Assessment Team used team member experience in the region and approximations derived from other received data.

Damage to physical assets was limited and mostly impacted administrative buildings and furniture on the first floors and basements, and the electrical components of pumping stations and plants. The Federation saw 2.66 million EUR worth of damage to physical assets, while Republika Srpska sustained over 2.15 million EUR worth of Damage, along with 0.56 million EUR worth of damage in Brcko District. All of the damage accounted for is public, stemming from municipal level water utilities. Minor additional damage to the sector is likely to stem from the impact on local water supply systems in some communities and neighbourhoods not connected to the service delivery grid. However, due to the small portion of the population served by these systems and the lack of accounting on the size and cost of these systems, they are not included in this damage assessment. However, addressing the impact on these local systems represents a crucial component for full service restoration during the recovery and reconstruction phase, and therefore the cost of doing so are included in the reconstruction needs.

#### **2.2.4.4 Losses in Water Supply and Sanitation (Effects on Service Delivery)**

Service interruption to the water supply and sanitation sector was created at the moment when the floodwater reached pumping and water treatment facilities, which are usually located close to the water sources. Essentially, it damaged electrical equipment, cut the energy supply and further stopped service provision. Service interruption lasted until the floodwater receded, enabling the replacement of damaged critical equipment and service restoration.

The sector saw minor losses due to service interruption caused by damage to pipelines and pumps. Losses were especially felt due to the decrease in demand from affected households and industrial customers. All losses accounted for are considered public as they stem from the public municipal level water utilities. The following table summarises losses and damage to the water and sanitation sector as seen in the FBiH, RS and Brcko District.

Table 26 - Damage and Losses to the Water and Sanitation Sector, in millions EUR

	Damage	Losses	Total
FBiH	2.69	0.67	3.36
RS	2.18	1.32	3.50
BD	0.57	0.08	0.64
<b>TOTAL BiH</b>	<b>5.44</b>	<b>2.07</b>	<b>7.51</b>

## 2.2.5 Flood Protection

### 2.2.5.1 Executive Summary

Flood protection and watershed management in BiH are strategically important in terms of risk management as well as in terms of appropriate environmental management and use of natural resources. The watershed network of rivers that the country has is an important source of energy as well as irrigation and recreation in addition to the water supply. The country's rivers flow into major waterways and large European basins to which they are tributaries of large importance.

Unfortunately, on this occasion these rivers became one of the major factors that contributed to the flooding that was experienced in view of the extremely over the average precipitation received. This caused damage to embankments and pumps, albeit limited, accompanied by severe damage to streams and channels, which was very high. Rainfall triggered both floods and torrents but through different processes.

Damage was associated, as indicated, with dykes, pumps, channels and streams to an amount estimated at 25.77 million EUR. There was a very small impact on dams in the FBiH whereas torrent associated damage is estimated at a cost 23.16 million EUR, which is equivalent to 47.3% of the total damage of 47.86 million EUR. Of this amount 23.98 corresponds to the FBiH (49.0%), 22.50 million EUR to RS (46.0%) and 2.76 million EUR to BD (5.0%). The losses associated with this disruption of the flood protection structures is reflected in other sectors, namely due to the destruction of housing and the damage and losses to agriculture, other productive activities and commerce, leading to a considerable impact on livelihoods.

The cost/benefit ratio of investment in flood protection and watershed management is thus vastly positive and is to be seen as one of the most relevant emerging needs, even more so as the River Sava is a trans-boundary waterway of great importance from the regional perspective. It is very important that measures are planned at the catchment level. Moreover, given the current trend of climate variability and change, there can always be a bigger flood so planning for excesses and emergency preparedness is an integral part of any DRR.

It is important to stress that in the near future more care has to be taken about the management of torrent catchments because these play a crucial role in the segment for protection against the severe effects of water in low-lying reaches of a watercourse. Successful torrent control concepts are available today which permit a balanced debris regime and a morphological development, which is close to nature. A key objective is for more space to be allowed for waters in the future. This means that some difficult decisions will need to be made with regard to agriculture and urban development.

## 2.2.5.2 Sector Overview

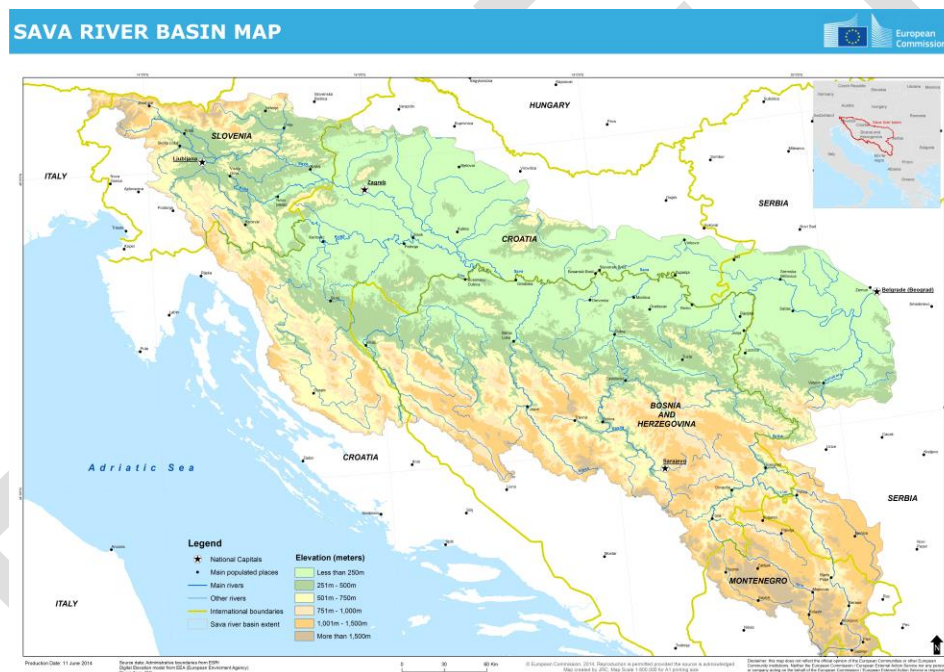
The section provides a Sector Overview and pre-disaster Baseline.

### 2.2.5.2.1 Pre-disaster characteristics

#### Infrastructure and Assets

Bosnia and Herzegovina includes two river basins the Sava River Basin to the north and the Adriatic and Black Sea river basins to the south. The flooding that occurred in May 2014 affected the Sava River Basin. The Sava River Basin covers an area of nearly 100,000 km<sup>2</sup>, and is spread across Slovenia, Croatia, Bosnia and Herzegovina, Serbia and Montenegro (see map). In Belgrade, the Sava flows into the Danube.

Map 6- Sava River Basin

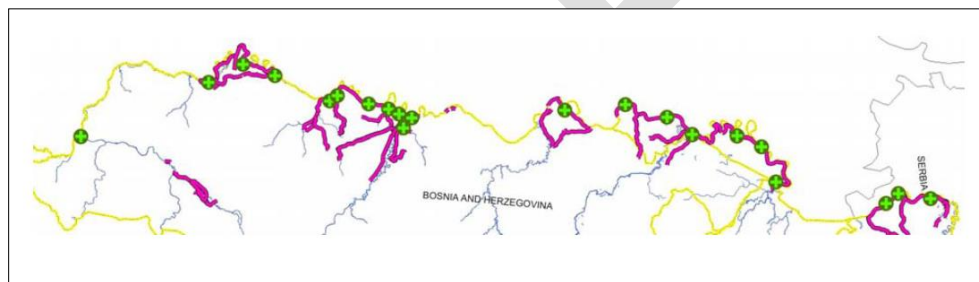


Bosnia and Herzegovina is located on the southern flank of the Sava, bordered between two tributaries of the Sava: the River Una in the West (border with Croatia) and the River Drina in the east (border with Serbia and Montenegro). Two other tributaries of the River Sava, the Vrbas and Bosna river basins, are situated fully on the territory of Bosnia Herzegovina.

Historically, the River Sava and most of its tributaries are sensitive to flooding and settlements in the river valleys such as Novi Grad, Prijedor and Sanski Most, Samac and Janja were flooded regularly. This led to the construction of flood defence systems such as

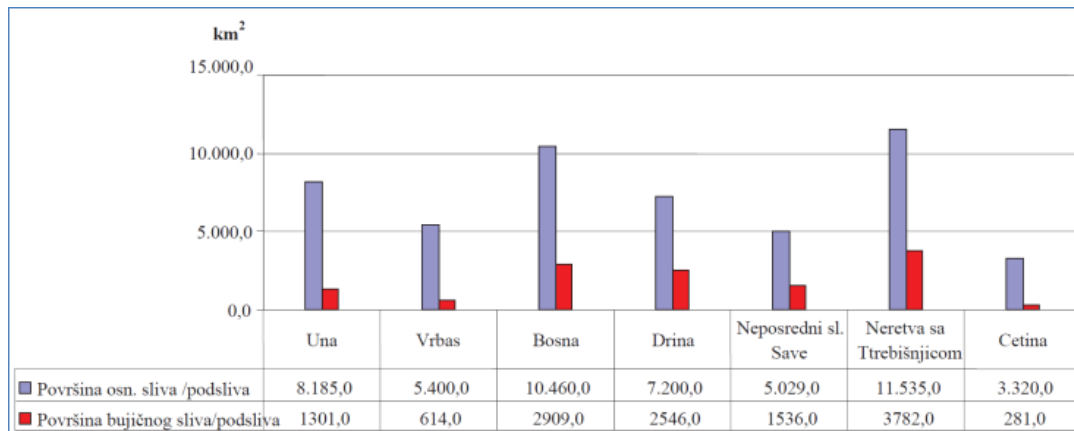
small dykes and drainage channels from the end of the 19<sup>th</sup> century onwards. With the establishment of the Federal People's Republic of Yugoslavia in 1946 the Sava and its tributaries became a fully national river basin, which stimulated the development of trans-basin flood defence systems such as the main Sava river dyke and drainage system. In 1972, a study on Planning and Regulation of the Sava River was performed with support from the UNDP. It included the development of mathematical models and an integrated flood protection plan. The overall flood defence system constructed by the former Yugoslavian authorities was rather robust and ensured a flood protection level of generally 1:100 years for most of the Sava River Basin and its tributaries. Along the Sava and in the lower reaches of the tributaries the flood protection consists of a series of flood protection dykes, drainage channels and pumping stations. The middle to upper reaches of the tributaries relies on the capacity of the river channel with some small dykes in places. The flood protection in these reaches is typically a 1 in 100 years return period. There are some reservoirs for hydroelectric power generation as well as some flood retention areas in the upper Sava watershed.

*Map 7 - Dykes and pumping stations along the River Sava*



Because of many natural and negative human impacts, torrent erosion in some areas of BiH is becoming increasingly problematic. Hills and mountains in Bosnia and Herzegovina cause a large number of torrents of various destructive power and the possibility of bringing about new erosion processes. Intensive erosion and torrents are caused by relief, geological and pedological features, climate factors, land use and vegetation cover and especially by anthropogenic effects (uncontrolled forest felling, fires and the like). Erosion processes cause great damage, leaching fertile soils on steep unprotected areas (endangered even today by forest felling) and hilly parts of the river basin and also reducing agricultural areas, the retentive capacity of forests, and the retentive capacity of the soils. Heavy rainfall caused many landslides in the headwaters, bank erosion and very high waters in the streams and rivers. This leads to flash flood and debris flow events and unleashes an enormous quantity of debris to the alluvial fans. Extensive damage occurred to infrastructure objects, houses and other buildings and farmland around the torrential rivers.

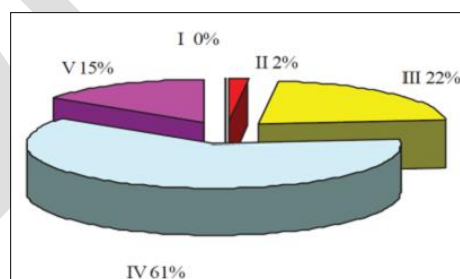
Graph 6 - Overview of torrential areas in BiH (blue designates area of the main catchments, red designates areas of torrential catchments)



Economic and social conditions of the society have led to the acceleration of these processes more than all natural factors taken together. Torrents in hilly areas move enormous quantities of sediment that is deposited in low-lying parts of rivers, thus reducing their discharge capacity; filling reservoirs and retention ponds - reducing their volume; contaminating stored water (water supply reservoirs) and leading to the occurrence of turbidity and so on.

Various types and intensities of erosion processes and a considerable number of torrents affected BiH. According to 'The Register of Torrents and Erosion-prone Areas in Bosnia and Herzegovina' there are 935 torrential watercourses covering an area of 12,969 km<sup>2</sup>.

Graph 7 - Intensity of erosion processes in BiH: I. cat. = extreme erosion, II. cat. = high erosion, III. = middle erosion, IV. Cat. = weak erosion, V. cat. = very weak erosion



The protective function of forests is an extremely important positive factor for the torrential character of the mountain landscape of Bosnia and Herzegovina. Sustainable, multifunctional and close to nature oriented forest management contributes significantly to reducing erosion and flood risk. Due to the high containing and filtration capacities of forest soil, forests are of exceptional importance for the preservation of sources of clean potable water. However, in many locations there has been a significant decrease in this protective role because of the highly intensive exploitation of forests over the last two decades. Yet



the desired level of protection against erosion and torrents cannot be achieved only through care for forests or simply by regulating torrents and torrent sites. The only solution is the integral/integrated management of forests and water (inter-disciplinary!).

### Governance

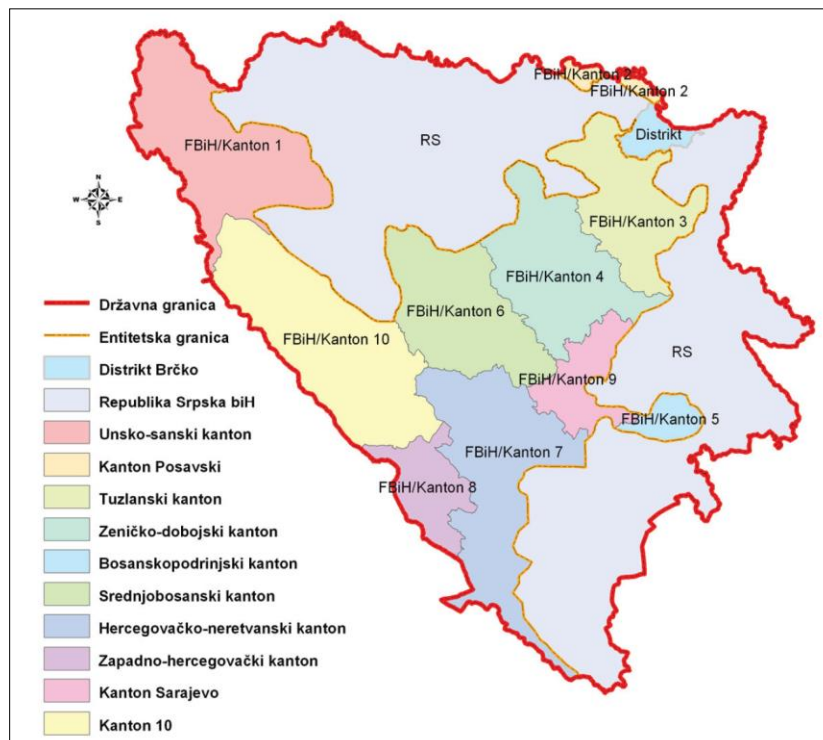
The competence for water management rests with entities: Federation of Bosnia and Herzegovina, Republika Srpska, and Brcko District. Only BiH has competences to enter into relevant international agreements (both multilateral and bilateral); however, the entities and Brcko District are those that are competent for execution of these agreements. Multi-lateral cooperation in water management has been already established amongst the pertaining countries within the various basins. The countries of the Sava River Basin established a Framework Agreement (FASRB). Under article 15 of the framework the Sava Commission was formed to implement the framework and is based in Zagreb, Croatia.

Competence for water management is shared with the cantons and municipalities in the Federation. Watercourses are classified according to their importance in relation to water management, with the most important resting with the Federation.

*Figure 14 - Šamac 19 May 2014*



Map 8 - Distribution of cantons within the Federation of Bosnia and Herzegovina



The Ministry of Agriculture, Forestry and Water Management of Republika Srpska is an independent administrative institution that performs administrative and other tasks in several administrative areas and it is under direct jurisdiction of the Government of Republika Srpska. The public institution 'VOĐE SRPSKE' was formed in 2013 to manage water, public water resources and hydraulic engineering structures and systems, rivers, streams and lakes in the manner prescribed by the Water Act and other relevant regulations.

Concerning the role of water governance and public participation in flood risk management in the Sava River Basin, the following challenges have been observed as limiting factors for the successful implementation and maintenance of flood risk reduction mechanisms:

- different organisational/institutional forms in the field of flood management between the entities, cantons water agencies, municipalities etc. lead to poor communication with the population and activities in the flood hazard zones;
- limited transparency between the public institutions that are in charge of flood management in the Sava River Basin countries (Slovenia, Croatia, Serbia and BiH);
- rigidity of public institutions in the field of water management and flood management, with limited connectivity between centres of competences in the Sava River Basin;



- only partial implementation of solutions, sometimes proposed by consultants, who after the project closure are not engaged to monitor the performance of their projects;
- insufficient work on sustainable systematic and long-term management of flood and torrent protection structures/assets;
- insufficient communication and pre-event programming (preparedness stage) between civil protection organisations and flood management organisations;
- inconsistent and inadequate funding for water management limiting inspections, maintenance and prevention measures;
- inadequate powers within water management to control land use (urban developments, forestry and agriculture);
- inadequate continuity in water management organisation structures leading to a loss of knowledge and experience; and
- water sector human resources in the public administrations as well as those in professional institutions are insufficient to fulfil all of the required tasks. An illustrative example is the number of filled positions in the cantonal ministries where the ratio of the currently employed personnel to the designated positions is 53%.

### 2.2.5.3 Assessment of the effect of the disaster

In April and early May 2014, heavy rain saturated the soils in the upper watersheds of the Sava River. The rainfall for April was double the long-term average. Three months of rain fell in just three days between the 14 and 17 May, between 150 and 250mm of rain in total.

One of the most severe events happens in the village of Topčić Polje, which was destroyed by three torrents.

*Figure 15 - Montage of aerial imagery and a 3D photogrammetric model of the debris flow at Topčić Polje (Peter Spruyt, European Commission Joint Research Centre - JRC)*



This rainfall precipitated thousands of landslips in the upper watersheds. These landslips caused a temporary dam to form when they entered mountain streams. Water built up behind this dam until the dam was breached releasing a rapid wave of water and soil. Erosion from this release may well have initiated further landslips into the stream with the process repeating. The mixture of soil and water flowed down the stream to the alluvial fan where the lower velocities caused the sediment to be deposited. As the bed built up sediment was pushed out of the channel. Thousands of tonnes of sediment was deposited on the alluvial fans destroying several and damaging houses and other infrastructure located there.

*Figure 16 - Devastation after debris flow event (Topčić Polje) - sediment deposits estimated to be more than 3m deep*



The water flowing down the rivers overwhelmed the capacity of their channels causing serious flooding to the Sava River and its tributaries, Vrbas with Vrbanja, Bosna with Sprečo (near Dobo) and Krivajo and Drina. The largest damage and consequences were in the towns and villages including Brcko, Orašje (Sava), Dobo, Zavidovici, Maglaj (Bosna), Samac (Sava/Bosnia confluence) followed by Bijeljina, Zvornik (Drina) and Čelinac, Kotor, Varos (Vrbanja). Flooding in the tributaries was torrential with a rapid rise in water and a large amount of floodwater incorporating a lot of natural materials (soils, stones, wooden material, river sediments and crushed building material). On the Sava and the lowland rivers the response was slower with lower velocities and little debris but with a longer retention time. The exceptional velocities eroded the riverbed and banks. In the lower reaches of the tributaries in the Sava floodplain the debris washed into the river and together with the eroded material was deposited in the slower moving mouths at the confluences of the rivers.

The exceptional flows caused river levels in the River Sava to rise very quickly. On 17 May 2014 near Slavonski Šamac in Croatia the flow in the Sava was estimated at 6,000 m<sup>3</sup>/s, which exceeded the previous peaks by 50%. The devastation wrought upon the upper reaches was the warning to the towns along the Sava that a major flood was coming. The river rose very quickly and exceeded all previous peak levels for records over the past 120 years. The return period estimates vary but predictions of 500 to 1,000 years have been made. The high levels in the Sava prevented the tributaries from freely discharging creating a backwater effect that raised water levels in the tributaries. In the case of the Bosna at Samac and the Drina at Beilijina this is considered to be a significant factor that led to the flooding of the towns.

With few places to go, due to the construction of dykes on both sides of the River Sava, the river levels continued to rise eventually exceeding the capacity of the dykes and triggering breaches in them. The breaches occurred in the lowest and weakest sections of the dyke. The Sava dykes are typically 4m wide at the crest and 2 to 3m high with steep 1 in 1.5 to 1 in 2 side slopes and are made from silt c locally.

The 3 breaches at Prud allowed further floodwater onto the floodplain which combined with the Bosna, although the contribution of this to the flooding at Samac is not yet fully understood. The floodwaters flowed along the floodplain to Orašje where they ponded until drained and pumped. The 5 pumping stations near Odžak were damaged by floodwater and took several days to repair. European Civil Protection pumped out approximately 4,000,000m<sup>3</sup> of water.

A breach at Vucilovac allowed floodwater to travel 7km and flood the outskirts of Brčko.

Near Bijeljina high levels in the Drina coincided with high run off from the hills into the cut off drain causing flooding on the outskirts of Bijeljina. This was followed by dyke breaches at 4 locations allowing vast quantities of floodwater to flow onto the floodplain. An artificial breach was created to the Drina to drain this floodwater but it is uncertain how effective this was as water continued to flow through the open breaches on the River Sava. The area was slowly drained by a combination of gravity discharge and pumps, which all remained operational.

#### **2.2.5.3.1 Effect on Infrastructure and Physical Asset Damage (total or partial destruction of infrastructure and assets)**

The damage caused to the flood protection assets is listed in the table below together with a brief description of the reconstruction work needed.

Table 27 - The damage to flood protection assets

Asset	Damage
Flood dyke	Breaches caused by the flooding or created to allow floodwater to drain.
	Erosion to the faces and crest. Some of these dykes are also highway assets.
Dams	Damage to dam structures.
Channels	Damage to the erosion protection system.
	Toe of erosion protection destabilised due to erosion of the riverbed.
	Erosion of the natural channel.
	Sediment build-up at critical locations, under bridges and at rivers mouths.
Torrents	Destabilisation of torrent catchments caused by landslides, bed & bank erosion and depositing of sediments. In some places, the torrents rose to 4m in depth completely blocking the profile.
Torrent banks and dams	Damage on torrent control structures (dams, bank protections)
Land above torrents	Landslides formed that destabilised the land above the torrents. This caused further debris to flow into the torrents.
Pumping Station	Water damage to equipment.
Water control structures (sluices, weirs etc.)	No damage report.
Gauging stations	Equipment in all stations damaged by water and sediments.

Figure 17 - Road also acting as a dyke at Dobož damaged by overflowing water.



Until the breaches in the dykes are sealed, there is a very high risk of flooding should another flood event occur. Even quite a small flood would flow through the open breaches causing further damage to the houses and infrastructure that they protect. However, with

dry summer conditions the losses associated with water flowing through the breaches are unlikely to arise before the breaches are sealed. The responsible agencies are already planning to repair these breaches.

As all of the drainage pumps are now operational any rainfall or other flows into the land enclosed by the dykes will be suitably drained.

Further damage to the erosion protection could occur particularly in the upper reaches where velocities are higher. This further loss has not been included in this report as it relates to a future event that has not yet occurred.

The sediment in the channels will reduce their capacity leading to an increase in flood risk. The values of these further losses have not been included in this report as they relate to a future flood that has not yet occurred.

Less intensive rainfall and high water events could trigger further damage in the upper parts of torrent catchments. This damage would have more severe consequences due to the unstable nature of the slopes above the streams, unstable stream banks, debris within the streams and loss of the protective structures.

#### **2.2.5.4 Calculating the Value of the Damage and Losses**

This section estimates the cost of the Damage and Losses (alteration of flows indicated in the above) by costing:

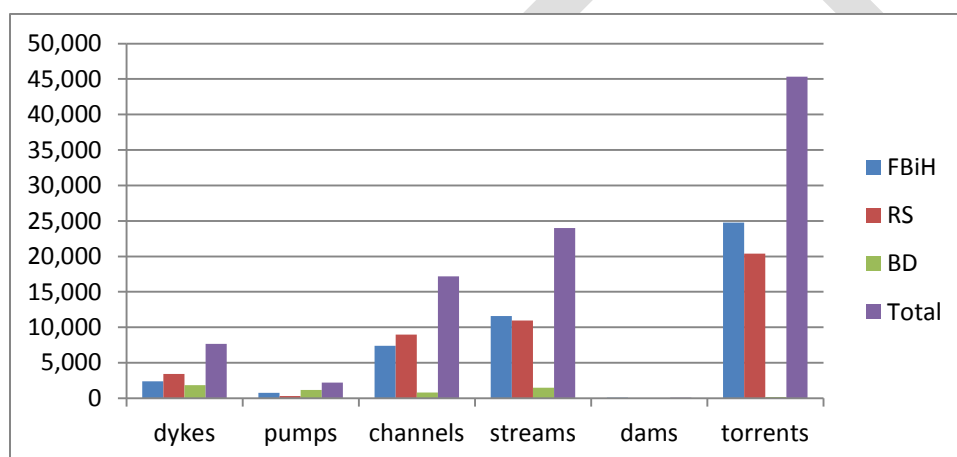
- damage to infrastructure and assets (at replacement and/or repair costs) and
- monetary value losses due to changes in flows (*separating partial/complete damage, losses and/or increased costs for the categories indicated above (production, service delivery, performance of government functions, and altered risks).*)

NB: A distinction will be made between private and public ownership.

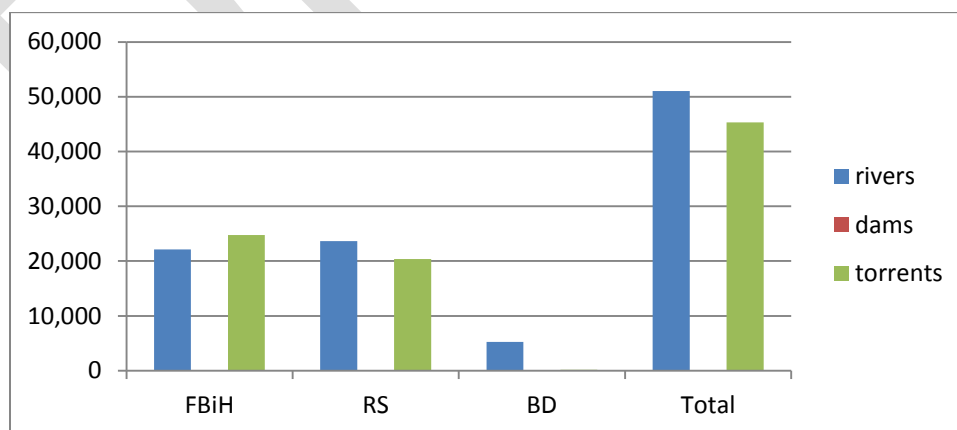
Table 28 - Damage to the flood protection sector

(in 000 EUR)		Damage			
Damage		FBiH	RS	BD	Total
<b>Rivers</b>					
dykes		1,225	1,753	937.20	3,915
pumps		383.4689	153.3876	583.90	1,121
channels		3,776	4,593	415.68	8,786
streams		5,921	5,591	750.58	12,263
<b>Dams</b>		60	30.67751	-	-
<b>Torrents</b>		24,746	12,652	10,428	93.06
<b>Total</b>		<b>46,919</b>	<b>23,989</b>	<b>22,519</b>	<b>2,780</b>

Graph 8 - Damage to the flood protection sector



Graph 9 - Damage to the flood protection sector





## 2.2.6 Housing

### 2.2.6.1 Executive Summary

The housing sector suffered severe damage associated with both the vast extension of the flooding covering both urban and rural housing and the destruction of houses by landslides. Associated with the destruction or damage of houses was the destruction of household goods and valuable items such as documentation, family heirlooms and other valuables difficult to price. The total extent of the damage and losses amounts to 453.21 million EUR, most of it suffered by privately owned households. Given the level of destruction, the losses incurred are associated with longer-term temporary shelter. This is particularly true for those houses destroyed or flooded for a longer period, demolished and requiring the removal of rubble and debris, relocation, land acquisition and the provision of essential services. The largest number of houses destroyed was in the FBiH (1,688 out of 1,952) and the largest number of damaged ones, mostly due to flooding, occurred in RS (23,281 out of 39,231). In RS an additional 1,596 flats were damaged (out of a total of 2,016). In BD, 63 houses were reported as destroyed and 703 damaged at the end of the reporting period encompassed by this assessment. Given the extent of the damage and the continued flooding in some areas for a number of weeks some additional figures may have to be added once a full census of the affected housing sector is made. Additionally, an undetermined number of households may have to be relocated as some of the slopes in areas affected by landslide make the terrain unstable necessitating resettlement.

Table 29 - Summary of damage to the housing sector

Description	Number of units	Replacement/Repair cost (EUR)	Household Goods (EUR)	Other assets in houses*** (EUR)	TOTAL
<b>Fully destroyed</b>					
Houses - RS	201	6,114,795	668,003	92,493	6,875,291
Houses - FBiH	1,688	51,352,111	5,609,895	776,755	57,738,761
Houses - BD	63	1,916,578	209,374	28,990	2,154,942
<b>Subtotal Destruction</b>	<b>1,952</b>	<b>59,383,484</b>	<b>6,487,271</b>	<b>898,238</b>	<b>66,768,993</b>
<b>Partial damaged</b>					
Flats - RS	816	4,243,314	5,304,142	734,420	10,282,691
Flats - FBiH	215	1,116,661	1,395,827	193,268	2,705,971
Flats - BH	-	-	-	-	-
Houses - RS	11,903	116,653,186	77,372,011	10,713,048	204,750,148
Houses - FBiH	7,796	76,397,540	50,671,838	7,016,101	134,093,273
Houses - BD	359	3,522,494	2,336,348	323,494	6,182,696
<b>Subtotal Damaged</b>	<b>21,089</b>	<b>201,933,195</b>	<b>137,080,165</b>	<b>18,980,331</b>	<b>358,014,780</b>
<b>Totals</b>	<b>22,087</b>	<b>261,316,679</b>	<b>143,567,437</b>	<b>19,878,568</b>	<b>424,784,771</b>



Table 30 - Summary of losses in the housing sector

	FBiH	RS	BD	TOTAL
Temporary shelter facilities	1,290,940	3,341,932	248,258	4,881,130
Demolition and rubble removal	1,343,880	1,405,183	58,492	2,807,555
Land acquisition for relocation	1,233,236	10,356,728	386,537	11,976,501
Essential services for relocation	904,373	7,594,934	283,460	8,782,767
<b>TOTAL</b>	<b>4,772,429</b>	<b>22,698,778</b>	<b>976,746</b>	<b>28,447,953</b>

The extent of the damage in this sector poses social as well as physical issues to be resolved as part of the recovery and reconstruction strategy. It is essential that all affected communities, engaging both men and women, are involved in the planning and implementation of the recovery and reconstruction process. Affected individuals and households must be informed and encouraged to rebuild in areas that are not at risk to avoid similar death tolls in the future. Recovery and reconstruction in the housing sector must take into equal consideration recovery in other sectors, including livelihood, transport, electricity, water and sanitation, agriculture and access to social services, including health and education. Finally, it is crucial that vulnerable groups such as Roma or conflict IDPs, refugees and returnees are not overlooked in the recovery and reconstruction process. In some cases, they may require additional support.

An estimated 427.39 million EUR is required for the recovery and reconstruction process, 7.69 of which is necessary in the short and medium term to achieve full recovery. The reconstruction needs are spread over the medium term and, as indicated, are subject to potential increases if studies demonstrate that an additional number of households need to be relocated; the latter due to risks in their present location leading to declarations of inhabitability resulting from unstable or risky ground.

Table 31 - Summary of Reconstruction and Recovery Costs

Entity/District	Damage (millions EUR)
Republika Srpska	223.98
Federation of BiH	194.62
Brcko District of BiH	8.80
<b>Total</b>	<b>427.40</b>

## 2.2.6.2 Baseline information

Before the disaster that hit 82 municipalities in BiH in May 2014, the total stock of housing, composed of houses and flats, in the affected area was 1,120,309 dwellings (Census

2013). All units were privately owned and had access to basic infrastructure (water, electricity and sewerage).

In the period 1999-2005, many municipalities allocated plots of land as donations in order to alleviate the pressure of housing needs for IDPs and refugees wanting to integrate locally. Furthermore, the economic vulnerability of this population forced them to buy the cheapest plots of land. In many cases, these were located in lowlands near to riverbanks prone to flooding or on hillsides that were prone to landslides. Building new housing for that population group represented a huge issue due to lack of financial resources and so many constructions were built using poor construction materials and/or minimum experience construction workers. Moreover, over 75% of all housing units built before and after the war were constructed without building permits, which means that they are not properly registered.

### **2.2.6.3 Assessment of the Effect of the Disaster**

#### **Locations**

Most of northern Bosnia was flooded, with the Bosna river valley hit hardest. Other affected areas included Sarajevo and Tuzla Canton. Northern and north-eastern Bosnia, including the region of Semberija, was also flooded. The town of Maglaj experienced severe destruction along with others such as the city of Zavidovići. The entire hamlet of Parići in Hrasno Donje in the Municipality of Kalesija was swept away by landslides. The torrents in Doboj and Samac destroyed brick walls and fences and flash flood covered a vast area. The downtown area was severely affected and the waters completely flooded two floors and seriously damaged the third floor of houses and apartment buildings. Areas that were seriously affected included, among others, Prijedor, Samac, Doboj and Bijeljina in RS and Domaljevac-Samac, Odzak, Maglaj, Orasje and Tuzla in the Federation of BiH and Brcko District.

**The Effect on Infrastructure and Physical Assets** - Damage (total or partial destruction) to Infrastructure and Assets.

The housing sector suffered severe damage and losses resulting from the flooding and consequent landslides. Damage has been categorised for houses or flats as either 'Damaged' or 'Destroyed'. 'Damaged' means that the unit has been flooded but can be repaired. 'Destroyed' means that the unit has been destroyed either because it is situated on or close to a landslide or can not be repaired. Owners of destroyed houses will have to be relocated.

The table below provides an overview of the damage and destruction caused by the flooding and landslides.

Table 32 - Summary of damaged and destroyed dwellings

	No. of Destroyed Houses	No. Damaged Houses and Flats	Total No. of Damaged and Destroyed Houses
RS	201	24,877	25,078
FBiH	1,688	15,667	17,355
BD	54	762	816
<b>Total</b>	<b>1,943</b>	<b>41,036</b>	<b>43,249</b>

The effect per municipality varied both in absolute figures and intensity (percentage of houses damaged or destroyed). The table below provides a summary of the damage per municipality for those municipalities where absolute figures on the damage exceeded 1,000 as well as those municipalities where a large proportion of them were destroyed.

Table 33 - Municipalities with over 1,000 damaged and destroyed units

Municipality	Existing housing stock	No. of destroyed houses	No. of damaged houses and flats	Total damaged and destroyed houses	% of total housing stock affected
Bijeljina	48,280	60	6,940	7,000	14.50%
Šamac	7,337		4,500	4,500	61.33%
Doboj	36,132	5	3,500	3,505	9.70%
Prijedor	38,334	10	2,750	2,760	7.20%
Banja Luka	87,986		2,511	2,511	2.85%
Maglaj	10,086	214	2035	2,249	22.3%
Odžak	7,933	10	1800	1,810	22.8%
Tuzla	59,124	329	1365	1,694	2.9%
Domaljevac-Šamac	1,752	4	1669	1,673	95.5%
Orašje	7,933	70	1595	1,665	21.0%
Sanski Most	16,513	25	1245	1,270	7.7%

A few municipalities had a large percentage of their houses destroyed, as seen in the following table.

Table 34 - Municipalities that suffered damage to more than 9% of their houses

MUNICIPALITY <sup>8</sup>	No. of destroyed houses	No. of damaged houses and flats	% of total housing stock affected
<b>In the FBiH</b>			
Domaljevac-Šamac	4	1,669	95.5%
Odžak	10	1,800	22.8%
Maglaj	214	2,035	22.3%
Orašje	70	1,595	21.0%
Šamac	0	4,500	61.33%
<b>In RS</b>			
Jezero	0	97	16.28%
Bijeljina	60	6,940	14.50%
Vukosavlje	0	293	13.51%
Donji Žabar	0	170	11.10%
Doboј	5	3,500	9.70%

The tables included in Annex 1 provide a breakdown of damage per all municipalities per entity.

Flooding of houses varied both in terms of the height of the floodwater and the time that the water remained in the unit. Hence, there is a large range of damage from basic damage to floors and doors where the water only reached a height of 30 cm and stayed for a few hours to complete damage to the unit (doors, windows, electrical and sanitary installations) in cases where the water reached a height of 2.5 meters and stayed five days or more.

Along with the damage to houses, household goods and productive assets were also damaged and/or lost in the floods and landslides. The basic household belongings that the owners of flooded houses had managed to collect over the last 20 years are now mostly gone due to the floods.

Destroyed houses are those that are on or close to landslides and as a result are now no longer habitable. The owners of these houses have started removing the joinery and sanitary appliances in order to use them for the construction of relocated units.

There are also 1,400 houses located close to landslides. They are still habitable but at risk of being on a landslide in the near future. Although these houses have not been included in the damage assessment, there is a real risk that at some stage they will be destroyed or become uninhabitable.

<sup>8</sup> In RS less than 2% of houses were affected.

#### **2.2.6.3.1 Effect on Risks and Vulnerabilities - Changes in Risks and Vulnerabilities as well as Disaster related Direct Responses to Mitigate these Effects**

The recent floods seriously affected many dwellings housing minority populations who in the last 19 years returned to their homes or are currently in the process of return and rehabilitating their dwellings. The statistics indicate that the vast majority are elderly, single and financially deprived. Natural disasters such as the one that occurred in May 2014 in BiH represent an insurmountable obstacle for them.

Not only are they facing difficulties in reconstructing their homes but they will also be more exposed to health risks at a later stage because they will most likely preserve as many flooded belongings as possible.

The preliminary assessments conducted by the centres for social work after the floods receded indicate that they can expect an increase of at least 50% as many have completely lost all of their belongings and assets. At least 1,500 families will need emergency housing as their houses are destroyed. The destruction of crops, livestock, markets/suppliers/income from SME has led to an increased number of families without any regular income and reliant on assistance from their relatives and community.

#### **2.2.6.4 Calculating the Value of the Damage and Losses**

The level of damage has been estimated by calculating the replacement cost for houses that have been destroyed, the repair cost for flats or houses that have been flooded, the replacement cost of household goods and the replacement cost of other personal goods.

The damage calculation for destroyed houses includes:

- The cost of constructing a new home of 75 square meters net, including the foundation.

Repair costs for houses and flats

- The repair and replacement of all items that were damaged, including:
  - cleaning and disinfection;
  - civil works (plastering, painting, etc.);
  - replacement of joinery;
  - water/sanitation and electrical installations;
  - flooring; and
  - installation of a new kitchen.

- For flats, an average size of 50 square meters net was used as the basis with an additional 10 square metres net to account for common spaces.
- For houses, an average size of 65 square meters net was assumed.

The replacement cost of household goods includes:

- furniture (beds, cabinets, shelves, etc.)
- Appliances (washing machine, refrigerator, stove, etc).

The replacement cost of other personal goods includes:

- documents
- pots
- blankets
- clothes

*Table 35 - Summary of damage to the housing stock*

Entity/District	Damage (millions EUR)
Republika Srpska	221.90
Federation of BiH	194.55
Brcko District of BiH	8.33
<b>Total</b>	<b>424.78</b>

Losses have been calculated as follows:

- losses due to of demolition and rubbish removal, which includes the cost of removing the destroyed houses and all items from damaged houses (including furniture, etc.);
- losses incurred due to relocation, which includes the cost of new land (300 square metres per each family that needs to be relocated and needs to build a new home);
- losses resulting from the provision of services, which includes the cost for the provision of infrastructure services (water supply and electricity) to the relocated units; and
- losses resulting from temporary shelter, which includes the cost of accommodating those permanently displaced in temporary shelters.

*Table 36 - Summary of losses to the housing stock*

Entity/District	Losses (millions EUR)
Republika Srpska	4.76
Federation of BiH	22.70
Brcko District of BiH	0.97
<b>Total</b>	<b>28.43</b>

*Table 37 - Summary of damage and Losses to the housing stock*

Entity/District	Damage and Losses (millions EUR)
Republika Srpska	226.66
Federation of BiH	217.25
Brcko District of BiH	9.31
<b>Total</b>	<b>453.21</b>



## 2.2.7 Facilities and Services

### 2.2.7.1 Executive Summary

Severe disruption of services for citizens occurred in the affected municipalities and it will take several months to restore critical functions in some instances. In addition to infrastructure, valuable equipment, files and records were also damaged. The absence of a welfare safety net has exacerbated social and economic disparities in the flooded areas, especially ones affecting vulnerable populations such as women and children. In addition to primary service infrastructure, 23 cultural institutions have suffered damage from the floods including libraries, museums, art galleries and municipal cultural centres.<sup>9</sup>

In brief, the total estimated losses and damage to public facilities is 27.42 million EUR, which includes 9.66 million in damage to buildings, 8.49 million in damage to equipment and other assets, 184,218.46 in damage to municipal records, 3.43 million in lost revenue and 5.62 million deployed for emergency response.

Recovery and reconstruction will place an additional burden on local governments already drained by the emergency response phase that has seen almost 5.62 million EUR deployed to mitigate the immediate effects of the flooding and landslides. In addition, the loss of own and other revenue to the amount of 3.43 million EUR is sure to diminish the service delivery capacities of local government.

In addition, the reduced tax base at the municipal level, through the losses experienced by the private sector, is likely to result in a shrinking of municipal budgets and diminished service delivery.

Overall, impaired institutional capacities will reduce the coverage and quality of services leading to increased risks of vulnerability amongst residents and possibly a reduced rate of recovery and rehabilitation.

### 2.2.7.2 Sector Overview

The vast majority of services provided directly to citizens are within the purview of local government. Municipal and city authorities almost exclusively exercise basic administrative and social competencies, both through their administrative apparatus and associated municipal institutions. Own and delegated competencies range from spatial planning and business permits and registration to vital records management. Each of the affected municipalities operates a social welfare centre that caters to vulnerable social groups while

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<sup>9</sup> The assessment does not reflect damage suffered by religious facilities and cultural/historical monuments. A separate survey undertaken by UNESCO is presented in Annex 5.4, which lists the damage to 5 cultural monuments and 25 religious facilities, estimated at 0.98 million EUR.

90% offer citizen services are provided through one-stop-shops of varying degrees of sophistication.

Prior to the flooding, the ability of local government to exercise their mandates effectively was frequently curtailed by the lack of the necessary capacities, diminishing revenue and the complex policy environment in BiH.

### **2.2.7.3 Assessment of the Effect of the Disaster**

While the physical effects of the flooding and landslides were devastating to a number of sectors the direct damage to critical public service infrastructure<sup>10</sup> and services were geographically limited in comparison. On average, rural areas reported most damage while the urban centres, where the majority of public institutions are traditionally located, suffered comparatively little damage. At the time of the assessment, 60% of affected municipalities reported little or no damage to their facilities but noted substantial disruption of services due to the engagement of local authorities in the emergency response and difficulties related to access.

In addition to the suspension of services, seven municipalities that were subject to flooding in their urban centres reported damage to their administrative facilities. In total 210,000 residents were directly affected by the complete disruption of services.

The assessment established that the physical damage to affected local administrations was threefold:

- flood damage to office facilities and other buildings, which will prevent a speedy restoration of services;
- substantial loss of assets and equipment, to include personal computers, servers, vehicles and office furniture; and
- damage and loss of municipal records that will likely have the most significant and long-term effect on the ability of municipalities to deliver services.

In addition to the disruption of normal operations, the partial or complete evacuation of local government institutions in four instances affected their ability to coordinate and deliver emergency assistance.

The operation of welfare centres in seven municipalities was suspended with four suffering substantial damage to the infrastructure and assets. This left some 50,000 beneficiaries without access to social services, which for many represents the sole source of income and non-material means of support. It is worth noting that the majority of beneficiaries are women.

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<sup>10</sup> This definition excludes utility services, health and education is covered elsewhere in the report.

The absence of a welfare safety net has exacerbated social and economic disparities in the flooded areas, especially ones affecting vulnerable populations such as women and children.

Damage to the culture sector will also have an adverse effect on the quality of life in affected communities as libraries, museums, galleries and cultural centres are expected to remain closed or offer only limited services for the foreseeable future. At the time of the assessment, most of the cultural institutions affected remain closed.

#### 2.2.7.4 Calculating the Value of the Damage and Losses

The total estimated losses and damage to public facilities is 27.42 million EUR, including 9.66 million in damage to buildings, 8.49 million in damage to equipment and other assets, 184,218.46 in damage to municipal records, 3.43 million in lost revenue and 5.62 million deployed for emergency response.

The bulk of the damage was caused by the destruction of municipal premises through flash flooding and/or residual water. The total number of square meters of facilities damaged by the flooding is 78,305.80 m<sup>2</sup> with the cost of rehabilitation assessed at 102.26 EUR per unit. The municipalities also reported 3,644.00 m<sup>2</sup> in need of full reconstruction. The cost of reconstruction per unit (m<sup>2</sup>) was assessed at 460.16 EUR.

A separate estimate has been made for the effect on municipal administration premises and services and of the effect on higher government levels.

*Table 38 - Damage and losses to municipal administration facilities*

000 EUR	Damage to Assets			Losses		TOTAL DAMAGE AND LOSSES
	Total (Physical damage + destroyed buildings)	Physical damage to equipment and vehicles	Physical damage to records	Loss of revenue (monthly)	Investment by municipality in response	
<b>TOTAL</b>	<b>6,625.83</b>	<b>6,191.23</b>	<b>138.05</b>	<b>3,407.76</b>	<b>3,577.51</b>	<b>19,940.38</b>
FBiH	3,796.34	3,510.53	81.81	1,981.77	1,414.23	10,784.68
RS	2,829.49	2,680.70	56.24	1,425.99	2,163.28	9,155.70

Table 39 - Damage and losses to higher government level facilities

000 EUR	Total (Physical damage + destroyed buildings)	Physical damage to equipment and vehicles	Physical damage to records	Loss of revenue (monthly)	Investment by municipality in response	TOTAL DAMAGE AND LOSSES
<b>TOTAL</b>	<b>3,059.06</b>	<b>2,305.42</b>	<b>46.02</b>	<b>30.17</b>	<b>2,033.92</b>	<b>7,474.58</b>
FBiH	778.19	648.32	15.34	-	1,726.12	3,167.96
RS	2,280.87	1,657.10	30.68	30.17	307.80	4,306.61

The loss of municipal records has been noted in four municipalities with damage caused to vital records, data on benefits, land registry and archives featuring prominently. While electronic vital records are now available due to the move towards E-government, the loss of data on benefits and land registry information will likely have a substantial impact on the ability of local administrations to offer quality services to both the most vulnerable and the private sector. The cost of damage here is provided based on an estimate of the recovery costs for the affected municipalities, which will likely entail a prolonged process of administrative verification through specially appointed municipal commissions.

Finally, the loss of revenue for local government and other offices operating in the municipalities is estimated at the monthly index level for the month of May with funds invested by affected local authorities in emergency response added to generate a total loss estimate. In addition to vital services provided by local government, the projected loss of revenue is expected to have a particularly negative effect on the culture sector; this sector struggled to attract sufficient funding prior to the flooding.

In all instances, municipal authorities were able to restore basic services within 48 hours minimising indirect losses due to the withholding of services. Nonetheless, five municipalities continue to operate with diminished capacity leading to limited service delivery in terms of scope and speed.

## 2.2.8 Health

### 2.2.8.1 Executive Summary

The health sector, as the other sectors of society and economy, suffered the impact of the severe floods and landslides. The damage in this sector was limited as few installations were affected, mostly concentrated in primary level municipal health centres (called '*Dom Zdravljas*') belonging to outposts/clinics, known in the country as '*Ambulantas*'. Yet this limited impact on the infrastructure is accompanied by losses of a larger magnitude associated with an anticipated increase in medical attention requirements. In addition, a reduction in medical insurance payments earmarked for health and public health services for the population is expected, as employment suffers a decline and the consequent decrease in mandatory financial contributions to the health sector.

This reduced income to healthcare institutions poses a potential threat of reduced medical attention being provided to a population for which there is still a need to strengthen the control of communicable diseases. This population also experiences a trend towards slightly increased mortality and may now face a morbidity increase associated with difficult living and working conditions in some of the flooded areas during post-emergency and recovery period.

An additional consideration is the disparity of health indicators for some communities, such as Roma. In the case of Roma, the health indicators are well below the average for the rest of the population.

Furthermore, the damage suffered by installations and reduced resources for the sector may place the percentage of the population suffering from chronic non-communicable diseases, which are the leading cause of morbidity and mortality in the country, at further risk.

In conclusion, the total estimated damage to the health facility infrastructure amounts to 5.78 million EUR, of which 1.70 is in the FBiH and 4.09 in RS. BD reported no damage to its health facility infrastructure. Nevertheless, for the reasons indicated above the losses are much higher: 47.13 million EUR in total, of which 24.17 is in the FBiH and 22.96 in RS.

### 2.2.8.2 Sector Overview and Baseline Information

In Bosnia and Herzegovina the FBiH, RS and BD are each responsible for health policy, health promotion, health surveillance and the organisation, financing and provision of health services within each of their territories. According to the 2003 Law on Ministries, the Ministry of Civil Affairs of BiH is responsible for health coordination and strategic coherence in BiH.

After 2010, BiH entered a period of negative population growth with a declining birth rate and slight increase in the mortality rate. The total fertility rate decreased from 1.4 in 2002 to 1.2 in 2011. The constant fertility scenario for the period 2010-2015 is below the replacement level. The population over 65 now over 15% is expected to reach approximately 40% by 2050. With life expectancy at birth estimated at 76 years, BiH is comparable to other countries in the South-Eastern Europe as well as the EU Member States. BiH has over the last 15 years demonstrated steady progress in improving child health and reducing child mortality (IMR 5.7/1000 and U5MR 8/1000)<sup>11</sup>, although these figures are substantially higher for socially vulnerable population groups such as Roma (IMR 24/1000 and U5MR 27/1000, respectively).

Despite a long legacy of effective public health interventions and programmes, there is an unfinished agenda of communicable diseases in BiH. Tuberculosis is still more common in BiH than in the neighbouring countries (prevalence rate 66/100,000), while only 68% of children in BiH enjoy the benefits of being fully immunised against the main vaccine preventable diseases. The immunisation system is failing to reach Roma children, for whom an extremely low coverage of 4% has been reported. Recently, the World Health Organisation (WHO) declared BiH as being amongst the countries at high risk from polio.

Non-communicable diseases (NCDs) are the leading cause of morbidity and mortality in BiH, with approximately 50% of deaths attributable to cardiovascular diseases and an additional 20% to cancer. The ageing population and unhealthy lifestyle, associated with diet, tobacco and alcohol use, as well as other risk factors are the main contributors to the disease burden. Mental health problems, especially those arising from 1992-1995 war and the related psychological trauma still represent an important public health issue and priority.

Other health and wider social determinants of health legacies from the 1992-1995 war include physical disability, high unemployment, a significant number of war widows or female headed single households and challenges for the elderly who no longer have the supportive social networks that existed prior to the war. What is currently lacking is sound evidence on health inequalities and variations on it in BiH. Investment in the prevention of ill health, crosscutting action and all-policy focus on health equity are much needed.

### **2.2.8.3 Assessment of the Effect of the Disaster**

#### **2.2.8.3.1 Introduction: General Description of the Disaster, Population and Areas Affected**

The immediate impact of the disaster was the loss of over 50 lives and the need to evacuate over 85,000 people to temporary shelters. The flooding and accompanying landslides caused damage to the health sector. It has been estimated that in BiH over 1

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<sup>11</sup> IMR – infant mortality rate; U5MR – under-five (years of age) mortality rate.

million people (over 25% of the total population) have been directly or indirectly affected by the flooding and landslides.

The direct damage to health facilities is limited and thanks to the quick response of the health authorities to repurpose health staff and patients to unaffected facilities interruption of health services was only localised and minimal. However, the effects of the overall damage and loss of livelihoods and employment will lead to considerable losses in terms of Health Insurance Funds. As the affected populations and enterprises ability to pay the required insurance premiums will be reduced this will affect the delivery of health services. An increase in the demand for health services is anticipated in the immediate aftermath of the disaster. In addition, there will also be a need for extra investment in a number of public health services, including, amongst others, disease surveillance, immunisation programmes, mental health services and environmental health services, including vector and rodent control. These services will need to be enhanced over an extended period (according to some estimation, at least three years following the disaster).

#### **2.2.8.3.2 Effect on Infrastructure and Physical Assets**

In the four affected cantons in the FBiH and the 24 affected municipalities in RS all health authorities reported damage, mostly to primary healthcare facilities (*Dom Zdravljas* – DZs and *Ambulantas*). Brcko District (BD) reported limited damage to just two *Ambulantas*, which can be covered through already available resources. Therefore, BD is not included in the tables below on the breakdown of the damage, losses and recovery needs.

The initial estimate was that 25 health facilities were damaged: 4 *Dom Zdravljas* (DZs Samac and Doboj in RS and DZs Maglaj and Domaljevac in the FBiH), 15 *Ambulantas* (7 in the FBiH, belonging to 5 DZs, and 8 in RS, all, with a single exception, belonging to DZ Bijeljina). A rapid assessment completed by the International Medical Corps (IMC) on 28 May 2014 later confirmed this.

#### **2.2.8.3.3 Effect on Infrastructure and Physical Assets**

The immediate response from the different health authorities in BiH ensured that there was only minimal and localised interruption of health services. For instance, several patients requiring regular dialysis services in Doboj in RS, where the dialysis unit was destroyed, received dialysis in nearby dialysis units in the FBiH. Restoration of health service delivery has been a high priority and the medical teams relocated personnel to the nearest hospital and/or undamaged *Ambulantas*. Clean-up of the damaged health facilities was undertaken a couple of days of the flooding in many locations and health facilities were resupplied. Planning and implementation of campaigns for disease surveillance and prevention, vaccination, vector control, rodent control and disinfection were undertaken immediately (see also the WASH sector). Several international organisations provided urgent medical supplies and items for water treatment immediately after the disaster.



As indicated above, due to the overall effect on the production sector, the Health Insurance Funds (HIF) noted a significant reduction in revenue at the end of May. In addition, the increase in overall morbidity led to a higher than normal expected number of patients per month; therefore, expenditure for these funds was higher than normal. Health authorities decided to provide health services free of charge for persons not covered by health insurance in the aftermath of the disaster. This will cause additional losses to the HIF, especially if maintained over an extended period.

#### **2.2.8.3.4 Effect on Risks and Vulnerabilities**

Young people aged between 10-24 years of age represent 25% of the population. Three out of four are unemployed and this increases social vulnerability, especially amongst girls, Roma and youths with disability. Due to a lack of life-skills education in and out of school, adolescents' knowledge about sexual and reproductive health is poor. The youth unemployment rate for those aged 15-24 was 64% for women and 62.6% for men in 2013.

The flooding contaminated and disrupted the functioning of water supply systems in the affected areas. However, most large-scale water supply systems were reportedly back in function after only a few days and were able to produce potable water after less than two weeks disruption. Contamination of individual wells and small-scale rural water supply systems remained a concern for several weeks (for more detail, see the WASH sector). Enhanced epidemiological surveillance of communicable disease incidence with daily reporting was initiated immediately in the most affected areas. No epidemics caused by water or food borne diseases had been detected (reported) as of mid-June.

Leptospirosis is a bacterial disease often linked to floods and can be difficult to diagnose. No cases of leptospirosis had been reported as of mid-June 2014. Teams and individuals involved in the post-flooding clean-up activities need to be provided with proper personal protective equipment in order to prevent leptospirosis as well as other communicable diseases.

Sustained West Nile Virus (WNV) activity has been observed in many countries in the European region in recent years. A large outbreak was reported in Serbia in 2013 (302 cases). Only 3 cases were detected in BiH during the 2013 WNV season; however, the flooding in May 2014 might contribute to increased breeding of the *Culex* mosquitoes that transmit the WNV and result in an earlier or possibly stronger WNV season in 2014.

In order to prevent and/or reduce the impact of WNV circulation, the WHO Regional Office for Europe has provided recommendations to health authorities in Croatia, Serbia and in particular BiH. These recommendations include advice on insecticides (both against adult mosquitoes and against mosquito larvae) considered safe for use, according to an

assessment conducted by the WHO Pesticide Evaluation Scheme (WHOPES)<sup>12</sup>. This advice has also been shared with key donors.

Mental health and psychosocial support services need to be provided for the affected populations because mental health disorders (stress, aggressive behaviour and recurrent dreams of flooding) are common in the aftermath of flooding. Many people in BiH already suffer from post-traumatic stress disorder (PTSD) following the war in the 1990's. A network of community based mental health (CBMH) services was set-up after the war in both entities. Some of these facilities – which are needed now more than ever – were also damaged by the flooding.

The flooding and landslides in BiH also dislodged landmines and UXO left from the war and removed warning signs and marking. This poses a serious risk of death or injury that could lead to additional demands and costs to the health sector. The issue is covered in detail in a separate section of this document.

#### **2.2.8.4 Calculating the Cost of the Damage and Losses**

In order to establish the effects of the flooding, a questionnaire was shared with representatives of the Ministry of Health (MoH) of the FBiH, the Ministry of Health and Social Welfare (MoHSW) of RS and the Department of Health and Other Services of Brcko District between 31 May and 2 June 2014. A health sector PNDA expert from the WHO headquarters and a senior international public health consultant employed locally by UNFPA and WHO subsequently visited all of the above-mentioned authorities and briefed them in detail on the PDNA methodology on 1-2 June 2014, setting deadlines for data collection and the return of the completed questionnaire back to the WHO.

The MoH of FBiH adapted the questionnaire and sent it out to the cantonal health authorities. It received reports from six out of the ten cantons in the FBiH, the six cantons most affected by the disaster in the FBiH: Una-Sana, Posavina, Tuzla, Zenica-Doboj, Bosnian Podrinje/Gorazde and Sarajevo cantons. Through the MoH of the FBiH, WHO received a narrative report on public health and the (partially) completed questionnaires from four of the cantons (Una-Sana, Posavina, Tuzla and Zenica-Doboj cantons) that reported damage and losses, together with two cantons (Gorazde and Sarajevo) that did not claim any damage or losses.

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<sup>12</sup> Adulticides for aerial spraying: [http://www.who.int/whopes/Insecticides\\_for\\_space\\_spraying\\_Jul\\_2012.pdf?ua=1](http://www.who.int/whopes/Insecticides_for_space_spraying_Jul_2012.pdf?ua=1)  
Culex mosquitoes larvicides (Bti, temephos and Spinosad for aerial application):  
[http://www.who.int/whopes/Mosquito\\_Larvicides\\_25\\_Oct\\_2013.pdf?ua=1](http://www.who.int/whopes/Mosquito_Larvicides_25_Oct_2013.pdf?ua=1)

RS returned two separate reports (one on public health and one on healthcare services). All reports from both entities were received by the WHO on the 11 June. The WHO Country Office in BiH then compiled data from all the various reports on 12-13 June 2014. Upon the return of the WHO PDNA expert to the country on 13 June, WHO met with the EU and the PDNA entity focal points on 14 June.

The data compilation revealed a good correlation of the assessment of damage to health facilities from both entities (BD did not claim any damage or losses) with the earlier IMC field assessment from 28 May 2014 and the results of the UNDP field assessment teams that visited some of the health facilities at the beginning of June 2014. However, there was a significant discrepancy in the assumptions underlying the estimations concerning the losses to the health insurance funds between the two entities. A videoconference between the entity PDNA coordinators, the health authorities in both entities, EU and WHO was organised on the morning of 16 June. WHO had in the meantime prepared calculations using various levels of loss for both entities. After detailed discussions and further teleconferences with the MoH of FBiH, MoHSW of RS, HIF RS and WHO a common conclusion was reached on the level of loss estimations using the more conservative scenario for revenue losses and increased costs for the HIFs.

#### 2.2.8.4.1 Damage

##### The Federation of BiH

Damage to health facilities was reported in cantons 1, 2, 3 and 4 (cantons Una-Sana, Posavina, Tuzla and Zenica Dobo, respectively), while no damage was reported for cantons 5 and 9 (cantons Gorazde and Sarajevo). In the original questionnaires developed by MoH and completed by the respective cantonal health authorities a short description of the damage was given for each listed facility, together with a rough financial estimate of the damage (in some cases broken down into main components, i.e., furniture, equipment and supplies). In addition to primary healthcare facilities, *Dom Zdravlja* and *Ambulantas* in the affected areas, damage to other health facilities, such as hospitals, public health institutes, pharmacies and branch units of the respective health insurance funds, was listed. Out of the total amount of estimated damage to the health infrastructure in the flood-affected areas (**1,703,558.08 EUR**) approximately 68% relates to primary healthcare facilities and 32% to all other facilities mentioned above. In respect to the cantons, the greatest damage to the physical infrastructure was reported by the Zenica-Dobo and Posavina cantons (in financial terms, 70% and 25% of the total, respectively).

##### Republika Srpska

Damage to 25 (out of a total of 54) primary healthcare facilities was reported. The damage was described in detail for two flooded DZs (Samac and Dobo) and 7 *Ambulantas* belonging to DZ Bijeljina (*Ambulantas* Brodac, Janja, Batkovic, Vrsani, Dvorovi, Amajlije and Pucila – full match with the IMC assessment). Minor damage to assets of several other DZs (Kotor Varos, Kozarska Dubica, Celinac, Bratunac, Modrica, Sekovici, Mrkonjic

Grad/Jezero and Banja Luka) were also accounted for and presented as an aggregate figure. The total damage was estimated at **4,092,427.26 EUR** (originally presented in USD, but converted to EUR using the UN official exchange rate for June 2014). All figures for damage were broken down to furniture and equipment costs. Total damage (full destruction) was reported for DZ Samac (25% of the total), while partial damage was reported for DZs Doboje and Bijeljina and the other DZs (listed above).

In summary, the total estimated damage to the health facilities infrastructure for Bosnia and Herzegovina amounts to **5,795,985.34 EUR (USD 7,883,145)** at the UN exchange rate for June 2014).

*Table 40 - Estimated cost of damage to the health sector BiH*

	Damage Total*, EUR	Ownership	
		Public	Private
The Federation of BiH Total	1,703,558.08	100%	
Republika Srpska Total**	4,092,427.26	100%	
Brčko District Total	0	100%	
<b>Bosnia and Herzegovina Grand Total</b>	<b>5,795,985.34</b>	<b>100%</b>	
* Damage includes damage to health facilities, furniture and equipment in flood-affected areas.			
** Damage in Republika Srpska is reported in USD. Reported figures in the table were converted to BAM (at the exchange rate: 1USD = 1.438 BAM).			

#### 2.2.8.4.2 Losses to the Health Sector

Healthcare services in BiH are financed through the mandatory payroll tax (which includes contributions shared by employer and employee), which is collected by the health insurance funds (HIFs). There is a single HIF in RS and BD and 10 cantonal HIFs in the ten cantons of the FBiH (with one additional 'solidarity' HIF at the level of the FBiH that covers the cost of very expensive procedures/medications at the level of the FBiH - there is no 'portability' of benefits from one canton to another). In terms of the losses initially reported, the main item was the projected loss of revenue to the respective HIFs due to a drop in payroll contributions over an estimated period of 18 months (6 months in 2014 and 12 months in 2015) expressed as a flat percentage of total HIF income for the baseline year of 2013.

The HIFs reported an average 20% reduction in revenue for May 2014, while the projection is that as the productive sector is restored to its pre-disaster capacity this loss of total income will gradually decrease to pre-disaster levels over a period of 9 months. In addition, the increased cost to the HIFs resulting from a higher than normal patient load will also gradually decrease: an initial 5% increase in cost is predicted, decreasing to pre-disaster levels over a period of 6 months. The estimates of the losses incurred by the respective HIFs in both RS and the FBiH are considered conservative, as the percentage may be higher and the duration over which the loss is incurred could be longer.

The networks of public health institutes in both the FBiH and RS are tasked with providing public health services (which would typically include food and food handlers control, water and air quality control/environmental health, disease surveillance, health promotion/disease prevention campaigns, disinfection and vector (insects, rodents) control etc. Some of these services are commercialised and public health authorities (and the respective laboratories) allowed to generate income i.e., independent of funding from the HIFs, especially in RS. In addition to the losses to the HIFs, the anticipated higher cost of post-disaster disease surveillance, disease prevention campaigns, vector control campaigns and long term mental health/psychosocial treatment over a period of 18 months, during which increased health risks are expected to persist, were accounted for separately in the table below in which total losses are shown.

*Table 41 - Losses to the health sector*

<b>Losses Components</b>	<b>Republika Srpska Total</b>	<b>The Federation of BiH Total</b>	<b>Brcko District Total</b>	<b>Bosnia and Herzegovina Grand Total</b>
Estimated duration of the recovery period: 6 – 18 months				
<b>A. Loss of Revenue</b>				
1. Loss of revenue for the Health Insurance Funds and PHI (in EUR)	17,230,009.77	17,331,662.57	0	34,541,672.34
<b>B. Higher Costs</b>				
2. Increased costs due to increased morbidity (in EUR)	3,612,743.95	3,629,864.56	0	7,242,608.51
3. Increased cost of disease surveillance after disaster (in EUR)	16,145.58	502,088.63	-	518,234.20
4. Increased cost of disease prevention campaigns (in EUR)	184,209.26	585,429.20	-	769,638.47
5. Increased cost of vector control campaigns (in EUR)	1,238,066.70	1,403,848.49	-	2,641,915.20
6. Cost for long-term mental health psychological treatment (in EUR)	675,160.93	740,095.00	-	1,415,255.93
<b>Total increased costs (in EUR)</b>	<b>5,726,326.42</b>	<b>6,861,325.88</b>	<b>-</b>	<b>12,587,652.30</b>
<b>Total losses (Total A + B) (in EUR)</b>	<b>22,956,336.19</b>	<b>24,192,988.45</b>	<b>-</b>	<b>47,129,324.64</b>

**Annex 1 - Damage to public administration facilities, by municipality**

ENTITY	MUNICIPALITY	Total damage in 000 EUR	ENTITY	MUNICIPALITY	Total damage in 000 EUR
FBIH	Maglaj	4,894.60	RS	Kostajnica	92.03
RS	Doboj	3,976.83	FBIH	Gračanica	89.48
RS	Šamac	3,717.60	FBIH	Živinice	78.23
FBIH	Domaljevac-Šamac	1,645.85	RS	Brod	76.69
RS	Bijeljina	1,503.20	FBIH	Doboj-Jug	73.11
FBIH	Orašje	1,307.37	FBIH	Kladanj	72.60
RS	Banja Luka	980.66	FBIH	Visoko	60.33
FBIH	Odžak	928.51	FBIH	Ilidža	59.31
FBIH	Tuzla	925.44	FBIH	Ribnik	52.66
RS	Prijedor	776.14	FBIH	Teočak	51.64
RS	Čelinac	636.56	RS	Kozarska Dubica	51.13
FBIH	Zenica	587.99	RS	Šipovo	51.13
FBIH	Olovo	577.76	RS	Teslić	48.57
FBIH	Sanski Most	548.62	RS	Modriča	40.90
FBIH	Zavidovići	480.61	FBIH	Vogošća	33.75
RS	Laktaši	446.87	FBIH	Usora	30.68
FBIH	Srebrenik	232.13	RS	Vlasenica	25.05
FBIH	Žepče	228.04	FBIH	Ilijaš	24.03
RS	Kotor Varoš	203.49	RS	Osmaci	22.50
FBIH	Doboj-Istok	200.43	FBIH	Bosanski Petrovac	18.92
RS	Bratunac	189.18	FBIH	Ključ	18.92
FBIH	Lukavac	180.49	RS	Ugljevik	16.36
RS	Šekovići	168.73	RS	Pelagićevo	12.78
FBIH	Kalesija	162.08	FBIH	Hadžići	4.09
RS	Srebrenica	153.39	RS	Oštra Luka	3.58
RS	Jezero	120.15	FBIH	Tešanj	2.05
FBIH	Kakanj	119.13	FBIH	Travnik	2.05
FBIH	Sapna	118.62	FBIH	Banovići	1.53
FBIH	Gradačac	97.66	FBIH	Novi Travnik	0.51
FBIH	Vareš	97.15	FBIH	Jajce	0.51
RS	Donji Žabar	96.12			
The amount of total damage in thousands of EUR includes municipal administration facilities and higher government level institutions					

## 2.2.9 Education

### 2.2.9.1 Executive Summary

The flooding caused by an unprecedented level of rain in Bosnia and Herzegovina had a profound impact on the lives of children. UNICEF identified 74 municipalities (42 in the FBiH and 31 in RS and BD) as 'affected', based on reports, municipal requests and field visits. There are 9 'severely affected' areas: Samac, Odzak, Orasje, Brcko, Bijeljina, Dobo, Maglaj, Zepce, Domaljevac-Samac. It is estimated that in the 74 municipalities over 320,000 people have been affected including 60,000 children aged 0-18 (16,000 children aged 0-5). More than 50% of the affected population and children live in the 9 severely affected municipalities. In order to try to restore normalcy for children, the school year is programmed to start as usual in September. In the meantime, there is the need to supply children activities while recuperation takes place during the summer months.

The education sector infrastructure suffered damage to 121 affected institutions, out of which 13 are preschools, 81 primary schools, 22 secondary schools, 1 boarding school and 4 higher education institutions. Total cost of damages and losses is estimated at 8.7 Million EUR, of which 4.68 Million in FBiH, 4.01 Million in RS and 5,113 EUR in BD.

### 2.2.9.2 Sector Overview

The field of education comes under the jurisdiction of Republika Srpska, the ten cantons in the FBiH and Brčko District. Each of the twelve listed administrative units has its own ministry of education, laws for the field of education and budgets for education. The Federal Ministry of Education and Science has both a coordination and advisory role. Since 2003, at the state level, the Ministry of Civil Affairs of BiH (MoCA) has obtained jurisdiction over coordination activities between the entities and is responsible for cooperation at the international level in the field of education. In accordance with its coordinating role, the MoCA has no established system of financing education activities.

There were 223 preschool institutions with 17,293 children in the school year 2011-2012, which represents an increase in attendees of 1.5% compared to the previous year. There were 316,657 pupils in 1,888 primary schools with 24,605 teachers. There were 163,284 pupils in 312 secondary schools with 12,773 teachers: 25.2% of pupils attended general secondary schools (gymnasias), 51.3% attended technical schools, 0.9% attended art schools, 1.3% attended religious schools, 21.1% attended Vocational Education and Training (VET) schools and 0.2% attended schools for children with special needs.

### 2.2.9.3 Assessment of the Effect of the disaster

#### 2.2.9.3.1 Effect on Infrastructure, Physical Assets and Service Delivery

Educational institutions ranging from pre-school to higher education were identified as 'affected' in 35 municipalities (22 in the FBiH and 12 in RS). There are 121 affected



institutions: 13 preschools, 81 primary schools, 22 secondary schools, 1 boarding school and 4 higher education institutions.

Table 42 - Identified municipalities with affected education institutions

Entity	Canton	Municipality/City	
Republika Srpska		Banja Luka	Novi Grad
		Bijeljina	Prijedor
		Čelinac	Šamac
		Doboj	Šekovići
		Derventa	Srbac
		Modriča	Zvornik
		<b>TOTAL FOR RS</b>	<b>12</b>
Federation of BiH	Una Sana	Sanski Most	
		<b>TOTAL FOR UNA SANA</b>	<b>1</b>
	Posavina	Domaljevac- Šamac	Orašje
		Odžak	
		<b>TOTAL FOR POSAVINA</b>	<b>3</b>
	Tuzla	Banovići	Lukavac
		Doboj- Istok	Srebrenik
		Kalesija	Tuzla
		Kladanj	Živinice
		Gračanica	
		<b>TOTAL FOR TUZLA</b>	<b>9</b>
	Zenica- Doboj	Maglaj	Zenica
		Olovo	Žepče
		Zavidovići	
		<b>TOTAL FOR ZENICA- DOBOJ</b>	<b>5</b>
	Sarajevo	Novo Sarajevo	Centar Sarajevo
		Vogošća	Stari Grad Sarajevo
		<b>TOTAL FOR SARAJEVO</b>	<b>4</b>
		<b>TOTAL FOR the FBiH</b>	<b>22</b>
Brcko District		Brcko	1
		<b>TOTAL FOR BiH</b>	<b>35</b>

The number of pupils from the affected schools is 44,000, which is 16% of all pupils from the 35 affected municipalities. As preschool facilities most commonly consist of only the ground floor the whole space was flooded and not usable for the preschool programme.

The children did not miss out a significant period of schooling as the 2014 flood occurred several weeks prior to the end of the school year. In some cases classes were interrupted for one or two weeks and then continued for the rest of the school year in the same facility (usually on higher floors) or in alternative facilities. There were also cases reported of interrupted classes due to damaged roads.

Although some preschool activities were moved to alternative locations (e.g., in Sarajevo Canton) they usually stopped working until further notice. It is the intention of education authorities at all levels to restart the school year normally in September.

#### 2.2.9.4 Cost of the Damage and Losses

The bulk of the damage was caused by the destruction of school premises through flash flooding and/or residual water as well as landslides. The total cost of the rehabilitation of education institutions was assessed by municipal commissions and consolidated by the respective ministries of education (see Table 43).

The estimate of the total damage to all 121 institutions includes the cost of refurbishing, furniture, equipment and didactics. As such, it is estimated at 8.04 million EUR. The estimated losses are 0.66 million EUR and refer mostly to the cost of closing preschool institutions, due to the lack of preschool fees for the recovery period.

*Table 43 - Estimated damage and losses to education institutions per entity/district*

Entity	Damage	Losses	TOTAL
RS	3,706,866.14	306,775.13	4,013,641.27
FBiH	4,325,529.31	357,904.32	4,683,433.63
BD	5,112.92		5,112.92
<b>TOTAL</b>	<b>8,037,508.37</b>	<b>664,679.45</b>	<b>8,702,187.82</b>

## 2.2.10 Livelihoods and Employment<sup>13</sup>

### 2.2.10.1 Executive Summary

The 2014 floods hit a country already grappling with a fragile labour market, socioeconomic distress driven by the legacy of the 1992-1995 war, a prolonged transition to a market economy and structural reforms. In addition, there were the effects of the 2008 global financial crisis that constrained opportunities for sustained and inclusive job-rich growth in BiH prior to the flooding.

The particular constraints of the BiH labour market and socioeconomic issues can be summarised as (1) a shrinking population and a maturing demographic, (2) high rates of unemployment and inactivity (estimated at 44.09 per cent in March of 2014) and (3) large gender and age differences in access to and the quality of the sectoral distribution of employment. Youth unemployment is estimated to be 63.1%. While women make up 51.4 % of the population, they constitute a mere 35.6% of the active labour force. Figures from the 2013 LFS show an employment rate of 23% for women, while the rate for men is 40.6%.

### 2.2.10.2 Sector Overview

#### 2.2.10.2.1 Constraints of the BiH Labour Market

##### Population and Demographics

The BiH population has been in constant decline due to a maturing demographic, negative population growth and one of the highest rates of outbound migration worldwide. The BiH population has shrunk by 9.5% since 2006. Over the past ten years, BiH's GDP per capita has shown positive growth of 71.6% (from USD 4,895 in 2002 to USD 8,400 in 2012) yet this increase is not primarily due to economic advances or productivity, but rather due to a decreasing number of people sharing the economic pie. At the same time, BiH's maturing demographic, with its median age of 40.8 years<sup>14</sup>, results in an unfavourable dependency ratio of workers to pensioners and pressures the pension funds to supply a growing number of beneficiaries while receiving fewer contributions.

According to the 2013 Labour Force Survey (LFS), BiH's working-age population makes up over two-thirds of the total population. However, in absolute numbers the working age population ostensibly shrank by almost 5% between 2006 and 2013. Less than half of persons of working-age are aged 25 to 49, while more than a third is aged above 50. BiH

<sup>13</sup> The Employment and Livelihoods Sector Assessment Team was lead by the ILO under the overall guidance of representatives from the three entities: Kenan Reso (FBiH), Biljana Semiz (RS) and Amra Abadzic (DB). Five experts from the ILO, WFP and the WB conducted the assessment of the Employment and Livelihoods (E&L) sector: Dragan Radic, Lejla Tanovic and Julian Schweitzer (ILO), Darko Petrovic (WFP) and Tomoko Unaki (WB).

<sup>14</sup> <https://www.cia.gov/library/publications/the-world-factbook/fields/2177.html>

has one of the highest dependency rates worldwide with each breadwinner supporting approximately 4.4 persons. This relatively high dependency ratio can be explained partly through the staggering unemployment rates as well as through the high flow of remittances. BiH ranked seventh in the world in terms of remittances received per capita in 2009 (7.1% of GDP in 2012). In the event of internal socioeconomic shocks, such as the natural disaster, remittances greatly soften the blow to livelihoods caused by the impact of the disaster on employment.

### Unemployment and Inactivity

Unemployment and widespread economic inactivity remain highly pertinent concerns. According to the 2013 LFS, unemployment in BiH stands at 27.5% and is nearly three times the rate of the EU27 average of 10.9% for the same period. The highest unemployment rate stands at 35.5% in BD, followed by 27.6% in the FBiH and 27% in RS.

Most unemployment in BiH is long term: almost half of all unemployed have been out of work for at least five years and a quarter of them for over ten years. A mere 8% of unemployed have been out of work for less than a year. Evidently, unemployment in BiH is structural rather than frictional.

Youth in particular in BiH struggle to enter the labour market and find meaningful employment with three out of four young people currently unemployed. Youth (aged 15-24) make up 16% of the BiH population. The activity rate for this population in 2013 was 29.4%, the employment rate 10.8% (compared to 16.7% in 2009) and the unemployment rate a staggering 59.1% (59.1% for men and 59.2% for women).<sup>15</sup> This should be compared with the rates of 48.7% in 2009, 57.1% in 2010, 57.7% in 2011 and 63.1% in 2012.<sup>16</sup> Youth unemployment in BiH is almost three times higher than in EU 27 countries, which stands at 23.5%.<sup>17</sup>

### Gender and Employment

BiH has made significant steps in developing institutional capacities for gender equality and establishing legal provisions to guarantee women's rights.<sup>18</sup> However, available data suggests a pattern of gender inequality in terms of access to and the sectoral distribution of employment. BiH has the lowest level of female participation in the labour force in South East Europe. Women make up 51.4 % of the population but constitute a mere 35.6% of the active labour force.<sup>19</sup> Figures from the 2013 LFS show an employment rate of 23% for women whereas the rate for men is 40.6%.

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<sup>15</sup> BHAS, LFS BiH, 2013.

<sup>16</sup> BHAS, LFS BiH, 2013.

<sup>17</sup> Eurostat website

<sup>18</sup> EU Progress Report, October 2011, p. 17

<sup>19</sup> BiH Combined Fourth and Fifth Period Reports on the implementation of the CEDAW, BiH Gender Equality Agency, April 2011

Few women turn to entrepreneurship in BiH. According to the 2013 Labour Force Survey, only 20.7% of employed citizens in BiH are self-employed and 15.2% of these (i.e., about 3.3% of all employed people) are self-employed women. At the same time, women make up 69.3% of unpaid family workers.<sup>20</sup> Those women that have businesses tend to focus on traditional service sectors such as small retail shops or beauty parlours.

Household and childcare responsibilities may lead women to invest less in economic activities. The lack of strong networks and pervasive cultural barriers further discourage women from entrepreneurship. Moreover, women in the private sector remain largely unorganised. Professional organisations tend to be male-dominated with limited participation of women. The lack of strong women's business associations means that women do not have a network of other businesswomen to turn to for sharing ideas and knowledge. This has an impact on their access to resources, training and information that could increase their business success.

While women face multiple forms of social exclusion in BiH, the most persistent ones relate to Roma women, women with disability and returnees/displaced persons. The position of Roma women in BiH society is extremely vulnerable. About 90% of Roma women have no access to healthcare, social protection or employment.<sup>21</sup> Women with disability face daily discrimination both as women and as persons with disability; this is manifested through social isolation and lack of access to services and employment. Estimates on the proportion of female-led households range from 7.5% to 20% but a third of internally displaced households are female-led.

Other structural forms of discrimination impede the level of economic participation of women. The most notable is the right to parental leave, which is regulated differently across the entities of BiH and maternity leave is not always paid. In many cases, women remain jobless after becoming pregnant.<sup>22</sup>

#### 2.2.10.2.2 Employment Structures in BiH

##### Wage Workers per Sector

The breakdown of the working age population by status of employment shows that the employment structure of BiH is dominated by wage workers (persons with full-time employment) who make up 74.6% of economically active people; women's share of these wage workers is 38%. In the lowest pay grades women are over represented while in the highest men outnumbered them by a ratio of 3:1. Overall, women earn 46% of what men earn.<sup>23</sup>

<sup>20</sup> <http://www.ifc.org/wps/wcm/connect/9e5be00048855a8d867cd66a6515bb18/Bosnia%2BVoices%2BFinal%2BReport.pdf?MOD=AJPERES&CACHEID=9e5be00048855a8d867cd66a6515bb18>

<sup>21</sup> BiH Combined Fourth and Fifth Periodic Report on the Implementation of CEDAW.

<sup>22</sup> The 3<sup>rd</sup> Alternative Report on the Implementation of CEDAW and Women's Human's Rights in BiH

<sup>23</sup> Economic Development and the Gender Wage Gap. Sherri Haas. Illinois. Wesleyan University. 2006.

Given the size of the government in BiH (administrative authorities at the cantonal, entity and central levels), public servants (excluding state-owned enterprises and healthcare workers) comprise a relatively large proportion of the labour force (11%) and total employment (19%).<sup>24</sup> The cantons in the FBiH have the highest number of public servants, followed by RS and the State. There is approximate gender parity among civil servants in BiH (51% female), but only 35% of senior positions are held by women. In 2013, ministers of all nine BiH ministries and the Chairman of the Council of Ministers were men.

The majority of wage workers in BiH in 2013 were engaged in the service sector comprising 51.3% of all wage workers, out of which 64.7% were women. The industry sector employed 29.8% of wage workers and remains a male-dominated sector with a female employment rate of only 16.2%. The agriculture sector creates little wage employment opportunities and is based mainly on seasonal labour. Only 18.9% of wage workers were employed in agriculture in 2013. However, these statistics omit the large grey figure of unpaid family workers. It is estimated that 70% of women in BiH work as unpaid labour in family establishments, including agriculture.

### **Business Environment and Enterprise Population**

The business environment in BiH remains challenging. Non-single economic space, complex government structures, difficult legal and regulatory framework and complicated business procedures are constraining economic development. The World Bank's Doing Business 2014 report ranks BiH 131 out of 189 economies. There are excessive administrative procedures and time needed in order to start a business (174<sup>th</sup> place), to get electricity (164<sup>th</sup> place), to deal with construction permits (175<sup>th</sup> place) and to deal with taxation payments (135<sup>th</sup> place). The World Economic Forum Global Competitiveness Report (2013-2014) ranks BiH 87 out of 148 economies. Difficulties in accessing loans (125<sup>th</sup> place) and availability of financial services (110<sup>th</sup> place) are pressing challenges for enterprises. The 2014 Index of Economic Freedom ranked Bosnia and Herzegovina 38 out of 43 countries in the European region and its score is below the global and regional averages.

According to the 2013 Statistical Business Register, there are 63,544 enterprises in BiH out of which 33,266 are active enterprises.<sup>25</sup> Enterprises in BiH are classified into four sections according to employment classes: micro (0-9), small (10-49), medium (50-249) and large (250 or more). The majority of enterprises in BiH are micro (73.8%) followed by small (18.8%), medium (6.1%) and large (0.9%) size enterprises. However, large and medium sized enterprises employ nearly two-thirds of all wage workers with 38.3% and 29.3% respectively; the remaining wage workers are employed in small (20.8%) and micro (11.6%) enterprises.

<sup>24</sup> IBHI. Policy Brief 'Political, Economic and Social Crisis in BiH 2012/2013: Towards New Policies'. Sarajevo. 2013

<sup>25</sup> Definition on p.16 2013 BiH Statistical Business Register

## The Informal Sector and Employment

The term 'informal' has many overlapping definitions ranging from 'grey' and 'black' to 'non-observed'. The definition used here is restricted to 'non-registered legal activities'.<sup>26</sup> It is calculated, based on a survey conducted in 2006, as encompassing an average size of 29.8% of the total unemployed who work in the informal sector.<sup>27</sup> The study also indicates that young persons, males, and those living in the FBiH and rural areas are more likely to be employed informally. Prior studies indicated 3.5% higher informal unemployment in 2001. Similarly, other studies of the 'grey' or 'informal' economy placed its size in 2002/2003 at 36.7% of GDP.<sup>28</sup>

As for the difference between the entities, some estimates for 2004 indicated 49% informal sector employment in RS and 36% in the FBiH.<sup>29</sup>

## Employment Structure in the Flood-affected Municipalities prior to May 2014

The 2.64 million people affected by the floods and landslides in May 2014 live across 80 municipalities: 1,465,390 in the FBiH, 1,103,805 in RS and 75,666 in Brcko District.

Out of these, nearly 466,000 were employed as wage workers as of April 2014. The 254,063 wage workers in the FBiH earned a monthly net wage of 361.99 EUR, in RS 195,487 wage workers (44% women) earned a monthly net wage of 370.69 EUR and in BD there were 16,279 wage workers.

In the same period, 478,564 (50% women) people of working-age were unemployed or inactive in the flood-affected areas: 262,102 (52% women) in the FBiH, 185,846 (49% women) in RS and 30,616 (48% women) in BD. This resulted in an overall dependency ratio of 4.7, the highest being in the FBiH at 4.8, followed by RS at 4.6 and BD at 3.6.

## 2.2.10.3 Assessment of the Effect of the Disaster

### 2.2.10.3.1 Methodology

Enterprises encompass the majority of employed wage workers in Bosnia and Herzegovina. An enterprise survey was conducted in 81 flood-affected municipalities

<sup>26</sup> As defined by the BiH Central Bank, considering legal economic activities bypassing appropriate legal regulations or in EBRD, Gorana Krsti and Peter Sanfey, *Mobility, poverty and well-being among the informally employed in Bosnia and Herzegovina*, Working paper No. 101, October 2006.

<sup>27</sup> ITUC-FNV, Suad Muhibic, *Informal Economy in BiH, Research Paper*, for the Confederation of Trade Unions of Bosnia and Herzegovina, under the 'Bosnia and Herzegovina Trade Union Technical Assistance Programme'. Sarajevo. August 2007

<sup>28</sup> BiH Central Bank, Ljubisa Vladusic and Vidosav Pantic, *Non-Observed and Grey Economy in BH*, Special Topics in Research, December 2008 (STI/01/08, ISSN 1840-2593). See also Rosas, G., Corbanese, V., O'Higgins, N., Roland, D., & Tanovic, L. (2009). *Employment Policy Review Bosnia and Herzegovina*. Strasbourg: Council of Europe. P.10.

<sup>29</sup> World Bank Labour Market Update. December 2005. Report No. 32650-BA.



throughout the FBiH, RS, and BD to estimate the damage and losses experienced by enterprises and the effect on wage workers..

Time constraints and insufficient baseline data did not allow for further distinction to be made on the account of non-wage workers and informal employment. The data was collected between 2 and 12 June 2014 and later expanded to cover additional municipalities as more information became available. The Employment and Livelihoods Assessment (ELA) accounts solely for the damage and losses suffered by registered enterprises and for the job loss/risk for wage workers employed in these enterprises. This estimate does not account for job loss/risk of non-wage workers and the informally employed. Only enterprises that are located in the 80 flood-affected municipalities (as per the list provided by the EU) in the FBiH, RS and in BD were taken into consideration.

To distinguish between the damage to physical assets (premises, machinery and equipment, raw materials and finished products) and losses of financial flow (increased cost of business operations, reduction in turnover and reduction in productivity), an enterprise survey was designed in consultation with representatives of employer organisations in BiH and distributed by the RS, FBiH and the BD governments. The losses to be included were those experienced in the month of May and the anticipated losses for June, July and August.

The survey was distributed to municipalities via the ELA focal points in the entities and BD and then sent to the ELA team for compilation, analysis and further validation. The data was collected initially between 2 and 12 June 2014. On 12 June 2014, 47 of the 80 flood-affected municipalities had collected the relevant data: 31 out of 43 municipalities in the FBiH and 16 out of 37 municipalities in RS. At that point, the survey had collected data on damage and losses from 1,439 enterprises in flood affected municipalities: 713 in the FBiH, 611 in the RS and 115 in BD. In Brcko District, all relevant information from all affected companies had been collected.

In order to have a more comprehensive and accurate assessment, additional information relevant to each municipality was added after the initial agreed deadline.

In parallel, the entity and district authorities collected baseline information that included the number of active enterprises per municipality by size (micro, small, medium and large). This included all types of registration, from public utility companies and public companies (legal entities) to crafts. The energy sector and the provision of services such as water and district heating were excluded. The number of employed people per size category was also made available.

The objective of the initial methodology was to extrapolate sample data obtained at the municipal level focusing on the percentage of affected companies comparative to the total number of companies in that specific municipality or a proxy based on the percentage of affected dwellings. For municipalities where all affected enterprises were surveyed, the estimated damage and losses were to be the sum of damage and losses reported by the

surveyed companies. The baseline population and surveyed companies were stratified according to their size (micro, small, medium and large).

Yet by the end of the extended timeframe there were still outstanding issues pertaining to insufficient sample size in certain municipalities, due to the total number of affected companies not being available, and the proxy not yet considered appropriate as well as the accurateness of the baseline in terms of active companies.

To get around these issues, a new approach was discussed with the entity representatives. Instead of calculating the estimation of damage and losses at the municipal level overall damage and losses were estimated at the entity level. Secondly, the estimation was then based on the mean of the damage and losses by work place stratified according to company size. Then, using a representative sample of municipalities (close to 30%), the percentage of affected workplaces to the total number of employed persons in these municipalities was calculated and used as an extrapolation factor.

As all affected companies in Brcko District had been surveyed, the estimation was calculated on the sum of reported damage and losses of the surveyed enterprises.

The following estimations are not to be considered definitive but merely indicative of the actual impact of the flood on employment and livelihoods.

#### **2.2.10.3.2 Damage and Losses**

The floods caused severe damage to commercial, industrial and other premises, equipment and machinery, raw materials and finished products across all of BiH amounting to 346.55 million EUR. Enterprises in the FBiH recorded damage of 203.36 million EUR, 141.20 million EUR in the RS and 1.99 million EUR in BD.

Additional losses in terms of increased costs of business operations and a reduction in productivity and turnover amounted to no less than 446.49 million EUR across the country. In the FBiH 259.39 million EUR in losses were recorded, followed by 184.26 million EUR in RS and 2.84 million EUR in BD.

Table 44 - Initial estimation of the impact of the disaster on Employment and Livelihoods linked to enterprises (agriculture, industry and services)

Initial estimation of the impact of the disaster on Employment and Livelihoods linked to enterprises (agriculture, industry and services)					
Category	Details of Damage or Losses	Likely duration of damage or losses	Costing principles (in EUR)		Impact on employment and livelihoods
DAMAGE TO ASSETS					
Premises	Total and partial damage causing closure and interruption of business activity	Medium and long-term	Cost of reconstruction or replacement	346.66 million EUR	Immediate 2,450 jobs permanently lost and an additional 35,000 jobs at risk, dependency ratio of 4.4 multiplies livelihoods losses
Equipment & Machinery			Cost of repair or replacement		
Raw Materials	Total and partial damage delaying production and service delivery	Short term	Cost of replacement		
Finished Products	Total and partial damage, causing interruption of supply chain, affecting other business	Short term	Cost of reproduction		
LOSSES TO INCOME/EMPLOYMENT					
Reduced business operations	Temporary power cuts, fuel scarcity or damaged roads	Short term	Additional costs	446.36 million EUR	Potential additional permanent or temporary suspension of labour
Reduction in productivity					
Reduction in turnover	Reduced demand for products or services	Short term	Forgone revenue		

### 2.2.10.3.3 Loss of Employment in Effected Enterprises

Based on data recorded by the enterprise survey, an additional 33,500 wage workers were directly affected by the floods and are at immediate risk. Out of these, 24,421 were recorded in the FBiH, 7,486 in RS and 1,536 in BD. Additional information received after the conclusion of the enterprise survey by the Ministry of Labour and Veterans of RS stated that approximately 20,000 jobs remain at risk in RS due to the flood. Difficult and prolonged administrative procedures related to formal registration of those laid off by flood-

affected employers may explain the discrepancy in recorded job losses and jobs at risk. Ultimately, the pace of enterprise recovery will be crucial and determine whether additional jobs are lost or preserved.

*Table 45 - Flood affected jobs*

	<b>Total</b>	<b>Already lost</b>	<b>At low to medium risk</b>	<b>At high risk</b>
FBiH	38,419	2,235	28,468	7,716
RS	27,688	768	21,179	5,741
BD	609	48	524	37
<b>BiH</b>	<b>66,716</b>	<b>3,051</b>	<b>50,171</b>	<b>13,494</b>

Qualitative research conducted through field visits in both three entities and BD supports these quantitative estimates. It appears that most employers have thus far kept their workers and do not intend to dismiss them; in fact, layoffs were considered only as an option of last resort while alternative working modalities are generally preferred. In some instances, workers reported receiving reduced wages, transferred to other production lines or were sent on mandatory leave. In other instances, it was simply too early to acquire precise figures on job losses as the enterprises were either still flooded or in the process of repairing and cleaning the premises. In a few cases employers reported that they had hired additional workers in order to speed-up the removal of debris and restore facilities. There was however agreement across all enterprises that if there is no quick recovery to revitalise the local and regional economy many enterprises may be forced to lay-off additional workers or to withdraw from business operations altogether. The restoration of key enterprises to re-establish the value chain and restart the economy is crucial in this regard. Enterprises prominently indicated the need for compensation for damage from government as well as temporary exemptions from tax payments (e.g., VAT), a reduction in contributions to the Pension and Disability Fund, and the reprogramming of existing and provision of future loans at low or zero interest rates.

Another indicator of lost jobs is the decreasing contributions to the Pension and Disability funds in the FBiH and RS. A dramatic decrease of 15% and 23% respectively, was recorded in May when compared to the level of contributions in April. Further monitoring of contributions over the coming months will indicate whether recovery is taking off or procrastinating and if this will put vulnerable segments of the society at risk. It should be noted that part of the reduction in contributions is due to delays (caused by the flooding) in payments to the Pension and Disability Fund, rather than effective jobs losses. It is too early to tell one cause of non-payment from the other.

Table 46 - Contributions (Pension &amp; Disability Fund)

	April	May	% change
<b>BiH</b>	<b>211,432,501</b>	<b>174,162.412</b>	<b>-18%</b>
FBiH	139,752,501	118,692,412	-15%
RS	71,680,000	55,470,000	-23%
BD	n/a	n/a	n/a

A dramatic loss of formal employment and extended decline in contributions to the social welfare systems could have implications for overall purchasing power and an increase in public expenditure leading to further impoverishment of Bosnian society. Such a scenario would particularly affect households with low wage labour opportunities, a high dependency ratio, limited asset ownership and coping capacity and a high reliance on social welfare, particularly jeopardising their food affordability and social inclusion.

Food prices have so far been the concern of the entity/district governments, leading to an introduction of sanctions against sporadic price hikes in the immediate aftermath of the flood. Monitoring trends in terms of the cost of living and the price of the basic food basket should remain a priority over the next 6-12 months, while the full effect of the flooding on the agriculture season, bilateral trade and the social welfare system is yet to be established. Temporary measures should also be considered for the financing of public works programmes as this could help affected and vulnerable households generate income in the difficult months to come.

#### 2.2.10.3.5 Type of Enterprises affected

Of those enterprises that recorded damage and losses in the flood-affected areas, 88% were micro and small enterprises. They comprise the highest share of all enterprises in BiH (95%) and therefore carry the heaviest burden of the flood. However, small and micro enterprises employ less than one-third of all workers. The damage and losses experienced by medium and large enterprises directly or indirectly affected by the floods amounts to 470.35 million EUR. Medium and large enterprises employ about two-thirds of all workers in BiH.

## 2.2.11 Crosscutting Themes

### 2.2.11.1 Gender

#### 2.2.11.1.1 Executive Summary

Gender inequality in Bosnia and Herzegovina has significant implications both in terms of damage and losses incurred by men and women differentially and for disaster recovery.

While the country is advanced in terms of legislation and policy there is little political will for the implementation of gender equality. Women are largely excluded from political and decision-making processes; they have disproportionately limited access to employment and income and many are subject to violence. There is particular concern with respect to Roma women in BiH, who are even more severely disadvantaged and marginalised.

Even though sex disaggregated baseline data, limited as it is, was utilised, compilation of the effects of the disaster in terms of the population affected and sex differentiated data in relevant sectors was very scarce. In spite of this, a gross estimate was made on women's losses resulting from the effect of the flood. No similar analysis was made on damage to women's assets since no information was accessible in terms of property rights or estimation of women's assets, be it household based or work related.

The estimate made calculated gender related losses at 8.95 million EUR (3.53 in the FBiH, 4.8 in RS and 168,726.32 in BD).

Resilience building against future shocks will require attention and funding directed towards reducing the severe economic and decision-making disparities between women and men.

Key recommendations and suggested funding priorities according to affected women informants and national gender equality experts are shown below.

#### Key Recommendations:

- equal and meaningful participation of women from all groups in all recovery decision-making forums;
- equitable and transparent land, housing and property restitution for men and women, using well-publicised criteria and procedures;
- default joint titling/joint registration of recovery assisted land and housing for couples;
- strengthened economic empowerment programmes for women as part of Disaster Risk Reduction; and
- gender-sensitive disaster preparedness, response and recovery planning.

Top funding priorities:

- compensation for women's unpaid labour;
- cash compensation for home garden losses & household equipment paid to women;
- grant fund to re-start women's uninsured small and home-based businesses;
- housing land and property rights campaign;
- expanded SOS telephone help lines; and
- gender and disaster training for police, civil defence, women's civil society organisations (CSO) and municipal governments.

### 2.2.11.1.2 Methodology

Sex-disaggregated data comparing conditions for men and women in BiH was compiled and shared with the sectoral teams for consideration as baseline information and as guidance when investigating gender issues relevant to the sectors. Some sectors, notably livelihoods, agriculture and housing, were keen to engage in gender analysis of their information and findings but limited by the lack of available sex-disaggregated data. Representatives of women's civil society organisations in fifteen flood affected communities and government bodies for gender equality were interviewed about differences in men's and women's experiences, needs and flood recovery priorities. A group discussion was held in Sarajevo with representatives of women's CSO.

### 2.2.11.1.3 Findings

For half of those interviewed in June, the 'emergency phase' was not yet over; however, it was also clear that needs are shifting from food, water and non-food items to income and housing. The lack of reliable information and communication with affected women and men emerged as an important need across several sectors. Concerns ranged from people worried about disease from flood-affected food to those affected by landslides who cannot return home and are desperate to know what kind of help they can expect and when.

Mostly information received referred to needs rather than losses. Of these, the most commonly cited needs were cleaning supplies and disinfectant, and for houses to be clean and dry, while food and water remained urgent needs in some areas. Hygiene packages were mentioned several times as being hugely appreciated by women, even more than bread; this is still something that local male disaster officials do not address.

'No discrimination in the emergency humanitarian phase!' All respondents believed there was no difference or discrimination based on gender in the immediate rush to help people. Some responders made efforts to prioritise single mothers, while others mentioned elderly



people. In Bijeljina, the government identified 14 and later 21 families with disabled children to be prioritised yet because of poor record keeping they could not be located.

The Social Welfare Centre and Centre for Children with Special Needs in Maglaj were both flooded as was the orphanage in Bijeljina and the women's safe houses in Banja Luka and Doboje were both affected. Two safe houses benefited from their earlier mitigation work: one having built an embankment and the other having purchased pumps. In at least one location, single women with children were accommodated in a safe house for victims of domestic violence, stretching this limited resource and creating a possible security risk for the women already living there. EUFOR was monitoring the situation of affected children in particular.

There is no information and there have not been any reports of increased violence against women during the floods, according to CSO, international non-governmental organisations (INGO) and EUFOR. While two people felt that the sense of solidarity might have temporarily reduced violence far more were worried that anger and frustration will soon trigger many regular offenders. One person reported fights between men at distribution sites. Concerns identified for monitoring include women's increased risk of labour exploitation, the risk of the trafficking of women and girls due to increased migration and the risk of sexual exploitation to obtain recovery resources.

Table 47 - Gender related losses

Gender related losses (Thousands EUR)	
<b>TOTAL</b>	<b>8,973.17</b>
<b>FBiH</b>	3,722.20
<b>RS</b>	5,020.89
<b>BD</b>	230.08

### Recommendations

Two general considerations are followed by sector specific ones, which should be taken into account for the recovery process.

- Clear and accessible information about recovery assistance, entitlements and procedures must be provided through various media to enable women and men of different ages and social groups to make informed decisions and to benefit equally.
- An inclusive gender-sensitive needs analysis should be conducted for all affected areas, with special attention to disabled women, single mothers, Roma women and other potentially vulnerable individuals, with the purpose of developing comprehensive and inclusive plan to improve post-disaster conditions for women in all areas.

*“The extremely patriarchal views held here will be reinforced if donors make no effort to bring women into recovery discussions. On the other hand, the floods may succeed in*

*highlighting the underlying social crisis and finally getting people to accept the need for social change and progress on equality. It is an advantage that gender equity is included in all legislation, particularly regarding human security and disaster strategy. OSCE and donors should be keen to see that equity provisions are implemented, particularly at local level.*<sup>30</sup>

### 2.2.11.2 Security

Excessive rainfall in Bosnia and Herzegovina in May 2014 caused flooding across one-third of the country affecting one million people, more than a quarter of the population. Concerns were raised about landmine migration as landmines contaminated 70% of the flooded area. Bosnia and Herzegovina is still one of the most heavily mine contaminated countries in the world. It is one of only 11 countries with over 100km<sup>2</sup> of mine contamination.

The total suspected area currently covers around 1,231 km<sup>2</sup> or 2.4% of the total surface area of the country. The information before the flooding defined:

- 9,514 - micro locations
- 19,185 minefield records
- 4,282 - mine action projects still to be implemented.

In accordance with the obligations to the Antipersonnel Mine Ban Treaty, the existing Mine Action Strategy over the period 2005-2007 was evaluated and a revised strategic plan for the 10-year period (2009-2019) was made.

A recovery needs assessment was conducted and found there to be minimal mine migration compared to that expected. Awareness campaigns and an effective emergency response by Civil Protection and BiH Mine Action Centre (BHMIC) ensured there were no casualties and 10,000+ mines, UXO, and weapons were located and destroyed.

Therefore, as the water recedes and cleanup tasks are undertaken, the survey and detection of landmines and unexploded ordnance (UXO) will hamper the recovery process.

The affected area of approximately 920 km<sup>2</sup> of land including more than 4,000 landslide locations has prompted a landmine awareness campaign to make the local population and relief workers aware of the dangers from unexploded mines and UXO that may be unearthed by water erosion and landslide subsidence.

Fencing and marking has been destroyed and urgently needs replacing. Landslides caused mine migration within suspected hazardous areas. The mines are now buried much deeper than before so current BiH mine clearance procedures need revising.

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<sup>30</sup> Adnan Kadrić, expert advisor to the Agency for Gender Equality of BiH

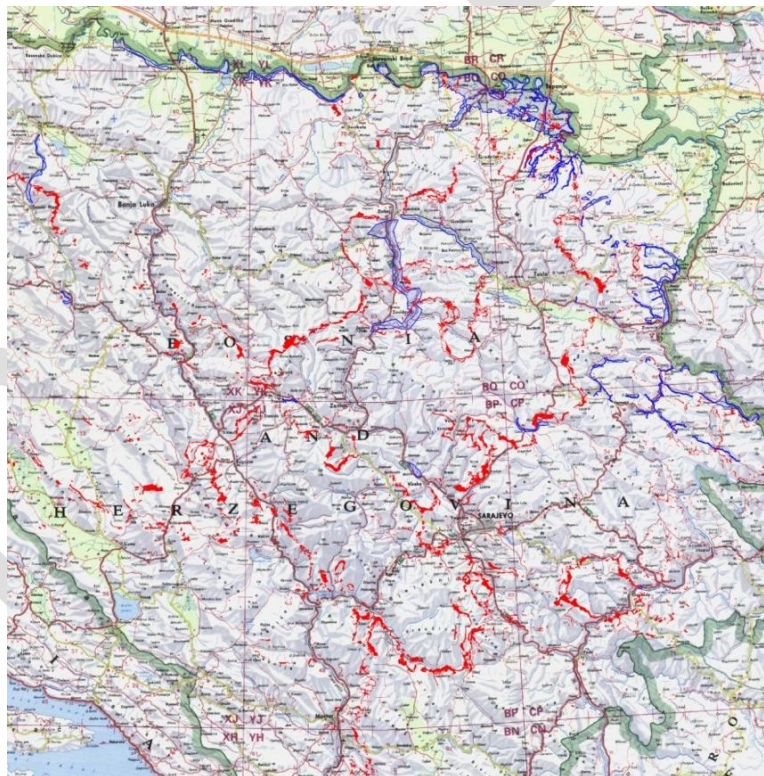
The suspected hazardous area now requires redefinition, which is done most efficiently through the application of the land release concept. First land is released through non-technical survey then, once there is evidence of mines, by technical survey and only at the very end, once the mined area is confirmed, by carrying out mine clearance. Commercial contractors usually conducted the final stage.

Information available at the time of writing suggests that the extent and impact of this problem in BiH is quite limited, both in terms of area/sites confirmed as having been affected and the number of items that were either eroded and newly exposed in situ or eroded from the soil and moved by the floodwaters.

In terms of casualties, there seems to have been no discernible impact on the affected communities.

The map overleaf shows in blue the areas affected by the flooding, the red areas indicate mine contamination across the whole of the country.

*Map 9 - Overall mine contamination in relation to flooded areas*



The major concern during the field visits to the BHMIC and the emergency response agencies was the effect of landslides within the Suspected Hazardous Areas (SHA). In several cases, landslides had occurred on hillsides causing earth and associated debris to

travel downhill covering roads, houses and associated infrastructure. At the time of writing, there had been 3,000 reported landslides, 51 of which were in SHA.

The landslides varied in size. Some were just small deposits of earth, trees and vegetation blocking a road or access route, while others were large and in some instances covered houses in several metres of earth and debris. In several locations, SHA awaiting survey and clearance were situated above roads and houses and therefore once the landslide evolved it took part or all of the SHA moving the suspected mine contamination in its path.

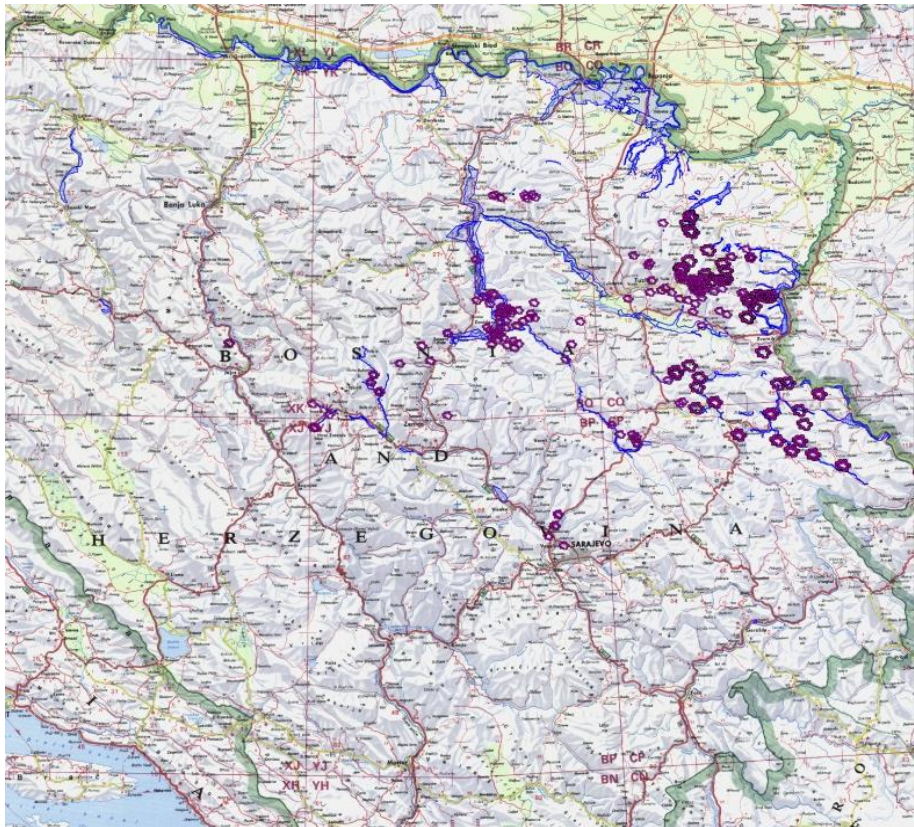
When recovery teams from Civil Protection and supporting agencies arrived to clear the landslides from the roads the teams found evidence of landmines and UXO within the earth and debris they were tasked to remove. This situation caused some concern and created an element of risk for the deployed workforce. In the event of items being located Civil Protection explosive ordnance disposal (EOD) teams, BHMAL and supporting agencies were immediately tasked to work with contractors opening up the roads.

The landslide problem will need to be assessed in more detail in order for the BHMAL to draft clear guidelines on how clearance organisations should work in this new environment. Currently, mine clearance in BiH is only conducted to a depth of 10-20 cm depending on confirmed readings<sup>31</sup>; however, some of landmines may now be buried below 2 meters as a result of landslides. This will need careful consideration as to how earth moving equipment and mine clearance will be conducted.

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<sup>31</sup> BHMAL Standing Operational Procedures for Humanitarian Demining, dated 1 June 2003.



*Map 10 - Landslides in relation to the flooding*

It should be mentioned that during and after the flooding there was accurate and effective reporting of items discovered. The general public had a good recognition and awareness of items and an awareness of where to report these items. There was an extremely effective response by Civil Protection and mine action operators (undertaking spot clearance tasks), while emergency mine risk education messages/campaigns enhanced general awareness of the risk posed by landmines and other explosive remnants of war (ERW) appearing in previously low-risk areas. One point for consideration when assessing the quantity of mines and ERW reported is that a large amount of these items were illegally held weapons, explosive ordnance, mines and small arms ammunition kept in cellars and basements.

The Civil Protection team summary of their emergency EOD/mine action response activities is summarised below. It should be noted that information received by Civil Protection during the emergency fieldwork revealed that as a result of the flooding some 10,000 items were disposed of. The data received from Norwegian Peoples' Aid (NPA) contained further records not listed in either Civil Protection or BHMAL data. Therefore, the results were not comprehensive at the time of writing.

*Table 48 - Landmines, UXO, small arms and ammunition detected after the flooding*

• 68 mines
• 1,372 pieces of UXO
• 33,419 items of small arms ammunition.

Respondents interviewed during the fieldwork confirmed that landmines and ERW found after the flooding were the result of both washing out from higher ground and the sheer force of the water exerted on the contaminated areas as rivers and connecting water sources burst banks and dams.

Judging from the results seen so far it can be concluded that heavy items of ERW (mainly UXO and cluster munitions) are highly unlikely to have been moved far, if at all, and that many of those observed appear to have been exposed as a result of erosion rather than wash out or being moved by floodwaters. Landmines most likely to have been moved over long distances by the floodwaters are the lighter plastic anti-personnel mines such as the PMA 2 or PMA 3. It is necessary to ascertain whether 'new mines' or items of ERW have emerged in previously safe areas through movement as opposed to erosion/exposure. It is relevant in as much as it may counter the largely inaccurate assertion that landmines float after floods and indiscriminately contaminate new widespread areas previously considered low risk.

Based on some of the data received it is apparent that mines moved due to landslides in previously contaminated areas but it is hard to differentiate how the mines/ERW moved in relation to their size and weight. This is especially true of heavier items of ERW (such as mortars) and even some landmines (such as POMZ 2 and PROM – a fragmentation mine that is effectively a heavy metal grenade on a stick). Civil Protection personnel played a vital role in reporting items discovered after the floods to mine action operators such as BHMAC and NPA. It is likely that the lack of incidents after the flooding has far more to do with the Civil Protection reporting structure being in place than a result of emergency mine risk education (MRE) activities. Emergency MRE is more important for highlighting the need to report and enhancing general community awareness than reducing vulnerability through other forms of risk reducing behavioural change. Recommendations and comments from interviewed respondents thoroughly endorsed the provision of sustained funding for and increased technical capacity of Civil Protection and the BiH Armed Forces.<sup>32</sup>

Communities in flood-affected areas seem to be well aware of the enhanced risk, especially along the sides of rivers, streams and ponds. Equally, they seem to be aware of the need to report any such discovered items to the authorities. This indicates awareness of and confidence in the existing reporting mechanisms.

<sup>32</sup> Meeting 12 June 2014, Sanja Tica European Union.

While not precluding the possibility that further studies might reveal a deeper impact on community life and livelihoods, the assessment is at this stage that the impact of flash floods on the landmine sector has had an extremely limited impact on livelihoods in mine-affected areas of northern BiH. People in the affected communities recognise landmines and other ERW and know where to report it. Civil Protection teams are doing a good job in co-ordinating and passing on such reports and mine action agencies are responding by conducting 'spot tasks' on the items reported in a timely manner.

DRAFT



### 3. DISASTER IMPACT

#### 3.1 Fiscal and Macroeconomic Impact

The floods are estimated to have caused the equivalent of nearly 15 percent of GDP in damages (9.3 percent of GDP) and losses (5.6 percent) in 2014 in Bosnia and Herzegovina (BiH). This amounts to around 1.27 Billion EUR of damages and 763.39 Million EUR of losses. The hardest hit economic sectors were agriculture, transport and productive activities. As a result, the economy of Bosnia and Herzegovina is expected to contract by 0.7 percent in 2014. The floods are expected to put further strain on public finances, raising the fiscal deficit from a baseline of 2 percent of GDP to 4.5 percent in 2014. A significant public sector financing gap of 1.7 percent of GDP has opened up, despite identified additional (to pre-floods needs) financing from domestic and international sources. The trade deficit is likely to come under pressure, widening to 34 percent of GDP in 2014 while the current account deficit is projected to increase from the baseline 7.8 to 9.7 percent of GDP in 2014.

##### 3.1.1 Economy-wide Impact

###### 3.1.1.1 Economy-wide Impact

The impact of the recent flood on BiH economic activity is placing additional pressure on an already weak economic recovery. Bosnia and Herzegovina's economy performed poorly in recent years due to weak internal and external economic environments but a surge in exports supported a modest economic recovery in 2013. Industrial production picked up by 6.4 per cent in 2013 with manufacturing growing by 9.7 per cent and intermediate goods by 4.7 per cent. Inflation remained low in 2013 and BiH experienced deflation at the end of the year. Internal and external risks to the recovery remained, including a high unemployment rate (27.5%) and a slow recovery in the EU. Even though a surge in exports supported modest growth, slow recovery in the EU could hurt export growth and cause a slow-down in fiscal revenue and impact on the 2014 budget.

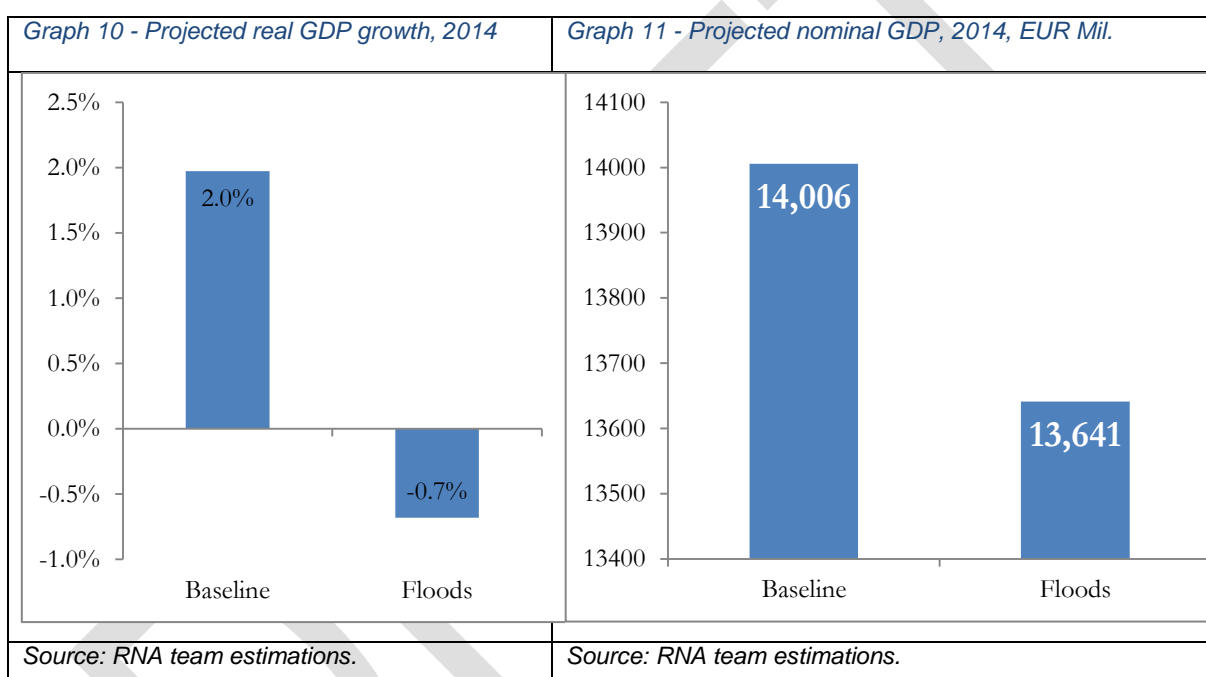
###### 3.1.1.2 Total GDP Growth Impact

The RNA indicates that agriculture, transport and productive activities were especially affected by the flooding. The floods have harmed numerous small and medium size businesses in manufacturing and farming as well as a few major employers. An estimated one million people have been negatively affected, including 40,000 displaced, and areas with low and middle-income households have been hit particularly hard.

Reconstruction efforts will partially counteract the negative effect on economic activity, provided adequate financing for reconstruction becomes available and there is sufficient capacity to absorb the resources efficiently. A pickup in construction activities, investment

and consumption (as lost items are gradually replaced) is expected. With increased domestic activity, a reversal of the current deflationary trends is possible.

As a result of the losses and damage caused by the flooding, the BiH economy is expected to contract by 0.7 per cent in 2014. Estimations by the RNA team suggest that economic growth is likely to turn negative, at a projected -0.7 per cent in 2014, a considerable reduction compared with the non-flood 'baseline scenario' of 2 per cent (see Graph 10). Nominal GDP is expected to decline from 27.4 to 13.65 billion EUR (see Graph 11) resulting in a worsening of economic indicators, including higher fiscal and trade deficits than previously projected. The flood damage is also expected to have a major negative impact on poverty, given the loss of homes, jobs and livelihoods, including crops and livestock.

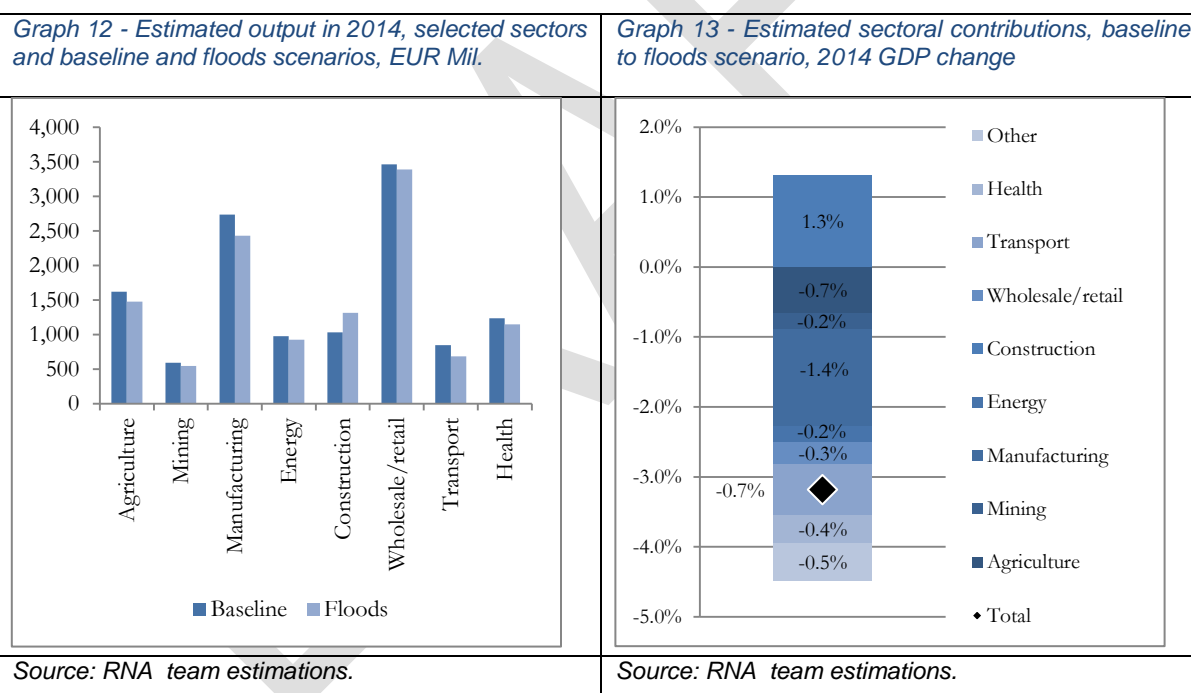


### 3.1.1.3 Sectoral Impact

Some areas of the economy have been especially hard hit by the flooding. The agriculture sector, which represents about 6 per cent of GDP and 19 per cent of overall employment, remains in a state of transition with a majority of very small farms and a growing number of larger commercial farms that acquired land through leasing arrangements with municipalities and other parties. As a result of the floods, agricultural output is projected to fall by 9 per cent compared to the baseline and by 8 per cent compared to 2013 (see Graph 12). This fall in agricultural output is expected to reduce economic growth by 0.7 of a percentage point (see Graph 13). Since agriculture employs such a large share of the population, this will likely have a significant impact on the poor. Another activity severely affected is transport. Some of the most important parts of the road transport network,

including the M17 Highway - the main artery for north-south traffic in BiH – are situated in some of the most heavily flooded areas. Damage has been large and the resulting losses to businesses and the economy in general are correspondingly high. In total, output from the transport sector is projected to fall by 19 per cent compared to the baseline and reduce economic growth by 0.7 of a percentage point in 2014. Manufacturing, health, energy and mining have also suffered negative consequences, including power outages and loss of output, between them reducing GDP growth in 2014 by 2.2 percentage points.

However, some sectors will likely grow faster following the flooding. Construction and wholesale/retail are expected to benefit from the flooding due to increased demand for their services. Construction is expected to make a positive contribution to economic growth, growing by 28 per cent compared to the baseline and contributing 1.3 percentage points to the pace of economic growth in 2014. The wholesale/retail sector will see some benefits from the flooding but has also been negatively affected, with the two effects approximately balancing.



### 3.1.1.4 Sub-national Damage and Losses

Damage and losses caused by the flooding are estimated at 14.9 per cent of GDP, unevenly spread across the territory of Bosnia and Herzegovina. While there are substantial issues with data timeliness and comparability between the sub-national entities

in the country, it is possible to make provisional estimates.<sup>33</sup> In value terms, losses are estimated to be similar in the Federation of Bosnia and Herzegovina (FBiH is home to approximately two-thirds of the population) and Republika Srpska (RS is home to approximately one-third of the population) (see Table 49). As a share of GDP, damage in the FBiH is estimated at 7.2 per cent and losses at 4.6 per cent of the entity's GDP respectively. The damage in RS is estimated at 13.5 per cent and losses at 7.6 per cent of RS's GDP respectively. Brcko District (BD) – a port town on the River Sava – was also hit by the flooding, suffering damage estimated at around 7.5 per cent and losses at 2 per cent of GDP respectively.

Table 49 - Damage and losses

	EUR Mil.		% GDP	
BD	23.65	5.95	7.5%	1.9%
RS	617.59	350.71	13.5%	7.6%
FBiH	632.75	406.73	7.2%	4.6%
<b>Total</b>	<b>1,273.99</b>	<b>763.39</b>	<b>9.3%</b>	<b>5.6%</b>

### 3.1.2 Fiscal Impact

Even before the flood, BiH faced significant fiscal challenges exacerbated by declining revenue. To maintain a sustainable fiscal stance in the face of declining revenue, the authorities took some measures to reduce expenditure. However, government spending remained overly concentrated on non-growth enhancing areas. Efforts to contain current spending in 2013 were weak with public sector wages and social benefits together amounting to 27 per cent of GDP. The targeting of social benefits was inadequate with only an estimated 37 per cent reaching the poorest quintile and over 12 per cent going to the wealthiest quintile in the country. This leakage is largely due to excessive spending on war-related benefits, which tend not to reach the neediest.

#### 3.1.2.1 Fiscal Balance

It is expected that the flooding will place further strain on public finance, bringing the fiscal deficit to 4.5 per cent of GDP in 2014 (see Table 50). Given the state of public finance in BiH, there is little fiscal space to address even the most urgent humanitarian needs. Before the flood, the fiscal deficit was projected to reach a sustainable 2 per cent of GDP in 2014 (see Graph 14). Yet the full cost of the reconstruction effort will not fall on the public purse and public sector participation will differ by sector (for example, public

<sup>33</sup> Estimates as a share of GDP were made by dividing national GDP according to the following: FBiH 64.2 per cent, RS 33.5 per cent and BD 2.3 per cent. A similar pattern can be observed in terms of estimated job losses and jobs at risk because of the flooding. Of total estimated job losses and jobs at risk, 73 per cent were in the FBiH, 22 per cent in RS and 5 per cent in BD.

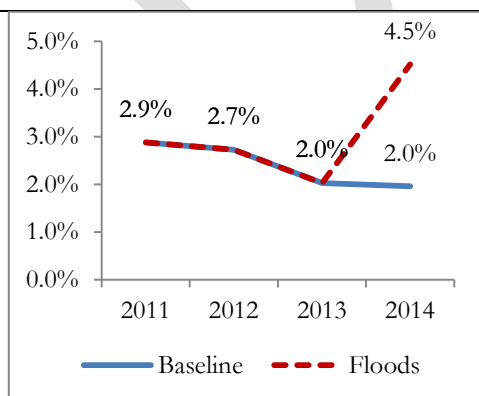
authorities will likely assist more in transport than housing repairs). The estimations presented in this report account that the public sector will bear the cost of the public sector damage, which amounts to around a quarter of the total. However, the Government may also choose to provide resources for other sectors, such as housing, in which case public spending needs would increase further. Despite its limited involvement, increased spending needs and lowered GDP combined with falling revenue are estimated to push the fiscal deficit to 4.5 per cent of GDP.

Table 50 - Headline fiscal indicators for 2014 as a percentage of GDP

	Baseline	Flood
Revenue	45.9%	45.8%
Expenditure	47.8%	50.3%
Deficit	2.0%	4.5%
Unidentified financing	0.0%	1.7%

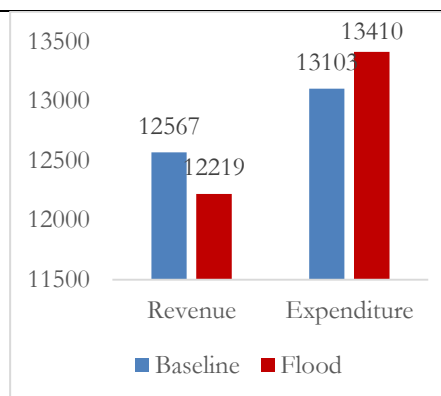
Lower tax revenue and higher spending needs are anticipated as a consequence of the slow-down in economic activity and flood-related construction. Significant falls in both direct and indirect tax revenue and social security contributions are likely, although donations from citizens and firms as well as donors, such as the Austrian Government, the Norwegian Agency for Development Cooperation, Swiss Cooperation and USAID, will slightly moderate the decline in revenue. Together, so far these donations amount to only around 14.83 million EUR. In total, revenue is expected to decrease by 177.93 million EUR compared to the baseline. However, since GDP has decreased so much this represents a change from 45.9 per cent of GDP to 45.8 per cent. At the same time, reconstruction costs will need to be met partly by the public purse. This will apply in particular to transport, energy and flood control as well as some contributions toward housing and livelihoods. Spending needs are expected to increase from 47.8 per cent of GDP in the baseline to 50.3 per cent of GDP (see Graph 15).

Graph 14 - Fiscal Deficit, % GDP



Source: RNA team estimations.

Graph 15 - Fiscal Revenue and Expenditure, 2014, BAM Mil.



Source: RNA team estimations.

### 3.1.2.2 Financing Requirements and Availability

The public sector financing needs for 2014 were significant even prior to the floods and increased quickly following them. Prior to the flooding, even after raising a significant amount from domestic markets<sup>34</sup>, a financing gap of 2 per cent of GDP or 268.94 million EUR (\$376 million) remained that needed to be closed through international financing. This included budget support in the form of the IMF Stand-By Arrangement (SBA) and a World Bank Development Policy Loan (DPL). Following the floods, with little room to raise further financing from domestic markets, external financing needs have increased to an estimated 4.9 per cent of GDP or 0.61 billion EUR (\$854 million). An estimated 53 per cent of the increase in the 2014 financing gap is the result of lost revenue and the remainder due to increased public expenditure on reconstruction efforts. Some potential sources of financing have already been identified in order to partially close this gap.

Additional financing sources (humanitarian and creditors' funds) are being made available to BiH in response to the flood disaster, but these only partially close the large international financing needs. Some donors have already made donations in the form of grants, which have been included in 'revenue'<sup>35</sup> (discussed above), and have helped to moderate the financing need. Identified potential new sources of financing include resources from (a) the IMF, which plans to seek additional financing under the current SBA; (b) the World Bank, which has approved \$100 million of financing available under the Crisis Response Window (CRW), some of which will be disbursed in 2014, and (c) the Council of Europe Development Bank, which has approved 7.67 million EUR in loans to finance housing and financing for SMEs. Together, these creditors may be able to provide around 386.03 million EUR, including funds that have already been agreed (i.e., an additional 117.09 million EUR) compared to the baseline of 0.61 billion EUR required in 2014. However, even with these additional financing sources, based on the RNA estimates, there remains an unidentified financing gap of 1.7 per cent of GDP or 225.48 million EUR (\$315 million) (see Table 51).

Closing the remaining financing gap of 1.7 per cent of GDP will require additional resources of around 225.48 million EUR. These resources will have to come primarily from external sources as domestic markets are unlikely to be able to absorb additional public debt to compensate for lost revenue and increased spending needs resulting from the flooding. Other institutions considering crisis response include, among others, the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB) the EU, Kreditanstalt für Wiederaufbau (KfW), Norwegian Cooperation, Swiss Cooperation and the United Nations Development Programme.

<sup>34</sup> The public sector was estimated to need to raise \$120 million from domestic sources.

<sup>35</sup> This is in line with the standard GFS methodology.

Table 51- Pre and post flood estimated financing needs

	Baseline (pre-flood)	Post-flood		
	BAM Mil.	BAM Mil.	EUR Mil.	USD Mil.
<b>Financing gap</b>	<b>526</b>	<b>1196</b>	<b>610</b>	<b>854</b>
Identified financing	526	755	385	540
IMF	452	639	326	457
WB*	73	101	52	72
Other	0	15	8	11
<b>Unidentified financing</b>	<b>0</b>	<b>441</b>	<b>225</b>	<b>315</b>
Deficit (% GDP)	-2.0%	-4.5%		
Unidentified financing (% GDP)	0.0%	1.7%		
* In addition to what is shown here, in both the baseline and post-flood scenarios, only World Bank budget support is shown. Investment loans amounting to around \$211 million over 2014-15 are also planned by the World Bank Group for sectors such as energy, flood control, competitiveness and jobs, but are not presented in the above financing table.				

Financing needs could be even higher if reconstruction progresses faster than expected and estimations presented consider only financing needs in 2014. A faster than expected reconstruction effort would boost economic growth. However, to the extent that part of this will be undertaken by the public sector. Increased donor resources would be required in 2014 to meet the increased costs associated with faster reconstruction. Moreover, reconstruction will be a medium-term effort and international support will be required in 2015 and beyond.

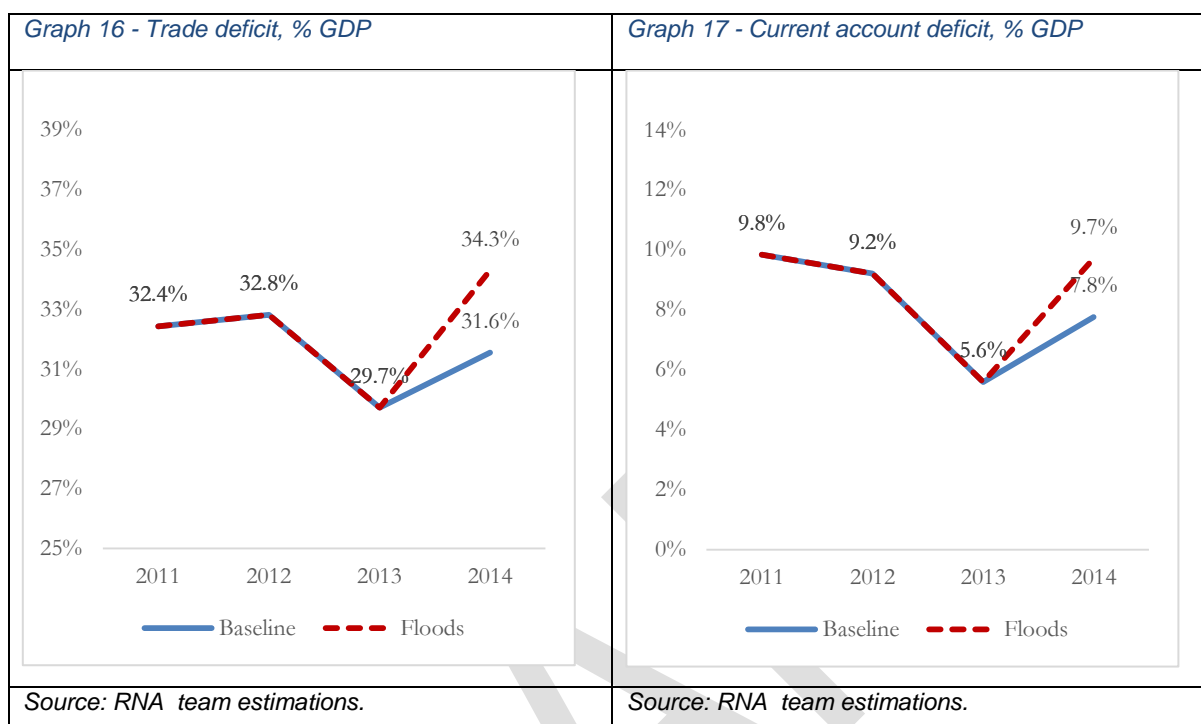
### 3.1.3 Balance of Payments

After two years of large current account deficits, the external deficit narrowed in 2013. The current account deficit narrowed from 9.3 per cent in 2012 to around 5.6 per cent of GDP in 2013 on the back of higher exports of goods. A blend of foreign direct investment (FDI), grants, foreign credit and remittances financed the external account in 2013. Remittances continued to be an important source of financial flows for BiH. In 2013, remittances in the narrow definition (workers' compensation and remittances) amounted to 10.5 per cent of GDP and in the broader definition (narrow definition plus private current transfers) to 15.8 per cent of GDP. Remittances have remained fairly stable over recent years although their trend expressed as a share of GDP has been on a slow downward path for a couple of years.

Even though a surge in exports supported modest recovery in the trade deficit in 2013, the impact of the recent flooding appears to have begun to reverse this trend in 2014 creating pressure for the trade deficit to widen. The balance of payments may also come under pressure as a result, particularly the current account deficit. Based on estimated losses in manufacturing and agriculture resulting from the flooding it is likely that exports will fall while imports will increase, as goods are needed for the reconstruction. It is projected that the trade deficit will widen from the baseline 31.6 to 34.3 per cent of GDP in 2014 (see



Graph 16) and that the current account deficit will also to widen from the baseline 7.8 to 9.7 per cent of GDP (see Graph 17).



### 3.1.4 Risks to the near-term Outlook

There are notable upside and downside risks to the near-term outlook. The projections for economic growth for 2014 are sensitive to the speed at which reconstruction happens.

- On the downside, failure to act quickly and disburse donor funds will slow growth further from the estimate of -0.7 per cent. Additional (to the already identified) donor resources are needed to close the unidentified fiscal gap. If these are not made available and not used quickly then economic growth will slow further.

On the upside, quick reconstruction will spur growth. However, it will also increase the need for donor resources to finance reconstruction funded through the public sector and will widen the external balances as imports increase faster in the short term. In the upside scenario, inflation could accelerate further from the baseline.

### 3.1.5 Key Model Assumptions

The RNA teams used a production-side national accounts growth model to estimate the overall macroeconomic impact of the flooding based on the damage and loss assessments undertaken by the sectoral teams.

**Baseline estimations:** A baseline (no floods) national accounts model was constructed with 19 national account sectors<sup>36</sup> plus FISIM<sup>37</sup> in order to derive the expected economic output and growth in 2014. The baseline scenario projected 2 per cent real economic growth, consistent with the latest forecasts of the IMF and World Bank. Export-driven manufacturing and agriculture as well as domestic wholesale/retail were the main growth drivers in the baseline scenario. The baseline fiscal accounts for 2014 were based on the latest IMF data and projected a fiscal deficit of 2 per cent of GDP.

**Flood-scenario estimations:** The flood scenario is based on the set of assumptions shown below.

- **Sectoral losses:** RNA sectoral teams estimated total losses in each of the main sectors impacted by the flooding. These losses-to-output were mapped to the national account model, termed the Disaster Response Macroeconomic Model (DReMM). Most sectors translated closely into the DReMM while others, such as 'livelihoods', were assigned to the industrial and service sectors where small and large businesses operate. This provided a provisional estimate as to the total loss of output in 2014 resulting from the shock.
- **Repair of damage:** While some sectors were hit badly others will likely see an increase in economic activity as a result of the reconstruction of damaged capital stock. Based on the damage caused by the flooding and the likely speed of reconstruction in each sector, the DReMM estimates an increase in economic activity in the construction and wholesale/retail sectors in 2014.<sup>38</sup> The additional economic activity, which would not have occurred in the baseline estimation, will help to moderate the economic shock resulting from the loss of output caused by the flooding.
- **Public revenue impact:** Based on preliminary indirect tax revenue data and discussions with relevant stakeholders, direct and indirect taxes appear to have been hit hard. The DReMM reduced the estimated revenue for 2014, based on the difference between 2013 and 2014 collections adjusting for non-flood-related effects (notably impact of tax from changes in the tobacco and oil sectors). Known donations totalling 11.25 million EUR were taken into account.
- **Public expenditure impact:** Public sector contributions toward the reconstruction effort in 2014 were estimated for each sector. In some cases this was high (e.g., transport) and in others comparatively low (e.g., housing). This additional expenditure above the baseline was assigned to public sector spending on goods

<sup>36</sup> The sectors are: agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; water supply; sewerage, waste management and remediation activities; construction; wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities; information and communication; financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities; public administration and defence; compulsory social security; education; human health and social work activities; arts entertainment and recreation and Other service activities.

<sup>37</sup> Financial intermediation services measured indirectly.

<sup>38</sup> The estimated import component for goods and services purchased for reconstruction was removed.

and services (25 per cent of the total) and non-financial assets<sup>39</sup> (75 per cent of the total).

- **Balance of payments impact:** A share of losses caused by the flooding, particularly in the agriculture and manufacturing sectors, were assumed to be directly transmitted into reduced exports (e.g., destroyed crops can no longer be exported). At the same time, damage caused by the flooding is assumed to reduce potential manufacturing and service output, some of which would have been exported, under the baseline. Sectoral RNA teams estimated the import component of damage repairs. This translates directly into the DReMM as increased imports. Remittances are expected to increase slightly as ex-patriots tend to respond to natural disasters by assisting family in their home country.

### 3.2 Simulated Poverty Impact of the flooding<sup>40</sup>

According to our estimates (see Table 52), the flooding has resulted in an increase in the share of families living in poverty based on the national methodology (absolute poverty)<sup>41</sup> of between 0.4 and 1.8 percentage points (equivalent to 4,134 to 18,602 families<sup>42</sup>). The difference between the two scenarios is driven by the assumptions made on the size of the shock to livelihoods in urban areas. The low scenarios replicate the effect of the job losses registered to date, while the high case assumes that all jobs considered at risk (in companies damaged by the flooding) are lost.

*Table 52 - Percentage of households living in poverty in BiH according to the baseline and High and Low case simulations*

	High case	Low case
Baseline	18.7	18.7
Summary of the simulations		
Mean	20.5	19.1

Table 53 includes detailed findings per entity. The effects at the entity level are not markedly different in terms of magnitude for both the high and low case, although the FBiH is slightly more affected in the high case and RS in the low case. The results for BD are more tentative given the limited number of observation covering the district.

<sup>39</sup> Known in previous public account methodologies as 'capital spending'.

<sup>40</sup> Prepared by Caterina Ruggeri Laderchi and Cesar Cancho, World Bank.

<sup>41</sup> The BHAS produces both absolute and relative poverty estimates. The estimates provided are based on the EHBS data for 2011 and the absolute poverty line.

<sup>42</sup> With an average number of people per family of 3.01 this roughly translates into 12,700 to 57,000 new individuals entering into poverty.

Table 53 - Percentage of households living in poverty in BiH in the baseline and High and Low case simulations, details by entity/district

	BIH		FBiH		RS		BD*	
	High case	Low case	High case	Low case	High case	Low case	High case	Low case
Baseline	18.7	18.7	18.4	18.4	19.9	19.9	10	10
Simulations	20.4	19.1	20.2	18.6	21.3	20.5	13.2	10
Increase in poverty (percentage points)	1.7	0.4	1.8	0.2	1.4	0.6	3.2	0
* Findings for BD are less robust than for the other entities as, even if the EHBS sample is representative for BD, there is a limited number of observations, which appears to affect the quality of our simulations.								

### 3.2.1 Methodology

A more detailed discussion of the methodology through which these estimates were obtained is provided below.

- We do not have poverty estimates at the local (municipality) level for BiH that would allow a clear identification of the poverty impact of the flood. The Extended Household Budgetary Survey (EHBS) was the only representative survey by entity and by urban and rural areas.
- As we could not exactly map the areas affected by the shock to the survey, we have simulated random shocks using a technique called 'bootstrapping'. This involves replicating a simulation more than several hundred times to replicate the distribution of possible outcomes. The results presented correspond to the mean of the distribution, in other words our findings suggest that on average shocks such as those we simulated in a population such as BiH would result in the impacts we present.
- A number of assumptions were made to identify the size of the shocks to be simulated.
  - We assumed that rural incomes were affected mostly by damage to agriculture whereas urban incomes were mostly affected by job losses.
  - As poverty in the country is measured in terms of consumption but the EHBS also contains detailed income information, we have transposed income shocks into consumption shocks by assuming that the latter drops by the same assumed percentage as income.
  - In rural areas we assume that (a) families cultivate plots close to their homes and (b) all families that reported damage or their destruction to their homes are likely to have experienced significant damage also to their crops. This might prove to be an underestimate if the floods damaged crops without significantly damage to houses; however, no information to refine these assumptions was available based on the impact on the ground.

- For urban areas, we assumed shocks equivalent to the reported job losses and therefore obtained two scenarios: a low case incorporating only job losses that have already been manifested and a high case that reflects the effects of the loss of all jobs deemed to be 'at risk'.

### 3.2.2 Results

#### Simulation 1: High case

##### *Simulated Shock 1a*

This simulation sets a reduction in consumption that is equivalent to the reduction in income when agricultural income falls to zero (as a percentage). The shock is assigned randomly to rural households (in a percentage equal to the percentage of rural dwellings affected by the floods).

FBiH	3.9%
RS	6.0%
BD	0%

##### *Simulated Shock 1b*

This simulation sets a reduction in consumption equivalent to the reduction in income when income from labour (wages and salaries) falls to zero (as a percentage). The shock is assigned randomly across urban employees (the percentage of employees affected is equal to the percentage of employees at risk of losing or already lost their job).

FBiH	11.4%
RS	7.7%
BD	21.9%

The results shown in tables 54 and 56 include the simultaneous effect of both shocks. The reported results are obtained after 1,000 iterations.

#### Simulation 2: Low case

##### *Simulated Shock 2a*

This simulation sets a reduction in consumption equivalent to the reduction in income when agricultural income falls to zero (as a percentage). The shock is randomly assigned to rural households (in a percentage equal to the percentage of rural dwellings affected by the floods).

FBiH	3.9%
RS	6.0%
BD	0%

### *Simulated Shock 2b*

This simulation sets a reduction in consumption equivalent to a reduction in income when income from labour (wages and salaries) falls to zero (as a percentage). The shock is assigned randomly across urban employees (the percentage of employees affected is equal to percentage of employees who already lost their job).

FBiH	0.8%
RS	0.4%
BD	0.7%

The results shown in tables 55 and 57 include the simultaneous effect of both shocks. The reported results are obtained after 1,000 iterations.

*Table 54 - HIGH CASE - Poverty rates after simulation (at the household level) – overall and with different breakdowns for households self-employed in agriculture*

		HH Type			
	All	HH not self-employed in agriculture [1]	Self-employed agricultural hh [1]	HH not self-employed in agriculture [2]	Self-employed agricultural hh [2]
Baseline	18.7	17.2	29.8	17.6	26.4
<b>Summary of results</b>					
Mean	20.5	18.9	32.4	19.2	29.3
Std. Dev.	0.15	0.15	0.54	0.15	0.54
NB - The findings are broken down according to two definitions of self-employed agricultural households: (1) households with any member working in agriculture and (2) households with any income from agriculture.					

*Table 55 - LOW CASE - Poverty rates after simulation (at the household level) – overall and with different breakdowns for households self-employed in agriculture*

		HH Type			
	All	HH not self-employed in agriculture [1]	Self-employed agricultural hh [1]	HH not self-employed in agriculture [2]	Self-employed agricultural hh [2]
Baseline	18.7	17.2	29.8	17.6	26.4
<b>Summary of results</b>					
Mean	19.1	17.4	31.9	17.7	28.8
Std. Dev.	0.07	0.05	0.49	0.04	0.50
NB - The findings are broken down according to two definitions of self-employed agricultural households: (1) households with any member working in agriculture and (2) households with any income from agriculture.					

Table 56 - HIGH CASE - Poverty rates after simulation (at the household level) – overall and with different breakdowns for households self-employed in agriculture – per entity

		HH Type			
	All	HH not self-employed in agriculture [1]	Self-employed agricultural hh [1]	HH not self-employed in agriculture [2]	Self-employed agricultural hh [2]
<b>FBIH</b>					
Baseline	18.4	16.8	32.8	17.2	30.5
Summary of results					
Mean	20.2	18.7	34.9	18.9	32.7
Std. Dev.	0.16	0.17	0.63	0.16	0.67
<b>RS</b>					
Baseline	19.9	18.5	27.4	19.1	23.5
Summary of results					
Mean	21.3	19.5	30.6	20.0	27.0
Std. Dev.	0.20	0.18	0.85	0.16	0.80
<b>BD*</b>					
Baseline	10.0	10.4	5.6	10.6	4.9
Summary of results					
Mean	13.2	13.8	6.5	14.0	5.7
Std. Dev.	0.69	0.75	1.69	0.76	1.49
<p>NB - The findings are broken down according to two definitions of self-employed agricultural households: (1) households with any member working in agriculture and (2) households with any income from agriculture.</p> <p>* Please Note: The urban shock in BD was too small to result in a discernible impact in the simulations. In addition, in the High case scenario the distribution of simulations outcome is not normal but bimodal. Although the results presented are for the average outcome, this appears less likely than an overall increase to either 12 or 14 per cent.</p>					

Table 57 - LOW CASE - Poverty rates after simulation (at the household level) – overall and with different breakdowns for households self-employed in agriculture – by entity

		HH Type			
	All	HH not self-employed in agriculture [1]	Self-employed agricultural hh [1]	HH not self-employed in agriculture [2]	Self-employed agricultural hh [2]
<b>FBIH</b>					
Baseline	18.4	16.8	32.8	17.2	30.5
Summary of results					
Mean	18.6	17.0	34.3	17.3	32.2
Std. Dev.	0.07	0.05	0.53	0.04	0.58



<b>RS</b>					
Baseline	19.9	18.5	27.4	19.1	23.5
Summary of results					
Mean	20.5	18.7	30.1	19.1	26.5
Std. Dev.	0.15	0.10	0.79	0.04	0.75
<b>BD *</b>					
Baseline	10.0	10.4	5.6	10.6	4.9
Summary of results					
Mean	10.0	10.4	5.6	10.6	4.9
Std. Dev.	0.00	0.00	0.00	0.00	0.00
<p><i>NB - The findings are broken down according to two definitions of self-employed agricultural households: (1) households with any member working in agriculture and (2) households with any income from agriculture.</i></p> <p><i>* Please Note: The urban shock in BD was too small to result in a discernible impact in the simulations (and the rural shock is 0 according to our assumptions). In addition, in the High case scenario the distribution of simulations outcome is not normal but bimodal.</i></p>					

## PART 2: THE RECOVERY STRATEGY

### 4. SUMMARY

#### 4.1 Recovery Needs

##### 4.1.1 Agriculture

The sector recovery will align with the main government priorities for the agriculture sector.

The Agriculture Recovery Plan will be based on:

- an immediate response to address urgent needs to maintain and restore productivity in the sector and the income of the affected population;
- transition from Relief to Development interventions in the medium-term; and
- development interventions with a strong focus on DRR and CCA as well as EU approximation in the medium and long-term.

The *Build Back Better* approach will be mainstreamed in the medium and long-term, although in some cases it will have to be introduced during the recovery phase.

##### 4.1.1.1 Vision and Guiding Principles

Floods and other disasters such as landslides and drought are recurrent issues facing the country, bringing significant devastation, hindering economic performance and depriving communities of their assets, livelihoods and labour force.

An adequate response to floods must not only meet the urgent recovery needs but also address the underlying vulnerabilities as urgent.

Farmers affected by floods need support in order to facilitate a speedier recovery, re-establish their normal livelihoods and enhance their resilience to future shocks.

Going forward, for long-term resilience building in BiH, there is a need for a comprehensive framework for recovery to not only guide recovery from the current flood disaster but also build towards disaster risk reduction in the future.

The sector recovery will align with the main government priorities for the agriculture sector. The 4 main priorities of the country for agriculture and rural development are outlined in the 'Strategy of Development of Bosnia and Herzegovina 2010-2014'. The priorities and measures developed by this document aim to strengthen the general coordination of capacities at the state level and enable gradual harmonisation of policies and measures needed to meet the conditions for EU and WTO membership and increase

competitiveness of agriculture and develop rural areas. These priorities are presented below.

- Priority 1: Establishment of a functional institutional capacity and implementation of the mechanisms for agriculture and rural development at all levels.
  - Measure 1: Development of human resources in the existing institutions.
  - Measure 2: Establishment of institutions missing in agriculture and rural development.
  - Measure 3: Harmonisation of the agriculture sector and rural development with EU standards.
- Priority 2: Improve competitiveness in production, processing and trade whilst raising quality and safety standards along the food chain.
  - Measure 1: Invest in agricultural properties/organisations and in the modernisation of the existing and construction of new capacities for processing and finishing of agricultural products.
  - Measure 2: Organisation of farmland.
  - Measure 3: Establishment and improvement of cooperation on the production and processing of agricultural products.
  - Measure 4: Support the introduction of a quality control system.
  - Measure 5: Support to organizations of agricultural producers;
  - Measure 6: Aquaculture industry policy for the improvement of the domestic and export market.
- Priority 3: Preservation of nature and the rational management of natural resources.
  - Measure 1: Support for measures aimed at environmental protection.
  - Measure 2: Support for measures aimed at the protection of biodiversity and the sustainable use of genetic resources.
- Priority 4: Improvement of living conditions and introduction of greater diversity in income generation into the rural economy.
  - Measure 1: Improvement of the rural infrastructure.
  - Measure 2: Support for the development of rural, particularly women's, entrepreneurship.
  - Measure 3: Support for the production of geographically specific brand-name products.
  - Measure 4: Promotion of rural tourism.

### 4.1.1.2 The Sector Recovery Plan

#### 4.1.1.2.1 Prioritisation and Sequencing

The Agriculture Recovery Plan will be based on:

- an immediate response to address urgent needs to maintain and restore productivity in the sector and the income of the affected population;
- transition from Relief to Development interventions in the medium-term; and
- development interventions with strong focus on DRR and CCA as well as EU approximation in the medium and long term.

The *Build Back Better* approach will be mainstreamed in the medium and long term, although in some cases it would have to be introduced during the recovery phase.

However, in addition to direct support with in-kind or cash grants, it will be necessary to address the indebtedness of farmers and agro-businesses through grace periods and/or the staggering of their debt over the short-term, combined with subsidised loans at low interest rates in order to allow for the medium-term development of the sector.

#### *Immediate Response*

Agricultural areas that require rehabilitation include some 5,000 Ha of land submerged for more than three weeks. These agricultural areas are located mainly along the Sava and Drina rivers.

The emergency animal feed provided by the authorities will most likely last until mid-June. Farmers are keen to preserve their most valuable animals; however, partial commercial destocking (up to 50%) is evident for those farmers most affected.

The interventions will have to be designed so as to have an impact on the local economy and employment market. Use of a voucher system and/or cash grants would allow affected farmers to access services for mechanised land preparation (ploughing, harrowing and sowing) as well as to combine harvester, silage or hay makers at harvest time as well as to hire the relevant labour force they might need but could otherwise not afford.

Lost assets such as storage facilities (barns, silos, cold storage, etc.), farm buildings (stables, animal pens, etc.) and lost equipment would have to be rehabilitated improved and restored. Similarly, damage to farm roads would have to be repaired and improved thus allowing for a reduction in production and marketing costs.

Rehabilitation and improvement of the irrigation network constitutes a priority, although some programmes funded by the World Bank were ongoing prior to the floods. The

resumption and completion of such programmes should address the irrigation needs. However, individual small-scale irrigation, especially in hilly areas (i.e., reservoirs and ponds) would need to be developed.

The DRR approach to agriculture needs to be implemented as soon as possible and would consist of four thematic pillars: (i) enable the environment, (ii) watch to safeguard, (iii) apply prevention and mitigation measures and (iv) prepare to respond.

If it is obvious that the rehabilitation, strengthening and improvement of management of flood defences is essential then specific measures contributing to DRR/CCA for agriculture should include the following:

- strengthen the capacity of the Meteorological Institutes to provide enhanced climate information and early warning services tailored to the needs of agriculture;
- improve local capacity to utilise and interpret early warning messages and weather forecasts for enhanced disaster preparedness in the agriculture sector;
- develop policy recommendations that address the overall sources of risk to communities;
- strengthen the capacity of the ministry of agriculture in the area of post-disaster damage assessment for the agriculture, livestock, fishery and forestry sectors;
- strengthen the response capacity at all levels (state, entities and the local level) through Contingency Planning and Emergency Response Preparedness;
- enhance Land Use Planning, social, economic and environmental development planning, including reforestation, sustainable management of forests, watershed/river basin management at the national and regional level;
- develop participatory risk management plans involving the population at the municipal level;
- build the capacity of the ministry of agriculture and extension services in relation to agricultural practices, including agricultural building design, for improved disaster risk reduction and management (DRR/M) and CCA and for piloting and dissemination through the extension services; and
- improve the awareness of the population on DRR/M and CCA.

The table summarizes what is considered an appropriate recovery plan for the sector.

### ***General Recovery Plan Agriculture for affected farms***

<b>All Farms</b>	<b>Immediate response June to December 2014 Recovery</b>	<b>Medium-Term 2015-2016 Recovery and BBB</b>	<b>Long-Term 2017 onwards BBB</b>
	The most affected farmers who lost crops, livestock and facilities (in at least 15 villages). The still submerged assets and facilities indicate that the agricultural season for these farmers has ended. With few sources of income and rising costs for recovery and investment for the next season, the most affected population will desperately need additional income. The need for income paired with the needs of the clean-up effort (which will last for years), indicate the need for a cash-for-work approach.	Most of the farmers (apart from those fully affected) remain credit viable and with some support can recover the damage caused to their households, mechanisation and agricultural production. Any intervention that will help reduce interest rates would be welcome.	<p>Modernise the approach to agriculture taking into consideration the risks of floods and the possible mitigation mechanisms.</p> <p>Set flood plans and areas to be inundated in the event of breaches in order to save the most valuable infrastructure and communities.</p> <p>Set up compensation schemes and policies.</p>

### ***Agriculture Recovery Plan for Productive Sub-sectors***

#### ***Crops***

Within the crops sector, priority in the short-term will be given to the restoration of the production capacity for cereals (wheat and maize) and fodder crops and horticulture. The revitalisation and replanting of orchards will also be essential, although at least 2-3 years will be necessary to recover the pre-disaster situation in term of production capacity. Inter-cropping and short cycle production would have to be developed until production can be resumed.

<b>Crops</b>	<b>Immediate response June to December 2014 Recovery</b>	<b>Medium-Term 2015-2016 Recovery and BBB</b>	<b>Long-Term 2017 onwards BBB</b>
Cereal (Wheat and Maize)	Provision of seeds, fertilizers and voucher schemes/cash grants for access to services for land preparation, harvesting and silage making.	Provision of seeds, fertilizers and voucher schemes/cash grants for access to services for land preparation, harvesting, silage making (for the most vulnerable). Subsidised credit for more	Crop diversification Climate Change Adaptation

		commercial farmers. Crop diversification.	
Fodder crops	Provision of fertilizers and seeds to revive meadows productivity. Voucher schemes/cash grants for access to services for hay/silage making.	Provision of seeds and fertilizers. Voucher schemes/cash grants for access to services for land preparation, harvesting and silage making (for the most vulnerable). Subsidised credit for more commercial farmers. Crop diversification.	Crop diversification Climate Change Adaptation
Horticulture	Seeds, fertilizers, phytosanitary products, small tools and sprayers. In-kind and cash grants for the re-establishment of greenhouses. Cash grants for labour.	Seeds, fertilizers, phytosanitary products, small tools and sprayers. In-kind and cash grants for the re-establishment of greenhouses. Cash grants for labour. Promotion of producers organisations and support for agro-processing. Adapted credit and insurance schemes.	Crop diversification Climate Change Adaptation  Strengthening Producers organisations.  Enhancement of the value-chains in line with EU approximation.
Orchards	Rejuvenation of affected orchards that are still productive (fertilizers, phytosanitary products, cash grants for labour).  Replanting of orchard (vouchers for land preparation, seedlings, fertilizers, posts and iron wire, etc).	Rejuvenation of affected orchards that are still productive (fertilizers, phytosanitary products, cash grants for labour).  Replanting of orchards (vouchers for land preparation, seedlings, fertilizers, posts and iron wire, etc).  Promotion of producers organisations and support to agro-processing.  Adapted credit and insurance schemes.	Strengthening Producers organisations.  Enhancement of the value-chains in line with EU approximation.

### **Livestock**

Restocking of livestock should strictly target the most vulnerable households for which these cattle represent a significant and essential source of income.

Most commercial dairy farms and meat production farms have the capacity to recover pre-disaster levels without any support in term of restocking. However, a small number of the



most affected households (500-1,000 HHs) that have lost all of their assets need support to restock in order to reach pre-flood levels.

The commercial farms would need financial support to clean repair and improve their buildings and equipment. Matching-grants, cash grants, relevant credit and insurance schemes could constitute an appropriate response to these specific needs.

The strategy for recovery in relation to cattle, small ruminants and pigs would aim at maintaining the existing stock until the resumption of production and availability of fodder. Fodder production is addressed in the paragraph above related to crops.

Poultry, rabbits and bees would have to be restocked, as they often constitute an important source of income for small holders and vulnerable households. Start-up kits would allow a quick resumption of production and income generation for targeted households.

<b>Livestock</b>	<b>Immediate response June to December 2014 Recovery</b>	<b>Medium-Term 2015-2016 Recovery and BBB</b>	<b>Long-Term 2017 onwards BBB</b>
Cattle	<p>Sustain livestock through concentrate animal feed and veterinary drugs.</p> <p>Support for fencing and rehabilitation/adaptation of stables and animal pens.</p> <p>Repair damaged buy-off stations / lacto freezers.</p>	<p>Support for fencing and rehabilitation/adaptation of stables and animal pens.</p> <p>Implementation of Good Agricultural Practices related to manure and animal dejection collection.</p> <p>Support to processing business and enhancement of the value chains.</p> <p>Promotion and support of producers' organisations and inter-professional organisations.</p>	<p>Enhancement of the value-chains.</p> <p>Enhancement of production, processing standards and marketing in line with EU approximation.</p>
Small ruminants and pigs	<p>Sustain livestock through concentrate animal feed and veterinary drugs.</p> <p>Support for fencing and rehabilitation/adaptation of stables and animal pens.</p>	<p>Support for fencing and rehabilitation/adaptation of stables and animal pens.</p> <p>Implementation of Good Agricultural Practices related to manure and animal dejection collection.</p> <p>Support to processing businesses and enhancement of the value chains.</p> <p>Promotion and Support to producers organisations and</p>	<p>Enhancement of the value-chains.</p> <p>Enhancement of production, processing standards and marketing in line with EU approximation.</p>

		inter-professional organisations.	
Poultry and rabbits	Provision of start-up kits (animals, animal feed, vaccination, pen, etc).	<p>Implementation of Good Agricultural Practices related to manure and animal dejection collection.</p> <p>Support to and enhancement of the value chain and marketing.</p> <p>Promotion and Support to producers organisations and inter-professional organisations.</p>	<p>Enhancement of the value-chains.</p> <p>Enhancement of production, processing standards and marketing in line with EU approximation.</p>
Bees	Provision of start-up kits (beehives, colonies, extracting equipment and small tools).	<p>Provision of start-up kits (beehives, colonies, extracting equipment and small tools).</p> <p>Promotion and support to producers organisations and inter-professional organisations. Support to and enhancement of the value chain and marketing.</p>	<p>Enhancement of the value-chains.</p> <p>Enhancement of production, processing standards and marketing in line with EU approximation.</p>

### ***Fisheries/Aquaculture***

The damage and losses in the aquaculture sector have been rather limited. However, it is important to allow a quick resumption of the production capacity through direct recovery assistance and financial support for the rehabilitation and restocking of the fish farms. Adequate measures from in-kind assistance for restocking and the provision of fish food and cash, grants and vouchers for the rehabilitation of the fish farms (cleaning, repairs and improvement) have to be implemented over the coming six months to recover the pre-disaster production capacity. In the medium-term, similar to other sub-sectors, promotion of and support for producers organisations and inter-professional organisations, measures targeting the enhancement of the value-chain as well as production, processing and marketing standards in line with EU approximation have to be implemented in the medium and long term.

### ***Forestry***

Most of the damage occurred in the public sector since forests are mainly government managed. The damaged occurred mostly to forest roads and forestry machinery. Specific assistance to clean and remove debris and dead trees and through CFW and cash grants repair or replace forestry machinery will be essential to restore productivity in the sub-

sector. In addition, such recovery efforts will constitute an opportunity to support employment in the affected rural areas.

In application of the principles of BBB, interventions in the forestry sub-sector will aim to enhance sustainable forest management, reduce deforestation and enhance reforestation where possible. Improved forestry management will help to counteract the occurrence of flash floods, thus contributing effectively to DRR.

#### 4.1.1.3 Costing

The overall recovery and reconstruction is estimated at 45.45 Million EUR (20.45 Million FBiH, 23.63 Million RS and 1.37 Million BD), of which 43% (19.54 Million EUR) is for immediate response and early recovery needs; 34% (15.46 Million EUR) for the rehabilitation of the sector in the medium-term; and 23% (10.45 Million EUR) for the long term.

Needs for medium to long term *build back better* and DRR/DRM/CCA are estimated 6,135,502.57 EUR mainly for institutional capacity building and strengthening at the state, entity and municipal levels, including capacity building and population awareness.

More than 87% of the overall requirement for restoring production relate to the agriculture sub-sectors (cereals, fodder crops, vegetable and fruits).

The needs to cover reconstruction, including *build back better* and flood proofing are estimated at 8,180,670.10 EUR (included in recovery costs).

Table 58 – Agriculture – reconstruction needs (in EUR)

Sub-sector	Total
Crops	9,364,939.69
Fodder crops	961,574.88
Vegetables	12,761,110.63
Orchards	6,316,241.70
Berries	1,152,224.38
Livestock	2,292,406.80
Aquaculture	76,693.78
Forestry	1,948,946.48
<b>Total Recovery Production Capacity</b>	<b>34,874,138.35</b>
Machinery & Equipment	327,906.31
Greenhouses & Buildings	773,073.32
Farm roads	1,286,983.02
<b>Total reconstruction</b>	<b>2,387,962.66</b>
<b>Total to recover to the pre-disaster level</b>	<b>37,262,100.49</b>
Measures for Employment	1,022,583.76

Flood proofing	1,022,583.76
<b>Total BBB</b>	<b>2,045,167.52</b>
<b>DRR/DRM/CCA</b>	<b>6,135,502.57</b>
<b>Total</b>	<b>45,442,770.59</b>

It is assumed that a certain amount of self-recovery will occur through recourse to self-financing, grace periods for the payment of inputs, bank loans and social solidarity. Details of this assumption are shown below.

- Crops: out of the 25,000 households (HH) affected, 12,500 HH will be most in need of assistance (estimated for 2 ha of cereal).
- Fodder: 50% self-recovery.
- Vegetables: 40% self-recovery.
- Orchards: 50% will require total replacement and 40% rejuvenation.
- Greenhouses: 50% will be self-replaced (self-recovery).
- Berries: 40% self-recovery.
- Livestock: affected households will replace (self-recovery) 50% of cattle, pigs, poultry and beehives.
- Machinery and Equipment: 50% of the damaged items will be self-repaired or replaced (self-recovery).

#### 4.1.1.3 Structure

Most of the needs will have to be addressed in the short and medium term through early recovery and rehabilitation interventions, although there will be a need for continued support for the sector in the long-term through the development of oriented interventions.

The needs timeline is summarised in the table below.

Table 59 - Agriculture - needs timeline (EUR)

	SHORT-TERM	MEDIUM-TERM	LONG-TERM
Recovery Production	14,995,879.50	11,857,206.91	8,021,051.93
Reconstruction	1,026,823.91	811,907.48	549,231.27
Measures for Employment	439,711.02	347,678.48	235,194.27
Flood Proofing	439,711.02	347,678.48	235,194.27
DRR/DRM/CCA	2,638,266.11	2,086,070.88	1,411,165.59
<b>TOTAL</b>	<b>19,540,391.55</b>	<b>15,450,542.23</b>	<b>10,451,837.33</b>

The needs per entity/district along the timeline are summarised hereafter.

*Table 60 - Agriculture - needs timeline per entity/district (EUR)*

	ST	MT	LT	Total
FBiH	8,793,176.30	6,952,743.85	4,703,326.98	<b>20,449,247.12</b>
RS	10,161,003.26	8,034,281.61	5,434,955.49	<b>23,630,240.36</b>
BD	586,211.99	463,516.26	313,555.37	<b>1,363,283.11</b>
<b>TOTAL</b>	<b>19,540,391.55</b>	<b>15,450,542.23</b>	<b>10,451,837.33</b>	<b>45,442,770.59</b>

#### 4.1.1.4 Implementation Arrangements

##### ***Partnerships, Coordination and Management***

There is no Ministry of Agriculture at the state level in Bosnia and Herzegovina. Each entity has its own ministry of agriculture. The Ministry of Foreign Trade and Economic Relations of (MOFTER), which is a state-level institution, is responsible for the coordination of the agriculture sector at the state level.

MoFTER, in close collaboration with the respective entity ministries of agriculture, will be responsible for overall coordination of the implementation of the recovery plan in the agriculture sector.

As for monitoring and evaluation, it is recommended that a steering committee be established to periodically review and advise on progress on implementation of the recovery plan in the agriculture sector.

It will be essential to implement programmes rapidly linking Relief to Development in line with the country strategies for poverty reduction, agriculture and rural development as well as EU approximation.

##### ***Cross-sectoral Themes related to the Sector***

Gender and age will be mainstreamed in the design of recovery and medium/long term interventions.

There are obvious links to Livelihood, Natural Resource Management and Employment within the agriculture and rural development recovery strategy.

Infrastructure such as irrigation and roads along with energy recovery measures will play a key role in the recovery of the sector as well as on rural development.

The main cross-sectoral theme relates to Disaster Risk Reduction and management. Given the specificities of the agriculture sector, tailored measures will have to be included in the various existing plans as well as those still to be developed.

### ***Resource Mobilisation and Funding Mechanisms***

Resource mobilisation will derive from the main donor conference introducing the PDNA.

The Government will mobilise resources from its own budget and through international financial institutional grants or credits.

Banks and insurers would have to be mobilised and involved because they are envisaged as part of the response.

Lastly, international organisations and NGOs will develop relevant programmes to be submitted to donors for funding.

The proposed steering committee for the implementation of the recovery plan for the agriculture sector would play a key role in identifying funding gaps and in addressing the donor community for necessary financial support for the recovery plan.

### ***Key Assumptions and Constraints***

Despite the fact that BiH has favourable climatic conditions, agricultural production remains underdeveloped and consequently domestic production in the country for the majority of products cannot meet the local requirement. There is substantial room to improve productivity through the utilisation of new technology and improved organisation of the sector.

As 20.6% of all employment in BiH is in the agriculture sector it is assumed that agriculture will remain an important sector for employment, regardless of the decline in the working-age population in rural areas and the declining share of agriculture in terms of Gross Domestic Product (GDP). Agriculture as a sector will remain crucial to BiH in maintaining employment in rural areas, providing food, safeguarding viable rural societies and infrastructures and maintaining traditional rural landscapes. Maintaining viable rural societies would be impossible without agriculture, particularly in remote sparsely populated areas that lack business potential and market opportunities.

The agriculture sector in BiH faces a broad range of constraints in both the input and output markets, which is likely to continue over the coming years. Farmers in BiH pay more for their inputs and receive less for their outputs, relative to their equivalents in neighbouring markets. Low output prices are a result of market failures, such as low bargaining power, the lack of post-harvest facilities for storage and packaging, fragmented supply chains, costly logistics, and limited access to affordable finance. This situation

dampens productivity and affects competitiveness, as limited access to modern inputs makes it more difficult for farmers to export their produce and to participate in modern supply chains.

Institutional constraints also prevent the BiH agriculture and food sectors from reaching their full potential. Despite access to the EU market through preferential trade agreements, BiH is not reaping the full benefit of this favourable treatment due to the absence of EU-compliant food safety institutions and an EU-compliant regulatory framework.

Public spending in BH's agriculture sector is relatively low and funds are not targeted at areas that generate the most growth. Sixty percent of agricultural expenditure in BiH goes on production subsidies, while only a small share of the already limited budget is allocated to services, research and extension services, market infrastructure and natural resource management.

Fragmented land ownership and the poor functioning of land markets also pose a constraint to farmers in BiH.

Lastly, climate change is expected to have an increasingly intense impact on agriculture over the coming decades in BiH. The current institutional set-up is not prepared to support the sector in adapting to these changes.

These constraints will have to be taken into consideration and addressed when designing the relevant programmes, in order to *build back better* the agriculture sector.

#### **4.1.1.5 Assessment Methods**

The description of the current situation in the agriculture sector is based on data provided by the BiH statistical offices, at all levels, supplemented by available cantonal and municipal data.

The assessment team used data from the respective entity ministries of agriculture and the Brcko District Department for Agriculture as baseline data.

The team used figures obtained from the entity ministries, based on municipal surveys they conducted, as post disaster data.

Similarly, the data on animal losses is based on the findings of the state veterinary agency and veterinarian services in the municipalities cross-referenced with data from the ministries.

However, the team noticed that official state level data and calculations were sometimes inaccurate and therefore to some extent unreliable. In light of this, the team did its best to establish a realistic statistical basis for the analysis based on its own research and data sources.



This data resulted from field visits carried out by the FAO team to flooded areas (covering around 75% of affected municipalities) in the FBiH and RS and included the whole of Brcko District. The FAO team collected as much data as possible during these field visits and then compared it with the data received from the ministries.

The result of all these calculations was then cross-referenced with various statistics, reports and stakeholders in order to confirm their overall plausibility.

The Assessment Team for Agriculture (see the team composition in Chapter 2) held three coordination meetings during the data collection phase in order to validate the collected data and identify any gaps as well as plan follow-up activities.

'Damage' includes totally or partially destroyed equipment, buildings and greenhouses, hectares of damaged crops, the number of dead animals and the kilometres of farm roads either totally or partially destroyed.

'Losses' expresses the decrease/loss of productivity of the surviving animals and the remaining crops.

- Surviving animals: losses estimate the decrease in productivity due to stress, disease and reduction in proper feeding.
- Remaining crops: losses estimate the decrease in yield according to the time of submersion, the status of the remaining crops and the possible impact of likely fungal diseases.

The calculation is based on standard production costs, the value of the equipment and materials, the value of the animals and animal products (i.e., milk), and grains, and the average yield and production. The respective line ministries at all levels provided and jointly agreed upon these standards.

Extensive and regular consultation with the focal points in the respective ministries of agriculture and other relevant services was maintained throughout the process.

It is essential to mention that all counterpart entity ministries were extensively and continuously consulted and informed about the process and results of the data analysis. The respective counterparts in each entity and Brcko District approved all of the data submitted for the presentation to the governments.

### 4.1.2 Energy

#### 4.1.2.1 Reconstruction and Recovery Strategy

The recent flooding has shown the vulnerability and high exposure of the energy sector in the country. The next steps in the recovery effort should be aimed at increasing the resilience of power utilities to worst-case scenarios. Therefore, a carefully planned reconstruction and recovery strategy is of the utmost importance.

Reconstruction and recovery strategy recommendations for all affected utilities in BiH are divided into short and medium term periods, specified in accordance with the time required for execution of the respective activities.

Short-term recommendations encompass period of up to 12 months, with focus on the below activities.

- **Provision of meters and the safe energising of the transmission and distribution systems** as quickly as possible, in order to help both utilities and customers (reduction in supply losses, prevention of consumption miscalculations). As this is an emergency operation, some equipment was energised after high-pressure water cleaning and rust-prevention spraying without replacement, while some switchgears and transformers were bypassed because of drive mechanism malfunction, a lack of spare inventories and parts. Water intrusions have inevitably led to insulation breakdowns and therefore the utilities should consider replacement of such equipment as soon as possible in order to secure reliable electricity supply and public safety.
- **Recovering the generation supply capacity** through temporary measures such as supplying coal from unaffected coalmines and removing water from the flooded mine.
- **Rapid restoration of the transmission and distribution network:** Immediate measures aimed at assisting power utilities to reduce losses due to lower electricity demand and non-metering of electricity. At the same time, customers are to be enabled to restart regular business operations.
- **Rehabilitation of the damage and destruction endangering high, medium and low voltage systems,** which were the most affected and constitute the highest priority. Some of them are located in areas affected by landslides and thus immediate measures for their recovery are required.
- **Restore the inventory** of equipment and spare parts that used in the emergency phase through bulk purchase.
- **Rehabilitate the small hydro power plants** and facilities managed by public utilities and independent power producers.

- **Rehabilitate affected business premises** in order to allow for continue uninterrupted business operation.
- **Ensure the restoration of all affected facilities to operation with better disaster resilience capacity:** rehabilitate and rebuild affected infrastructure and assets taking into account flood and landslide protection measures.
- **Explore lowest-cost options to minimise damage to the existing energy system assets in the future.** Consider the relocation of substations and assets in low lying areas and steep slopes and new applications such as universal cable application, which is more resistant to water and silt, and installation of SF6 medium voltage blocks at substation TS.
- **Review emergency procedures for future floods and insurance coverage** through new practices such as contingency plans, emergency funds, insurance coverage etc., in order to better prepare for future events.

Medium term recommendations encompass periods of between 13 and 24 months, with focus on the below activities.

- **Relocate of key facilities to new locations away from known flood areas.**
- **New design parameters and/or practices for energy infrastructure and assets** to improve performance and resilience. Some activities should include:
  - i. rethinking the design of various distribution network assets and redundancy for the overall system;
  - ii. installation of performance power line disconnectors with remote control; and
  - iii. interpolation (installation) of new substations to reduce technical losses and provide a more reliable supply.
- **Provide emergency equipment and material inventory** such as mobile substations strategically located across the territory for easier and faster access for immediate repair and reparations following extreme events.

Reconstruction and recovery efforts should be linked to existing development and growth strategies.

- **Reconstruction/rehabilitation and construction of new power distribution facilities:** short-term growth goals will be most affected, as resources will be

diverted towards the unexpected recovery of the low/mid voltage network and substations.

- **Reconstruction of calculation measurement points and AMM:** there has been an expected slowdown in the introduction of remote reading and control of power meters (AMM system) into the power distribution system.
- **Connection of new consumers/producers to the distribution grid:** due to financial constraints of the affected population, the utility companies expect a reduction in demand and a reduction in applications for new connections and a related increase in indirect costs due to lower energy consumption.

#### 4.1.2.2 Resilience

Given the current level of exposure and vulnerability of the energy sector, interventions should occur at different levels in order to increase the overall resilience of the sector. This resilience will be developed and strengthened over time and over a range of activities: governance (cross-boundary cooperation for river management) and planning (land use planning), flood protection measures at the watershed level and sector specific interventions. The objective is to strengthen the sector's ability to provide continuity of service and the speed of recovery to return to normal operations following an extreme event.

Taking into account factors such as the ageing profile of the infrastructure and assets, the governance structure of the sector, the impact of climate change and the topographic features of the country, the resilience strategy should be built around the following lines of action:

- better understanding of future flood risks with improved hazard data near energy sector assets and the identification of those assets at risk;
- development of response options, including review management practices, physical/structural options and a review of plant design parameters; and
- investment prioritisation through the conduct of cost/benefit studies on different options, the establishment of a risk management strategy and a review of the investment portfolio for adjustments.
- 

Some of the activities considered for integration into the reconstruction and recovery plan are to:

- conduct risk assessment studies (hydrological and geological studies, exposure assessment);

- revise the emergency operations plans;
- provide on-site flood protection measures if assets cannot be relocated and where the grid has been affected by landslides build back better through rerouting;
- assess and ensure slope stability for coalmining where flooding and landslides have occurred (active draining, construction of retaining walls, etc.); diversion of water around coalmine concessions (ring ditch, evacuation channels, etc.); and
- create more resilient energy applications such as phasing out the 35 kV voltage level, installing performance power line breakers with remote control, etc.

#### 4.1.2.3 Reconstructions and the Recovery Plan

Recovery strategy recommendations for all affected utilities in BiH, as presented in the tables below, are divided into short and medium term recovery periods and specified in accordance with the time required to execute specific activities. All of the utilities involved have indicated the requirements in order to address their needs in the coming period. The overall recovery and reconstruction needs in BiH are estimated at 64.12 million EUR.

The following two tables present the short and medium term reconstruction and recovery needs in BiH.

*Table 61 - Energy short-term reconstruction and recovery needs*

Category	Activity	Up to 12 months (in 000 EUR)						
		EP BiH	EP HZHB	EP RS	ED BD	TRANSCO	Oil	Total
<b>Coalmining and Generation</b>	Cleaning and drainage	4,974.87	-	-	-	-	-	4,974.87
	Repair of riverbanks and slope stabilisation	2,080.96	-	-	-	-	-	2,080.96
	Repair and rehabilitation of facilities & equipment	18,933.14	-	-	-	-	-	18,933.14
	Purchase of new equipment	373.24	-	-	-	-	-	373.24
	Rehabilitation of small power plants	240.31	-	-	-	-	-	240.31
<b>Transmission</b>	Reconstruction of the high voltage grid		-	-	-	1,487.86	-	
<b>Distribution</b>	Re-establish	148.27	1,523.65	4,376.66	51.13	-	-	6,099.71

	meters and customer connections							
	Rehabilitation of the low and mid voltage network	1,201.54	766.94	4,509.59	700.47	-	-	7,178.54
	Repair transformers and substations		-	4,397.11	25.56	-	-	
	Restore inventory and repair facilities	1,063.49	-	-	40.90	-	-	1,104.39
	Ensure supply to customers	853.86	-	-	-	-	-	853.86
<b>Oil sector</b>	Cleaning		-	-		-	110	
	Emergency repair and rehabilitation		-	-	-	-	60	
	Review the master design		-	-	-	-	10	
	Repair of equipment		-	-		-	1,850	
<b>Resilience</b>	Risk assessment studies	623.78	-	-	15.34	-	-	639.11
	Resilient applications	1,513.42	-	-	383.47	-	-	1,896.89
	Flood protection		-	-	-	-	500	
<b>TOTAL</b>		<b>32,006.87</b>	<b>2,290.59</b>	<b>13,283.36</b>	<b>1,216.87</b>	<b>1,487.86</b>	<b>1,293.57</b>	<b>51,579.12</b>

Table 62 - Energy medium-term reconstruction and recovery needs

Category	Activity	13 to 36 months (in 000 EUR)						
		EP BiH	EP HZHB	EP RS	ED BD	TRANSCO	Oil	Total
<b>Coalmining and Generation</b>	Cleaning mines	388.58	-	-	-	-	-	388.58
<b>Transmission</b>	Reconstruction of the high voltage grid		-	-	-	127.82	-	127.82
<b>Distribution</b>	Repair transformers and substations		444.82	-	-	-	-	444.82
	Restore inventory and repair facilities	644.23	-	-	-	-	-	644.23
<b>Oil sector</b>	New reservoir design		-	-	-	-	153.39	153.39

	New reservoir & equipment construction		-	-	-	-	4,090.34	4,090.34
<b>Resilience</b>	Risk assessment studies	102.26	-	-	-	-	-	102.26
	Resilient applications	6,002.57	-	-	332.34	-	-	6,334.91
	Asset relocation		-	-	245.42	-	-	245.42
<b>TOTAL</b>		<b>13,960</b>	<b>7,137.63</b>	<b>444.82</b>	<b>-</b>	<b>577.76</b>	<b>127.82</b>	<b>4,243.72</b>



### 4.1.3 Transport

#### 4.1.3.1 'Build Back Better' Reconstruction Needs

Without detailed survey information, not only topographical, it is extremely difficult to estimate both the actual damage figures and the ensuing reconstruction costs, including resilience in the face of increased risks and the need to build back better. To build back better must take into account the requirements to prevent a similar disaster affecting the same areas and population. In order to strengthen the assets to resist this type of disaster in the future more resistance in flood protection at the rivers must be undertaken.

In many instances, it is not possible to protect fully as not only would the cost be prohibitive but also, in certain cases, simply not be possible or practical (e.g., raising long lengths of railway embankments). Yet it is possible to undertake certain measures that may reduce the damage to the assets significantly.

The following could be undertaken for the road and railway networks:

- raise embankments;
- widen embankments, to give them more mass to resist flows;
- lessen the gradient of embankments, to make them less prone to damage from the high velocities;
- construct embankments using geogrid reinforcement;
- protect the embankments i.e., use rocks to protect the toes and the sides;
- make use of balancing culverts where the embankments cross the flood plains;
- install wider culverts where streams pass through the embankments;
- increase the span lengths or number of spans where a road or railway crosses a major river; and
- provide better drainage at the top and bottom of cuttings.

In the case of major problems, such as landslides, the possible solution is to either design and rebuild roads in the same location following detailed site investigation, monitoring and design methodology or, if possible, build on a different alignment. Both options depend on the cost comparison and risk analysis.

The solution to avoid disasters for ports in the future is to have better river defences. As a port has to connect to a river, this may not be practical unless gates/barriers are set between the river and the docks.

Solutions for communications and the post are limited in terms of building back better as they rely on river defences addressed by another sector.

Therefore, the amount needed for build back better should be based on the figure for the damage. Given the nature of hazards and the pre-disaster vulnerabilities, a reasonable figure is 35%. This percentage will vary across subsectors, given the different characteristics and exposure. In the case of telecommunications, the increase necessary

for building back better would far less than 35% but for the road and rail sector it would be higher, and would vary in landslide or flood prone areas. Recommendation is made for **lump sum allocation of 92,032.54 EUR** for Build Back Better.

#### **4.1.3.2 Improvement Measures**

##### ***Landslides***

All major landslides that affect transport assets should be surveyed/analysed to ascertain if they can be controlled/made stable. If they cannot or the cost to do so would be prohibitive then alternative designs should be considered.

##### ***Roads adjacent to major rivers (erosion damage)***

There have been many instances where roads have been constructed on the available space adjacent to rivers. In most cases, there has been some form of erosion control using retaining walls and gabion baskets; however, due to the increase in flow many of these have been overtopped or washed away. A better solution when rebuilding would be to:

- increase the height of the protection wall or height/thickness of the gabion baskets;
- increase the strength of the walls so that they are able to withstand the flows and velocities based on increased design needs; and
- move the road away from the river, which may largely reduce the need to contain the flows. Any work to prevent the river over topping its banks should be done in consultation with flood prevention specialists.

##### ***Road and rail embankments washouts***

The obvious answer for road and rail networks constructed through the various flood plains and damaged or destroyed by the recent floods is to build them back at a higher level. Yet as it would cost far too much this solution is not practical. For example, to raise the height of a railway embankment over the area of damage would probably mean increasing the height for several kilometres in each direction and this is just not practical. Some localised increase in height may be possible but a better solution would be to:

- increase the height of the riverbanks, although it may be impractical to contain the river for every flood situation;
- increase the mass of the embankments i.e., make them wider;
- use grid-reinforced high strength material for embankment construction;
- strengthen the slopes using rocks for protection;
- reduce the slopes from approximately 1 in 2 to 1 in 3 or less (depending on space);
- use balancing culverts to allow the floodwater to pass more easily from one side to the other.

### ***Bridges and culverts***

Many bridges, 20 were reported during the site visits/surveys (?) have been destroyed or have become unusable. In general, when rebuilding an improvement would be to:

- increase the spans to cover the flood width;
- improve protection to the abutments;
- improve the foundation design for piers and abutments;
- construct flood relief culverts within the flood plain;
- improve the watercourses both upstream and downstream to reduce the possibility of torrents; and
- construct more culverts through embankments on the flood plains (balancing culverts).

### ***Areas of embankment or cutting failures***

On the M17 highway, which is probably typical of many others in the region, several local slips were evident. Each of these will need to be studied individually but a typical solution could be to have a gabion retaining wall at the bottom of the cut slope to stop material going onto the road, while cut off drains should also be installed at the top of the cutting to prevent surface water from running over the slope.

### ***Tunnels***

Tunnels (road and rail) in the affected areas might not have been reported as damaged simply because they have not been inspected. In the rail sector, if trains were not running due to damage elsewhere on the network there would be no perceived need to undertake inspections. However, if a tunnel is in a similar state to the one at Vranduk, on the M17, then it is recommended that a visual inspection is undertaken. If damage is found then further investigations should be carried out and structural analysis undertaken in order to propose work to restore the tunnels to full structural integrity.

### ***General***

Consideration should be given to non-motorised users (NMU) for all highway and road reconstruction/improvements. This should include the provision of footpaths where possible, building laybys for bus stops and providing dedicated crossing places in villages and towns. The majority of the women in rural areas do not drive and these extra provisions may improve their well-being.

### 4.1.3.3 The Sector Recovery Plan

The Transport and Communications sector recovery plan is probably one of the most important as many of the other sectors rely on transport. In general, the plan should incorporate the following:

- removal of debris and landslip material etc. from roads and railways. Cleaning the affected areas would be quick and relatively inexpensive and enable transport, thus allowing the economy to regain momentum. This should be done according to the priority main, regional and then local network;
- repair minor damage, once again in the priority of main, regional and local;
- conduct surveys in all landslide areas affecting transport assets (other landslide areas will also need to be surveyed by other sectors) including damages to tunnels, bridges and culverts;
- design the proposed new/replacement railway line or highway and the associated landslides; and
- construct reinforced/ more resilient replacement assets.

The communications and postal sectors will undertake their own recovery plan, which to some extent will be dependent on the highway sector.

The process of full reconstruction will not be quick and each area of damage will need to be prioritised. Major highways should be dealt with first but any villages that are cut off should have a temporary access constructed.

In summary, the reconstruction needs amount to 353.38 million EUR. The immediate recovery needs were included in the damage estimates. The table below summarises the division between the entities and BD and the suggested timeline for the short, medium and longer term.

*Table 63 - Estimated reconstruction needs for the communications sector*

000 EUR	SHORT TERM	MEDIUM TERM	LONG TERM	TOTAL
<b>TOTAL</b>	<b>70,675.88</b>	<b>141,351.75</b>	<b>141,351.75</b>	<b>353,379.38</b>
FBiH	30,516.97	61,033.93	61,033.93	152,584.84
RS	38,419.49	76,838.99	76,838.99	192,097.47
BD	139,612.34	279,224.68	279,224.68	698,061.69

#### 4.1.3.4 Organisation for Recovery and Reconstruction

The Ministry of Transport and Communications of BiH at state level together with the respective ministries in the two entities as well as the relevant authorities in Brcko District will be responsible for implementing the recovery package. In the case of the FBiH, the plan will need to be coordinated with the respective cantons and in RS with the municipalities in order to prioritise the work required in each of their jurisdictions. The entities will be responsible for the recovery measures to the railway network and to the main highway network. As damage to the infrastructure covers a large area it may not be practical for the entities to attempt to undertake the studies separately but rather in liaison with the Ministry of Transport of BiH at state level.

#### 4.1.4 Water and Sanitation

##### 4.1.4.1 Reconstruction and Recovery Needs, including Disaster Risk Reduction (Build Back Better - BBB)

The restoration of basic water supply and sanitation services in the flood-affected area was relatively fast: in the majority of affected communities, it took less than one week to bring water supply systems back into function and around two weeks to restore drinking water quality standard supply. The only exception within this timeframe appeared in areas where there was physical damage to the water supply structures resulting from landslides. However, such cases were minimal and related mostly to smaller rural settlements. They did not cause any interruption of the water supply for a significant portion of the population. Interruption of wastewater services was due to slightly different reasons. The existing wastewater systems in the affected areas are mostly mixed flow gravity systems and therefore, in addition to direct damage, silt deposition inside the pipes hindered service delivery. However, it was possible to clear these deposits and so did not prevent the restoration of wastewater services as soon as the waters receded from these areas.

Based on the collected data, field visits and surveys, it can be concluded that two weeks after the withdrawal of the floodwater, water supply and wastewater services were fully re-established in the largest part of the affected areas. Approximately 9.31 million EUR will be needed to fully restore the water supply and sanitation infrastructure and resume full service delivery at an improved standard and quality. The following table summarises the reconstruction and recovery needs for the water supply and sanitation sector and provides a breakdown per entity/district and timeframe.

*Table 64 - Water and sanitation reconstruction and recovery needs by timeframe (in millions EUR)*

	<b>Total Recon. Needs</b>	<b>Short-term Recon. Needs</b>	<b>Med-Term Recon. Needs</b>	<b>Total Recovery Needs</b>	<b>Short-term Recovery Needs</b>	<b>Med-term Recovery Needs</b>
FBiH	2.69	2.22	0.47	1.44	0.67	0.77
RS	2.18	1.81	0.37	2.09	1.32	0.77
BD	0.57	0.46	0.11	0.33	0.08	0.26
<b>TOTAL BiH</b>	<b>5.44</b>	<b>4.49</b>	<b>0.95</b>	<b>3.86</b>	<b>2.07</b>	<b>1.79</b>

##### 4.1.4.2 Reconstruction Needs: Infrastructure and Assets

The total cost of the restoration of water supply and sanitation services to pre-disaster levels in BiH is estimated at 5.44 million EUR. In non-profit orientated service provision such as water supply and sanitation the costs of the damage derives from and represents a market based reconstruction cost. Recovery costs represent two different categories. The first relates to the cost of cleaning, including networks, objects, equipment and buildings. The second relates to lost revenue, including (a) lost revenue due to the interruption in services, (b) lost revenue due to the inability to charge customers for delivered water, (c) water delivered free of charge using water tankers and (d) water used

for streets and other public washing needs. Those costs were calculated based on known water prices (tariffs), known per capita water consumption, the known duration of service interruption and the known labour and fuel costs.

The cost of potential BBB activities was calculated based on market prices of equipment and labour, and represents the BiH market reference value.

Infrastructure reconstruction and assets repair needs include:

- (i) repairs to pumping stations, water treatment plants and reservoirs;
- (ii) repair and reconstruction of administrative offices and laboratory structures damaged by the floodwater, including replacement of laboratory and office supplies and furniture;
- (iii) reconstruction and replacement of pipes and structures damaged by landslides; and
- (iv) replacement of all electronic parts, such as motors, controls and measuring and communications equipment.

#### **4.1.4.2.1 Needs for BBB and DRR**

The operations of Water Sanitation Systems (WSS) in BiH are at a reasonably developed level and as such are not much different technologically from those in more the developed countries of the EU. As the level is already reasonably high, there is a limited level of technological improvement that could still be achieved during reconstruction. The relative resilience of the WSS systems to flooding has been proven by the quick service restoration seen after the end of the current flooding and by the comparatively small damage that the WSS suffered. It can be concluded therefore that BBB possibilities in the WSS sector are relatively limited and primarily linked to better planning and preparation of emergency procedures and stockpiling of water sensitive spare parts.

#### **4.1.4.3 Recovery Needs: Service Delivery and Production, and Access to Services and Goods**

The total cost of WSS recovery, including the cost of cleaning and revenue lost through the inability to deliver services and/or decreased demand for service is estimated at 3.86 million EUR.

##### **4.1.4.3.1 Restore Service Delivery and Production Capacity and ensure Access to Services and Goods**

Service restoration activities for water supply services included increased chlorination (0.8-1.0 ml Cl/l) over a 5-10 day period in order to ensure disinfection of the distribution system (during that time the system was delivering 'technological' water) and overall cleaning costs and temporary drinking water distribution by water tankers.



For wastewater services, service restoration activities included the cleaning of wastewater pipes with water from jet-blaster drain cleaners or similar devices, and the removal of accumulated silt and dirt from facilities. It is important to note that these activities can normally be done while the system is in operation as level of deposits only limits but does not prevent the functioning of wastewater systems.

### **Priority needs for BBB service delivery and production of good, and access to services and goods**

As previously explained, BBB possibilities are limited due to the relatively technologically advanced level of service provision and therefore improvement priorities do not relate to rebuilding but rather to the preparation of adequate emergency planning for such events. Defining clear roles and responsibilities as well as producing standard guidelines for speedy restoration of services will help the responsible agencies restore the service to drinking water quality at an even faster rate in the event of similar future flood events.

#### **4.1.4.3.2 Governance**

Water utility companies that operate water supply and wastewater systems in BiH are municipally owned (with the exception of Sarajevo and Brcko that are owned by the canton) and controlled companies and their field of activity in most cases also covers the provision of other municipal services. The weaknesses of such arrangements are well known and, as such, companies tend to be inefficient in operation and underfunded due to the low level of municipally set water tariffs. Regulation of water services, benchmarking and the gradual imposition of EU cost recovery tariffs requirements could drive the WSS sector in BiH towards more efficient operation, but this process will still take some time.

#### **4.1.4.3.3 Restoring and/or Strengthening Governance Capacity, including DRM**

The level of governance in BiH water utilities is usually below the level required to provide efficient services and would therefore benefit from capacity building and support for institutional strengthening. It is also necessary to improve the collection systems for water supply and sewage services, and pass regulations to legalise illegal connections and local water supply systems to contribute towards ensuring the commercial sustainability of the service provision.

Regional water supply and watershed management studies can be conducted and costs can be kept low by coupling with the recommended studies proposed for strengthening flood protection systems (see the flood protection and DRM chapters). Joint management will be crucial to deliver services and maintain effective low-cost water supply and sanitation systems.

#### 4.1.4.3.4 Priority Needs for BBB Governance and DRM

Regardless of the size of the utility, commercial efficiency of the water utility remains one of the main issues for utility operation in BiH. Bringing improvements in the commercial efficiency of utilities through preparation of solid business plans, addressing selected commercial issues such as collection management, establishing a transparent billing system and responsive customer relationship is essential for any future improvement of utility efficiency and sustainability. Business planning and financial management preparation of annual or annual/multiannual business plans, which is the norm in the more commercial segments of the services market, has only just started to enter the water utility sector. With the adoption of long-term investment and service provision commitment, often asking for long term financial commitments, the necessity of proper business planning is becoming increasingly evident. Client Orientation Changes across the entire political-economic environment in the region has led to a more client-orientated approach to water service delivery that could significantly increase the quality and efficiency of operation. However, in a large number of BiH water utilities client-orientation is still in its infancy and there is no clear understanding of the importance and benefits of a proper client-orientated approach.

#### 4.1.4.3.5 Risks

##### 4.1.4.3.5.1 Addressing Pre-existing and New Risks related to the Disaster

The risks that floods pose to the WSS systems are limited and mainly linked to the danger to the electrical parts of pumping and monitoring equipment as well as office buildings and office equipment and furniture. Otherwise, the WSS infrastructure is by its nature reasonably resilient to moderate flooding and only susceptible to serious damage through landslides, which can only affect a small part of the infrastructure such as pipelines.

#### 4.1.4.3.6 BBB: Reduce Risks and Vulnerabilities for Future Disasters

Increased resilience of the WSS infrastructure to floods could be achieved through the positioning of larger structures, such as reservoirs, at locations that are not subject to potential landslides. Other set of measures are those mainly aimed at reducing the impact of floods. These include the storage of critical water sensitive spare parts in advance in a safe place (so the replacement and restoration of services is faster) and development of procedural manuals in case of flooding that define the roles and responsibilities of different stakeholders during flood warning and response periods.

The future development of the WSS systems should be based on the findings of a comprehensive multi-hazard risk analysis with particular focus on landslide risk, especially when extending service to communities in areas of known risk.

#### 4.1.4.4 Vision and Guiding Principles

National development plans in the field of WSS are mainly linked to the achievement of a certain level of service coverage (in both water supply and wastewater) and requested level of environmental protection and improvement (for wastewater). There is no direct link between those objectives and flood protection or damage, but it is obvious that further development and expansion of the water and wastewater infrastructure will increase the potential level of damage for future floods.

#### 4.1.4.5 The Sector Recovery Plan

##### 4.1.4.5.1 Prioritisation and Sequencing

Activities can be divided into two stages, described below.

**(i) Short-term activities** in the WSS sector are linked to the initial restoration of basic WSS services (technological water). They include the following: (i) emergency replacement of damaged structures and equipment, (ii) reestablishment of energy supply, (iii) chlorination of the network to ensure disinfection of the water supply system and sampling to confirm the results, and (iv) the cleaning of wastewater pipes to enable basic wastewater flow. This set of activities is expected to last 7-14 days. Other short term activities are linked to the restoration of service quality to the pre-disaster level. They should include (i) a reduction in the chlorination level to the standard residual Cl level (0.3-0.5 mg/l), upon confirmation that the water delivered is of the applicable standard for drinking water; (ii) reestablishment of the WSS control and monitoring network, to enable optimisation of service provision; (iii) performing pressure tests and checking the level of losses and watertightness and (iv) complete cleaning of wastewater pipes followed by a CCTV review of the network to identify potential damage. This set of activities is expected to last for 15-30 days.

**(ii) Medium-term activities** have the objective to take the level of service provision and system resilience to above the pre-flood level. This should include (i) necessary physical repairs and upgrades of the system (including civil engineering works, and pumping equipment upgrades), (ii) upgrading the resilience of remote sensing and management systems, by elevating sensitive parts to higher levels; (iii) safe storage of key sensitive equipment spares, (iv) storing sufficient quantities of cleaning material and equipment, and (v) preparation of an emergency warning and response plan for the WSS services. The timeframe for this set of activities should be 1-5 months, but could take significantly longer (depending on the size and needs of the system).

## 4.1.5 Flood Protection

### 4.1.5.1 Reconstruction and Recovery Needs, including Disaster Risk Reduction (Build Back Better - BBB)

This section describes the need for reconstruction and recovery, distinguishing between the need to restore infrastructure and assets to pre-disaster levels and address the immediate effects and those needs that will reduce vulnerabilities and make government and communities more resilient in the future.

*Table 65 - Flood protection reconstruction*

Flood protection differences	Total	Short term	Medium term	Long term
<b>TOTAL reconstruction</b>	183.45			
<b>FBiH</b>	84.31	19.99	25.72	38.60
<b>RS</b>	91.57	20.76	27.05	43.26
<b>BD</b>	7.57	2.91	1.99	2.66

### 4.1.5.2 Flood Risk Management Overview

The management of risks caused by natural hazards needs to be undertaken in an integrated manner, to maintain such risks at a level that is acceptable to society and avoid transferring vulnerability to others. Integrated risk management incorporates all measures that contribute to a reduction in the damage caused by natural hazards. These include, for example, emergency management during disasters, the maintenance of protective structures (dykes, pumps, erosion control etc.), the creation of new structures (retention areas, improved channels, pumps etc.) and the maintenance of non-structural elements such as protective forests.

Essentially, there are only two possible strategies for improving flood protection:

1. measures to influence the extent of damage (reducing potential damage); and
2. measures to reduce the danger (reducing hazard potential).

### 4.1.5.3 Reconstruction Needs

#### 4.1.5.3.1 Infrastructure and Assets

The flood protection assets suffered very little damage: many remain operational while others are undergoing repairs to return them to operation shortly.

Figure 18 - Reconstruction of the Drina levee near Bijeljina



The damage caused to flood protection assets is listed below together with a brief description of the reconstruction work needed.

### ***Dyke and Dam Reconstruction***

Dyke and dam reconstruction incorporates:

- infilling of breaches with suitable material,
- compacting, profiling and re-establishing protective vegetation,
- full visual inspection of dykes to identify the damaged locations,
- cutting back and refilling damaged sections,
- profiling and re-establishing protective vegetation, and
- repair damage to dams particularly critical safety features e.g., spillways.

### ***Reinstate River and Canal Profiles and Repair Erosion Protection***

Repair damage to erosion protection systems replacing with like systems. Stabilise the toe to prevent further erosion and loss of the erosion protection, fill the eroded sections of the channel with suitable material and re-profile and re-establish the protective vegetation. Incorporate temporary protective measures where necessary in order to prevent damage while the vegetation is established. Remove deposited sediments to a suitable nearby site outside of the floodplain and of a stable profile. If contaminated take steps to ensure the

material does not pose a hazard to people or the environment. Profile and re-establish vegetation at the disposal site.

### ***Torrents Open Profiles and Sediment Management***

Landslides, erosion and sediments deposits measures would include:

- soil bio-engineering protection of erosion prone areas,
- cleaning and opening the flow profiles (sediments and driftwood),
- stabilisation of torrent beds with a system of check and retention dams .e.g.,
- debris flow protection barriers and
- regulation of the channel on alluvial plains.

### ***Reconstruct Torrent Banks and Dams***

Inspect and then repair damaged protection structures to return them to functional condition (base on hazard estimation for the entire torrent catchment).

### ***Stabilise Landslides***

Landslides, erosion, sediment deposits measures to stabilize slopes entail:

- soil bio-engineering protection of erosion prone areas,
- cleaning and opening the flow profiles (sediments and driftwood),
- stabilisation of torrent beds with a system of check and retention dams .e.g.,
- debris flow protection barriers and regulation of the channel on alluvial plains and
- maintenance of riparian forest and afforestation.

### ***Repair Pumps***

Make temporary and then permanent repairs to equipment.

### ***Gauging Station Reconstruction***

Construct new stations including structures and new equipment at a level that is not susceptible to flooding so that the equipment functions throughout a flood aiding forecasting and emergency response.

#### 4.1.5.3.1.1 Restore to Pre-disaster Costs

The cost to restore the damaged assets are shown in the table below.

Table 66 - The costs to restore the damaged assets

Item	Costs mil EUR
<b>Repair Damage</b>	
Dyke and dam reconstruction	4.09
Reinstate river profiles and repair erosion protection	12.32
Reinstate canal profiles	8.87
Torrent open profiles and sediment management	6.67
Reconstruct torrent banks and dams	12.35
Stabilise landslips	6.16
Repair pumps	1.20
Gauging station reconstruction	2.54
<b>Data collection</b>	-
Dykes survey	0.21

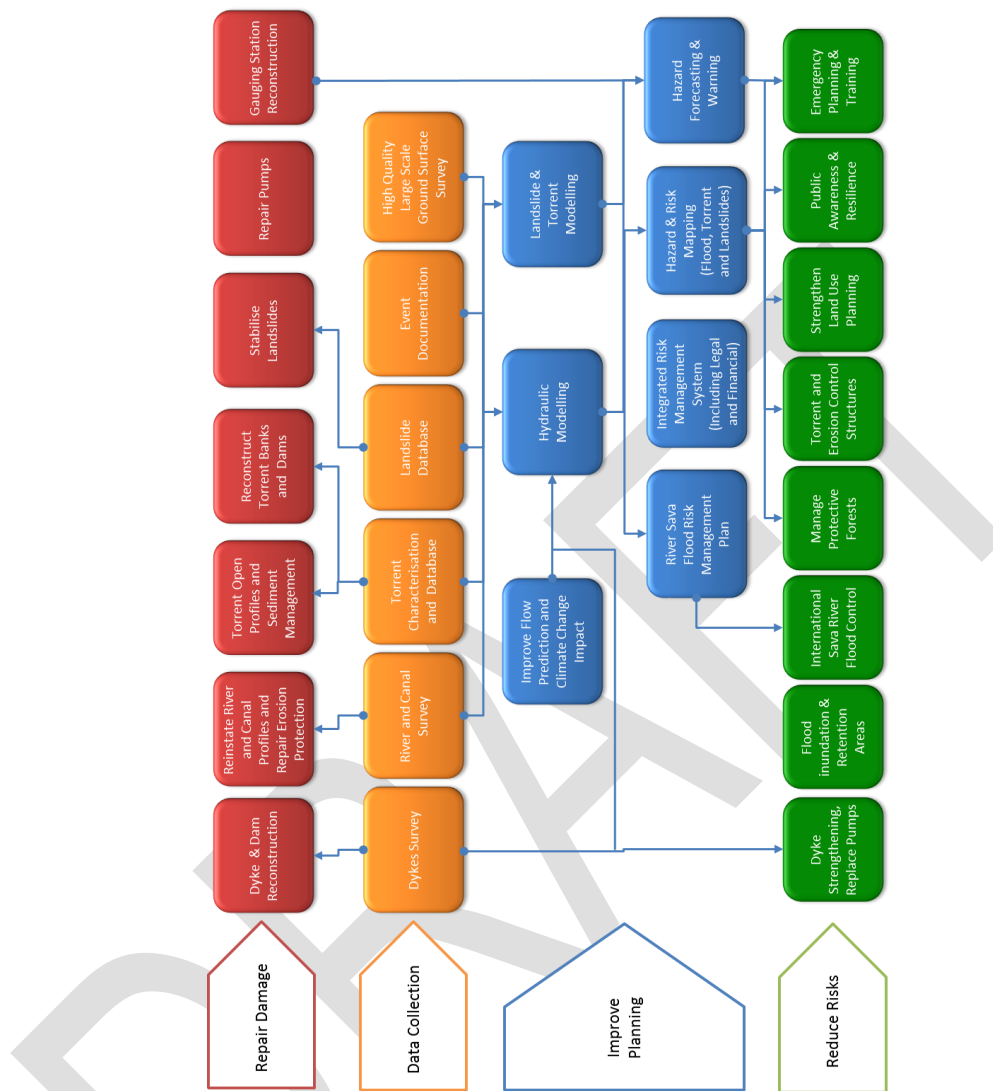
#### 4.1.5.3.1.2 Disaster related Needs for BBB and DRR

To reduce the risk of future flooding to housing and all other infrastructure additional measures of flood risk management should be undertaken. These risk reduction measures will not only reduce future damage but will also give investors' confidence by removing a substantial hurdle to further economic development in Bosnia and Herzegovina. In this context improvement of hazard management and spatial and emergency plans, and risk reduction measures (both structural and non-structural) are considered very important.

The chart below summarises the various activities and shows the primary links between them; each measure is described.



Graph 18 - Flood Risk Management Repair and Improvement Programme



To facilitate the development of all measures, good baseline data on the assets is essential. Therefore, the data collection activities below are recommended.

- **Dyke survey:** A detailed inspection and topographic survey of the flood dykes is required to aid both the assessment of flood hazards and to develop improved works. These surveys will identify low spots that require raising and weak points where strengthening is needed.
- **River and canal survey:** In order to update hydraulic models for flood risk assessment and to plan channel de-silting, detailed surveys of the river channels are needed. These surveys extend onto the floodplain in order to overlap the ground surface survey and can be combined with dyke surveys for efficiency. The

survey is necessary where data is missing, old or where the channel is known to have changed due to the floods.

- **Torrent characterisation and database:** An expert assessment of torrent catchments has to include all possible hazards emanating from torrents, landslides and erosion. Expert opinion is the basis for planning all further activities by mitigation torrent hazards. GIS-based data with a proper set of attributes gives an essential overview of the relationship between headwaters and river catchments. Torrents are sub-catchments in the headwaters of rivers and have a considerable influence on the ecological status, the water budget and the debris regime of the respective river system.
- **Landslide Database:** Slope movements can occur in the form of 'slow' creeping or gliding movements or in the form of 'fast' slides and slope type debris flows. The most frequent forms and has an immediate damaging effect through occurring deep-seated rotational slides or shallow translational slides (such as at Sirici). Slope movements frequently relate to springs and near-surface groundwater. A landslide database and susceptibility maps offer a quick and effective way to determine areas that people should not exploit or where it is known that any form of development would require special construction and other measures.
- **Event documentation:** The setting-up of and continual monitoring of natural hazards. The collection of event documentation for 2014 as part of the recovery is essential because all future studies will rely on this information to understand the natural processes and better estimate future hazards. This data should be collected immediately before marks are lost. The collected data should include water levels to show the extent of the flooding and detailed assessments of the natural phenomena and damage caused to different forms of objects and infrastructure.
- **Reconstruction of gauging stations:** During the 2014 floods water levels far exceeded the ability of the range of the gauging stations. In order to ensure that these stations can function throughout an event and to aid disaster management they should be reconstructed to a higher level.
- **High quality large scale ground surface surveys:** Ground surface levels are essential for evaluating flood risk. They are also exceptionally helpful in the pre-planning of improvement projects. Such data would benefit many other sectors. LiDAR, an aerial Laser scanning technique, can generate a high quality digital elevation and ground surface and would be suitable for this purpose. A significant benefit of this technique is that it avoids the need to send people into areas that may contain landmines. Ground truthing of the survey is needed in order to provide a vertical accuracy of 0.1 to 0.2m. The data resolution is typically 0.25 to 2m depending on the requirement. To maximise the value to the recovery and future development this data should be provided on a free license via an online portal.

The following activities will allow for better planning of flood risk management activities.

- **Improve flow and climate change impact predictions:** The hydrometric data on river flows is essential for the construction of quality hydraulic models and the management of flood risk. A review of the gauges is recommended to ensure the quality of this data, particularly the conversion between the height of the water (stage) and the river flow (discharge). Particular attention should be paid to very high flows and the application of advanced 2D modelling techniques is likely to be required to address the complications of these conditions during floods. A review of the hydrometric techniques being used should be undertaken and, if required, improved techniques developed. Coincident with this review, consideration should be given to the impact of climate change on river flows. Using the updated flow records from the gauging review, river flows should be design for a range of scenarios at a high number of output points. This should be established ensuring a consistent approach across the River Sava and its tributaries.
- **Hydraulic modelling:** To aid the production of improved hazard maps and the development of improved flood protection measures it is recommendable to use advanced models (that model flows across floodplains and represent the rising and falling limbs of the flood). The modelling should utilise the latest survey data (ground, dykes and channels) and updated hydrometric techniques.
- **Landslide and torrent modelling:** It should be emphasised here that the problem of landslides, torrents and erosion must be approached in a more systematic manner and with more expertise. This is because the consequences are immeasurable. It is difficult to provide adequate stability and functioning of regulated low-lying watercourses without paying greater attention and attributing greater significance to the complex regulation of the entire river basin, especially torrent catchments. Computer based process modelling has to be supported by documentation on past events, local knowledge and detailed field surveys.
- **River Sava Flood Management Plan:** The Sava River Basin Commission is producing a flood management plan and support from BiH is needed in order to advance this plan. Advancing this plan and its eventual implementation will reduce flood risk to all who live within the Sava's flood plains.
- **Integrated risk management system (including legal and financial):** All of the different parties involved in hazard mapping must be integrating and coordinated so that all possible opportunities to manage, communicate and mitigate the risks are taken.
- **Hazard and risk mapping (flood, torrent and landslides):** The development of high quality hazard maps is an important basis for land use and emergency planning. Torrent hazard zone-maps are the basis for the planning and implementation of torrent and erosion control measures. They are also essential for

ranking these measures according to priorities, which will ensure the optimal use of available resources. Locating development in threatened areas is still the best and most sustainable form of protection against natural hazards. These maps should meet the requirements of the floods directive. The hazard maps should be published online to aid flood awareness and local planning activities.

- **Hazard forecasting:** Effective and efficient early warning systems are required for disaster operations. An improved early warning systems enables better responses to be put into action quickly and improves safety for the public and civil protection staff. A single meteorological and hydrological forecast system for all of the countries that make up the Sava Basin would meet this aim. This system will require real time inputs from rain gauges, rain radar and river gauging stations. It would comprise of a metrological model to predict rainfall and a hydraulic model to forecast river flows and levels and the consequential impact on flooding and debris flow events. Where the damage potential of torrents is very high it is recommendable to establish and operate measuring equipment and monitoring systems for observation and early warning purposes (monitor the rain and water levels within their catchments and link these to the forecasting of events). Continuous improvement of the system will be necessary to deal with the inherent uncertainties in regional forecasting and to improve reliability.

The following activities will reduce risks by reducing the danger (hazard potential) or influencing the extent of damage (consequence).

- **Dyke strengthening and pumps repair:** Following the production of hazard maps the flood risk at some locations may be unacceptable. When this is the case plans should be developed to reduce the risks, for example, by constructing, raising or widening dykes or by constructing bypass channels. Care should be exercised in the production of these plans in order to preserve as much of the natural flood plain function as possible, both to preserve this important natural habitat and also to preserve the flood retention function of the floodplain. To avoid the risk of defences failing, consideration should be given to improving their resilience when overloaded. This could include, for example, the widening of flood dykes and reduction in the slope and possible reinforcement of the slope with geotextiles. Ongoing maintenance is an integral part of the defence, for example, dykes should be inspected, mown and settlement addressed. The continuity of human and financial resources is necessary even during 'quiet' times.
- **Flood inundation and retention areas:** Consideration should be given to the creation of flood retention areas within the land enclosed by dykes. These retention areas could be used to reduce the hydraulic load on the dykes and to store floodwater. By deliberately engineering structures to predefine where the water will flow in an over design situation damage can be reduced and emergency responses better coordinated. Optimising the control of artificial reservoirs and natural lakes should be examined to improve both flood protection and low-water regulation.

Ongoing maintenance to ensure that the control structures will function and that the built up sediments is removed is essential in order for retention areas to continue to function.

- **International Sava flood protection:** The development of a multinational approach to river control is needed for the Sava and this should be developed with the goal of minimising flood risks within the basin rather than for any single country.
- **Manage protective forests:** Forest in the hinterland of rivers has a significant effect on flood events and the transport of material. Forest vegetation intercepts and consumes water, improves filtration and retention of water in the forest floor, slows the melting and movement of snow, while the root systems prevent surface erosion. Forest reduces water runoff extremes in both drought and following heavy rainfall. Consequently, the impact of forest management is very important and unauthorised alterations in forest area have to be avoided in order to maintain the protection of the forests. Protective forests should be identified and supported by legislation. The establishment of best practice and procedures and the training of forestry staff as well as additional slope stabilisation measures will be needed at some locations within forest areas.
- **Torrent and erosion control:** Integrated water management begins in torrent catchments. BiH faces different forms of erosion, amongst which flash floods, torrent outbursts, extreme sediment transport and debris flows are usually rapidly and irregular evolving events that often lead to complex multi-hazard scenario combinations. Even if warning systems have been installed, the warning time is very short. Torrent control measures are implemented for this reason. Today, the modern system of torrent, landslide and erosion control measures comprise active and passive measures with permanent or temporary effects and special consideration of ecological compatibility and sustainability. The advantage of using 'living' construction material (bioengineering) aimed at preventing the erosion of loose rock and slopes has to be taken into consideration. Promotion of the protective effect of forests should be undertaken. When these forest engineering measures are successfully implemented re-forestation of torrent catchment areas and the stabilisation of erosion prone areas (scars) can take place. In torrential catchment areas, dams are built to stabilise the torrent bed against depth erosion and to retain sediments and woody debris. Furthermore, dams are used to retain the flood discharge and sediment transport as well as to 'break' the force of landslides. In densely settled areas, it may sometimes be necessary to develop a discharge section (regulation) or stabilise the banks. It is necessary to incorporate 'Life-cycle-management protection structures into the planning process! Landslides occur frequently in connection with water escaping from a slope and therefore the drainage of the sliding block is one of the most efficient techniques for slope stabilisation. Furthermore, technical protection structures like anchors, arrays of posts or barriers are used to give slopes the necessary stability. Only by constant maintenance in the torrents' hinterlands is it possible to maintain a suitable degree

of safety. 'Forgotten' and abandoned structures in the torrents hinterland can be a cause of even greater threat to downstream areas than if they were exposed to no protective structures at all! It is therefore essential that they are well and regularly maintained. Ongoing maintenance is an integral part of the defence. For example, important corridors along the torrents must be kept free in case of extreme events and dykes should be inspected. The continuity of human and financial resources is necessary even during 'quiet' times.

- **Strengthen land use planning:** Generally, there are technical and economic limits to each and every control measure. In some cases, it is better to leave the endangered area (de-settlement) and shift the residential area to a less threatened area (example, the intention of Brcko District to move 200 houses from the flood area). In any event, the future need for control measures can be avoided through precautionary spatial planning. The use of land needs to be carefully controlled to ensure that development and infrastructure is placed in appropriate zones. This will require a review of and possible modification of legislation as well as additional staff to implement planning control.
- **Public Awareness:** Public awareness of flood risk is essential in order to gain acceptance for the planning of new developments and to ensure they respond appropriately to residual risks. Individual responsibility should be encouraged on the part of those concerned, so that they take individual protective action or insure against loss. All opportunities to manage and minimise residual risks must be taken (e.g., property protection measures, and emergency planning and insurance). Communicating the risks associated with natural hazards to the local population is an essential contribution towards improved hazard awareness.
- **Emergency planning:** Utilising the hazard maps, a risk assessment should be undertaken and new emergency plans developed. A specific plan for floods is recommended, given the significant risk that they pose (e.g., emergency civil protection plans that consider the effects of breaches in dykes and the sudden onset of hazards, such as torrential outburst and landslides, should be prepared). These plans should address both flash and longer duration floods. They should contain a procedure for determining whether an emergency has occurred, provisions for training key staff and provisions to ensure that when exercising the plan it is effective. The plan should consider the response of multiple agencies, ideally cross border with the other Sava River Basin countries. An exercise should be held to test communications between and the responses of the agencies. After sensitive elements have been removed, the plan should be shared with the public to improve public awareness and co-operation.

#### **4.1.5.4 Recovery needs**

##### **4.1.5.4.1 Governance**

The number of technical staff within the local agencies is limited. In order to successfully deliver the recovery works additional engineers and scientists will be needed.

The governance of land use should be strengthened to ensure land use is compatible with the natural hazards. Measures to preserve and protect natural floodplains and protective forests are needed.

#### **4.1.5.5 Vision and Guiding Principles**

The guiding principles for flood management are described in the European Floods Directive (EFD) and the Water Framework Directive (WFD).

The Floods Directive requires Member States of the European Union to engage their government departments, agencies and other bodies to draw up a Preliminary Flood Risk Assessment to identify the areas at significant risk. This is then modelled in order to produce flood hazard and risk maps. These maps will include details on the flood extent, depth and level for three risk scenarios (high, medium and low probability). Flood Risk Management Plans should then be produced to indicate to policy-makers, developers and the public the nature of the risk and the measures proposed to manage these risks. The management plans are to focus on prevention, protection and preparedness. The Flood Risk Management Plans should ensure community buy-in and will require input from interested parties during their development. Flood risk management plans shall take into account the relevant environmental objectives of the 'Water Framework Directive'.

The Water Framework Directive of the European Union establishes a framework for community action in the field of water policy. It commits European Union Member States to achieve a good qualitative and quantitative status of all water bodies. One important aspect of the Water Framework Directive is the introduction of River Basin Districts. These areas are not designated according to administrative or political boundaries but rather according to the river basin (the spatial catchment area of the river) as a natural geographical and hydrological unit. As rivers often cross national borders, representatives from several Member States have to cooperate and work together on the management of the basin (so-called trans boundary basins). The river basins are managed according to River Basin Management Plans, which should provide a clear indication of the way the objectives set for the river basin are to be reached within the required timescale. The Directive aims for 'good status' for all ground and surface waters (rivers, lakes, transitional and coastal waters) in the EU. As well as the chemical and biological status of waters, the status of ecology and hydro-morphology of rivers is also considered by the Directive. The hydro-morphological quality in particular influences flood risk management policies where previous or planned interventions can have a significant impact on this status.



The key goals for flood risk management for the Sava are stated in the Sava River Basin Management Plan.

Future flood management plans could include the concept of ecological status and propose integrated solutions, such as providing areas with a diversity of habitats for organisms that will also act as flood storage.

The existence of flood protection dykes compromises the attainment of good water status and the possible measures will have to be carefully considered taking into account the principles of better environmental options, disproportionate costs and the overriding public interest.

The Sava River Basin countries, with the exception of Montenegro, are signatories to the FASRB and undertake coordinated sustainable flood protection at the Sava River Basin level. Flood risk management and water quality management are both part of integrated river basin management, based on the WFD and EU Floods Directive. Both documents recommend joint approaches to flood risk management, coordinated planning and measures within river basins and sub-basins, while considering the interests of all the partners involved.

It should be possible to develop sustainable flood protection in the Sava River Basin without compromising the environmental objectives of the WFD. All flood risk management activities should be planned and carried out in line with Article 9 of Directive 2007/60/EC. The Directive requires the taking of appropriate steps to coordinate the application of the EFD with the WFD, focusing on opportunities to improve efficiency, information exchange and for achieving common synergies and benefits with regard to the environmental objectives of the WFD.

### ***Specific Proposals for the Sava River Basin***

Flood protection is one of the main causes of river and habitat continuity interruption. A normal part of flood action plans are technical flood defence measures (construction of new dykes and consolidation of the banks). These plans must however be combined with the restoration of river and habitat continuity interruptions. Appropriate regulations regarding land use and spatial planning (e.g., limitations related to land use in areas prone to floods) must be adopted in parallel with flood protection activities.

Accidental pollution due to flooding is an important issue. Accidental pollution can originate from industrial facilities and from sites contaminated by former industrial activities or waste disposal. Pollution from rivers during flooding can reach protected retention areas (e.g., from the Sava River into Lonjsko polje). Consideration should also be given to treatment plants if they are located on a floodplain. Flood events should be managed in such a way that water surplus related pollution is reduced via suitable preventive measures, taking into consideration the land use management of floodplain/wetlands. Wetlands can play an important role in flood and drought mitigation as well as in nutrient reduction. They act as

sponges soaking up rain and storing floodwater and runoff. Wetlands slowly release floodwaters back into streams, lakes and groundwater making the impact of flooding less damaging. The specific measures are in conformity with the Flood Action Plan for the Sava River Basin and address a number of issues.

### **Land use and spatial planning regulations**

Measures in floodplains and areas designated for floodwater storage help retain space for flood expansion, thus decreasing the need for structural measures. Conservation and/or restoration of agricultural and forestry activities leads to an elevated retention time for water.

Key activities in this regard include:

- decree on conditions and limitations regarding constructions and activities in flood risk areas;
- criteria for identification and zoning of terrain and for limitation restrictions regarding the use of water;
- application of agro-technical measures, forest management measures and land in accordance with natural protection; and
- land use limitations.

### ***Improved efficiency of existent and/or creation of new retention and detention capacities***

Making space for rivers in areas with minimal human and economic activity reduces the risks in highly populated and industrial areas downstream.

Key activities in this regard include:

- reducing flood risk in the area southwest of Ljubljana, where detention reservoirs are planned on the current floodplains; and
- preservation of the existing large lowland retention storages on the Sava River Basin as well as the existing natural retention areas.

The long-term goal for flood issues is the development of sustainable flood protection in the Sava River Basin without compromising the environmental objectives of the WFD. This will also require that:

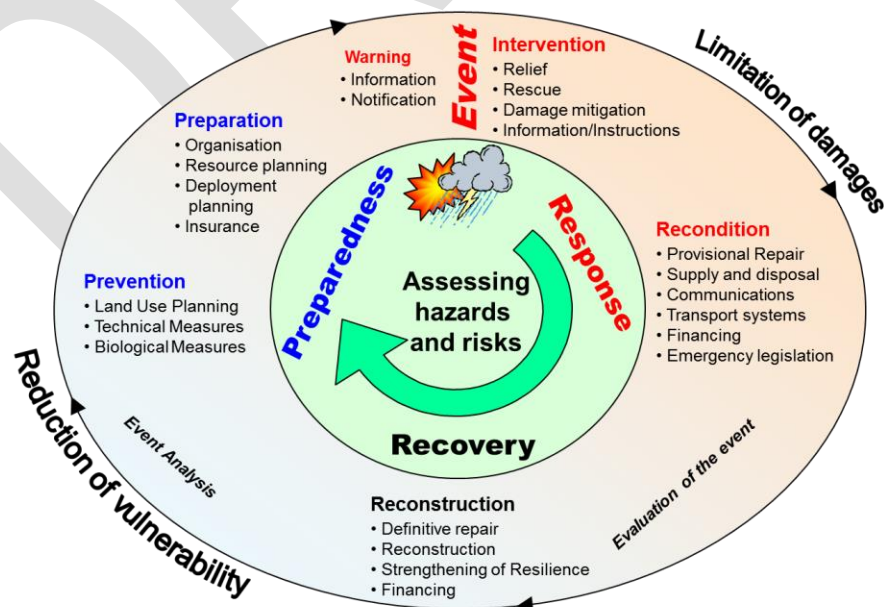
- flood management follows the entire cycle of risk assessment (prevention, protection, mitigation and restoration) and is performed in an integrated manner to ensure flood protection and the good status of water bodies;
- negative effects of the natural phenomena (floods, flash floods and soil erosion) on life, property and human activity as well as on water quality are reduced or mitigated;
- climate change and its hydrological impact (floods and flash floods) are fully addressed in decision-making to ensure the sustainability of ecosystems.

***The long-term goal will be achieved through implementation of the following measures:***

- development of the flood risk management plan for the Sava River Basin in accordance with Directive 2007/60/EC in coordination with the reviews of the river basin management plans provided for in Article 13(7) of Directive 2000/60/EC; and
- compliance with the management objectives for hydro morphological alterations, protection, conservation and restoration of wetlands/floodplains, increased flood protection potential while ensuring biodiversity, good status in the connected river and pollution reduction.

The guiding principles for the management of natural hazards in torrents are very well defined by The Natural Hazards Platform of the Alpine Convention (known as PLANALP).

*Graph 19 - Integral Hazard and Risk Management Concept (adapted from PLANALP)*



### 4.1.5.6 The Sector Recovery Plan

#### 4.1.5.6.1 Prioritisation and Sequencing

The recovery needs have been prioritised in order of importance ranging from high to low. It should be emphasised that all of these measures are important and that the priorities have been assigned to best focus funds based solely on the expert judgment of the assessment team.

The high priority items should be progressed as a matter of urgency (the next 6 months) in order to restore the critical protective measures. The medium priority items should be undertaken to preserve life, focus on improving natural hazard management and reduce the risks from torrents in particular. The lowest priority is given to softer measures and the strengthening of the dykes. Once reconstructed the dykes should offer protection against normal floods. The priority of some dykes could be increased to medium after further analysis of the potential damage and risks posed by future floods. The lower priority items will take longer to plan and implement and are scheduled for later in the recovery process.

*Table 67 - Prioritisation of recovery measures for flood and torrents risks*

Item	Type	Priority
<b>Repair Damage</b>		
Dyke Dam Reconstruction	Reconstruct	High
Reinstate River Profiles and Repair Erosion Protection	Reconstruct	High
Reinstate Canal Profiles	Reconstruct	High
Torrent Open Profiles and Sediment Management	Reconstruct	High
Reconstruct Torrent Banks and Dams	Reconstruct	High
<b>Stabilise Landslips</b>	Reconstruct	High
Repair Pumps	Reconstruct	High
Gauging Station Reconstruction	Reconstruct	High
<b>Data Collection</b>		
Dyke Surveys	Reconstruct	High
River and Canal Survey	DRR	Medium
Torrent Characterisation and Database	DRR	Medium
Landslide Database	DRR	Medium
Event Documentation	DRR	High
High Quality Large Scale Ground Surface Model	DRR	Medium
<b>Improve Planning</b>		
Improve Flow Prediction and Climate Change Impact	DRR	Medium

Hydraulic Modelling	DRR	Medium
Landslide and Torrent Modelling	DRR	Medium
River Sava Flood Risk Management Plan	DRR	Medium
Organise Integrated Risk Management (Legal and Financial)	DRR	Medium
Hazard & Risk Mapping (Flood, Torrent and Landslide)	DRR	Medium
Hazard Forecasting and Warning	DRR	Medium
<b>Reduce Risks</b>		
Dyke Strengthening, Replace Pumps	DRR	Low
Flood Inundation and Retention Areas	DRR	Low
International Sava River Flood Protection	DRR	Low
Manage Protective Forests	DRR	Medium
Torrent and Erosion Control Structures	DRR	Medium
Strengthen Land Use Planning	DRR	Medium
Public Awareness and resilience	DRR	Low
Emergency Planning	DRR	High

The sequencing of recovery measures is indicated in the flow chart shown in Figure 13. The Table below shows how much of each measure is undertaken within 3 time periods: the next 6 months, the next 2 years and the last period covering the following 2 years.

Table 68 - Sequencing and distribution

Item	Timeframe Distribution (months)		
	0-6	6-24	>24
<b>Repair Damage</b>			
Dyke and Dam Reconstruction	100%		
Reinstate River Profiles and Repair Erosion Protection	30%	70%	
Reinstate Canal Profiles	100%		
Torrent Open Profiles and Sediment Management	100%		
Reconstruct Torrent Banks and Dams		50%	50%
Stabilise <b>Landslips</b>	20%	50%	30%
Repair Pumps	100%		
Gauging Station Reconstruction	100%		
<b>Data Collection</b>			
Dyke Surveys	100%		
River and Canal Survey	100%		
Torrent Characterisation and Database	100%		
Landslide Database	100%		

Event Documentation	100%		
High Quality Large Scale Ground Surface Model	100%		
<b>Improve Planning</b>			
Improve Flow Prediction and Climate Change Impact	50%	50%	
Hydraulic Modelling		100%	
Landslide and Torrent Modelling		50%	50%
River Sava Flood Risk Management Plan	20%	80%	
Organize Integrated Risk Management (Legal and Financial)	40%	40%	20%
Hazard and Risk Mapping (Flood, Torrent and Landslides)		50%	50%
Hazard Forecasting and Warning	20%	80%	
<b>Reduce Risks</b>			
Dyke Strengthening Replace Pumps	10%	20%	70%
Flood Inundation and Retention Areas		100%	
International Sava River Flood control	20%	40%	40%
Manage Protective Forests	10%	50%	40%
Torrent and Erosion Control Structures	5%	35%	60%
Strengthen Land Use Planning	20%	40%	40%
Public Awareness and resilience	20%	40%	40%
Emergency Planning	20%	80%	

#### 4.1.5.7 Costing

It is recognised that disaster risk reduction measures for flood protection are far greater than the damage. However, the proposed measures will significantly reduce the risk to lives, housing, industry and infrastructure.

The estimates on damage to flood protection assets are based on the cost to reconstruct them, as advised by local managers from the water agencies and ministries. The damage has been rounded up to generate the approximate cost of the repairs. The costs for further measures are based on proposals already being developed or estimated by the expert team based on experience. The strengthening of embankments is based on existing plans for schemes on the River Drina and the estimated of 150km of additional dykes needed at an average rate of 306,775.13 EUR per kilometre.

The time for the assessment was limited. It was therefore not possible for the expert team to visit all of the damage locations. No detailed inspections of the damage were undertaken by the local agencies and ministries, thus all estimates on the damage are approximations. No comprehensive GIS data on flood protection assets or the location of landslides was provided to the assessment team so it was not possible to verify the damage claimed.

Some transportation assets also assume a flood protection function and the pricing for their repair was included in the transportation sector.

Most drains within the land enclosed by the dykes also perform irrigation functions; all costs for these drains are included in this section.

It is not possible at this point to quantify the costs associated with any of the defence improvements or strengthening with any degree of accuracy as to do so requires detailed studies. The estimates used here are based on cost estimates from a recent scheme put forward to the World Bank for the Drina.

A major part of the funds that will be invested in active flood and torrent protection control measures will feed back into the local and regional economy (wages, construction services, planning services). Tourism, being a key driver of the BiH economy (?), will profit to a considerable extent from the state supported preventive measures on torrent, landslide and erosion control.

## Key Constraints

The costs for recovery are shown in the table and charts below.

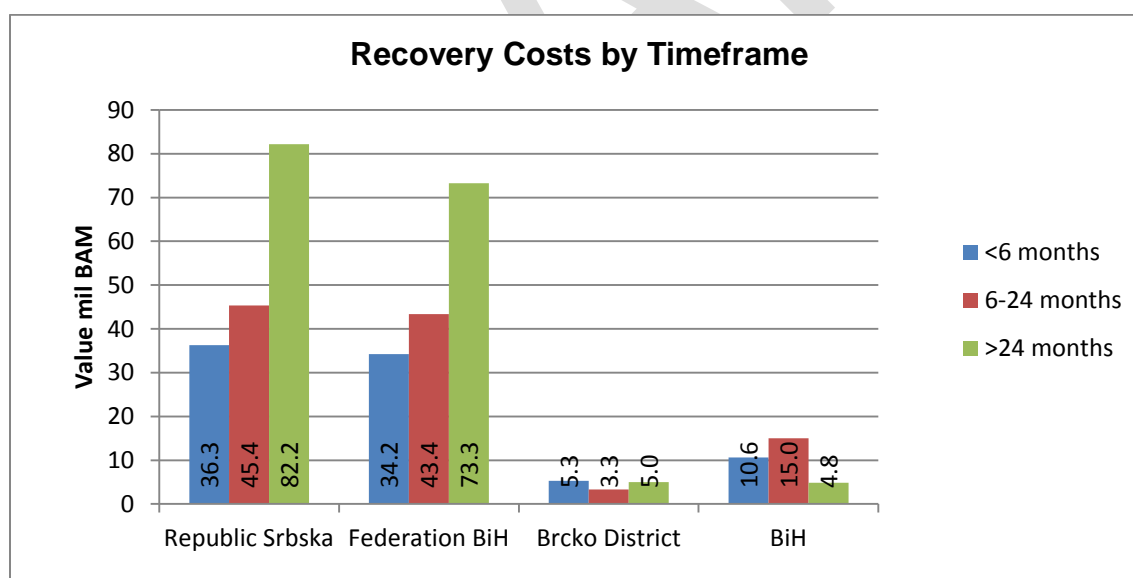
*Table 69 - Flood protection repair and recovery costs*

Item	Costs mil EUR
<b>Repair Damage</b>	-
Dyke and Dam Reconstruction	4.09
Reinstate River Profiles and Repair Erosion Protection	12.32
Reinstate Canal Profiles	8.87
Torrent Open Profiles and Sediment Management	6.67
Reconstruct Torrent Banks and Dams	12.35
Stabilise Landslips	6.16
Repair Pumps	1.20
Gauging Station Reconstruction	2.54
<b>Data Collection</b>	-
Dyke Surveys	0.21
River and Canal Survey	0.82
Torrent Characterisation and Database	0.41
Landslide Database	0.41
Event Documentation	0.33
High Quality Large Scale Ground Surface Model	2.35
<b>Improve Planning</b>	-
Improve Flow Prediction and Climate Change Impact	0.51
Hydraulic Modelling	1.43

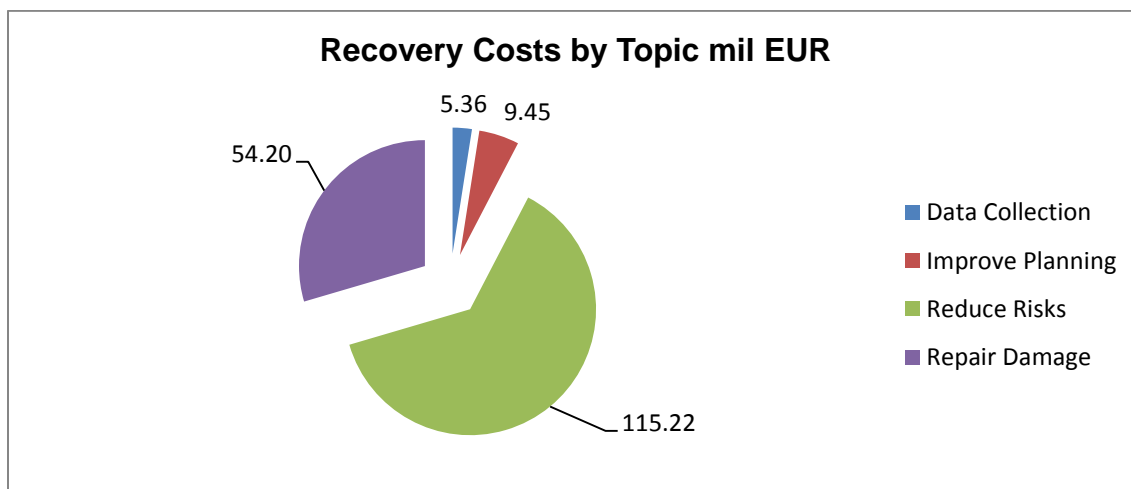


Landslide and Torrent Modelling	1.43
River Sava Flood Risk Management Plan	0.26
Organise Integrated Risk Management (Legal and Financial)	0.20
Hazard and Risk Mapping (Flood, Torrent and Landslide)	2.05
Hazard Forecasting	3.58
<b>Reduce Risks</b>	-
Dyke Strengthening, Replace Pumps	76.69
Flood Inundation and Retention Areas	0.72
International Sava River Flood protection	0.31
Manage Protective Forests	2.10
Torrent and Erosion Control Structures	31.96
Strengthen Land Use Planning	1.07
Public Awareness & resilience	1.12
Emergency Planning	1.25
	-
<b>Total</b>	<b>183.45</b>

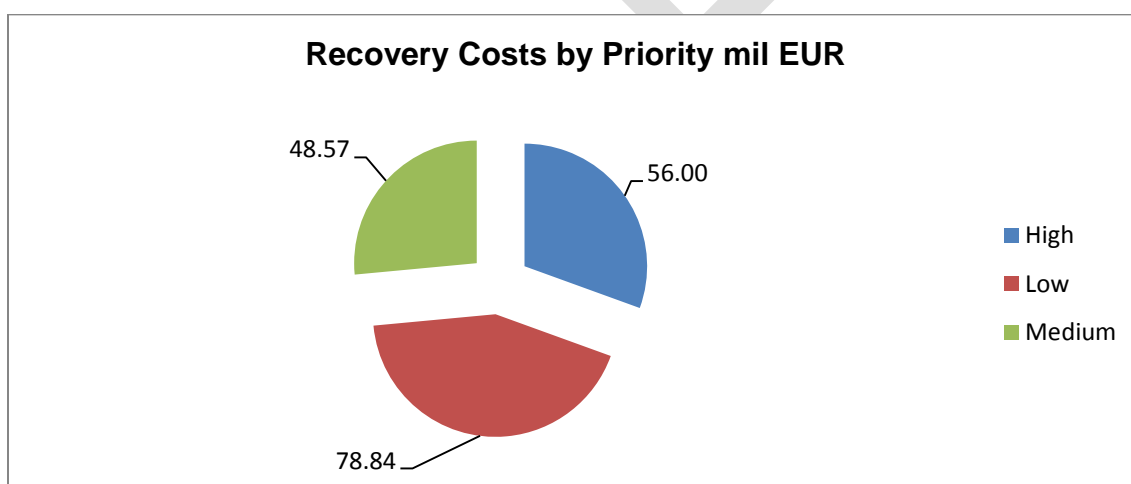
Graph 20 - Recovery costs by timeframe



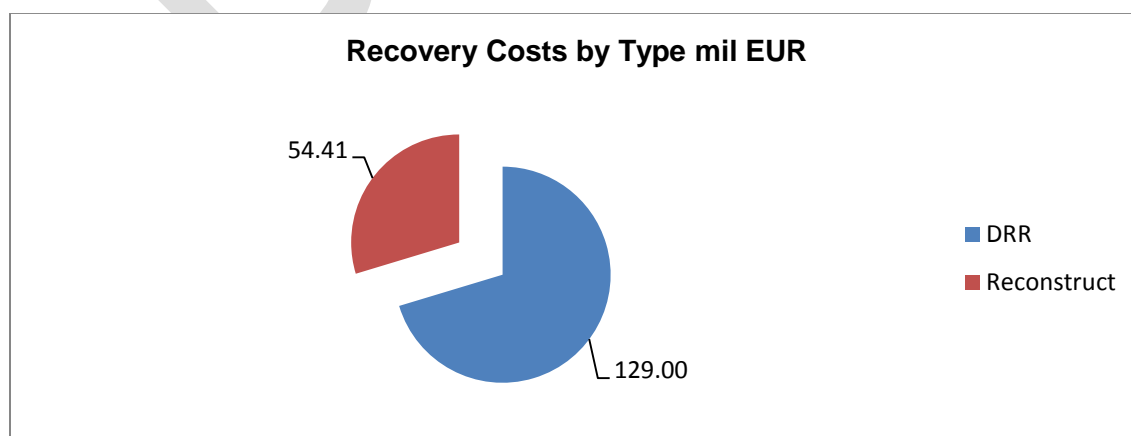
Graph 21 - Recovery costs by topic



Graph 22 - Recovery costs by priority



Graph 23 - Recovery costs by type



#### **4.1.5.8 Implementation Arrangements**

##### **4.1.5.8.1 Partnerships, Coordination and Management (including monitoring and evaluation)**

The River Sava flows through four countries: Slovenia, Croatia, Bosnia and Herzegovina and Serbia. In Bosnia and Herzegovina (BiH) management is further divided between the Federation of BiH and its ten cantons, Republika Srpska and Brcko District. It is important to strengthen the existing and set-up new knowledge sharing networks at the national, regional and international level in order to promote a coordinated approach and to share examples of best practice.

The countries of the Sava River Basin have acknowledged the importance of harmonised work in the largest river basin in the region. This resulted in the first constitutional session of the Sava Commission in 2005 and later activation of the permanent Secretariat of the Sava Commission in 2006. Several important steps were made following the establishment of the Sava Commission, but they were limited in their outcome. This is also due to the limited position of the Sava Commission regarding the possible impact on governance structures in the field of flood management. EU legislation in the field of water management (WFD 2000/60, FD 2007/60) provided an essential framework for improved co-operation and necessary changes in water governance, which includes the role of public participation.

Cross-sectoral connection of competence centres and the integration of research, development, educational and other institutions together with water (flood) governance institutions would be beneficial. Foreign organisations with specific knowledge would help address the knowledge gaps that exist in flood and particularly torrent management.

Repairs and maintenance will be the responsibility of the water management ministries and agencies, forestry administrations, municipalities and riparian owners. As part of these measures, manuals for maintenance operations are required and training in these should be undertaken. However, agreements should be reached concerning future maintenance prior to implementation of any measures.

##### **4.1.5.8.2 Cross-sectoral Themes related to the Sector**

There is a strong link with agriculture where the pumps and channels that provide drainage and irrigation also provide flood protection. To provide more flood storage on the floodplain and protect people and property some losses to agriculture may have to be accepted.

Forestry management is a key element in the control of risks related to torrents. Good forest management can reduce the number and severity of landslides and reduce the risks from debris flow events.

Important infrastructure, including water supply, sanitation, energy, roads and transport, would all be protected by flood protection measures. However, it may also be appropriate to make critical infrastructure resilient against over design events.

The reservoirs used to generate hydroelectric power and water supply could also provide flood storage yet this would introduce tensions between the competing needs. A reservoir needs to be emptied in advance of a flood to create the storage space needed and this creates the risk that the flood will not be as severe as forecast.

Spatial Planning for replacement housing and other infrastructure is crucial in order to prevent people being placed in high-risk areas.

#### **4.1.5.8.3 Resource Mobilisation and Funding Mechanisms**

Significant resources would need to be mobilised to implement all of the measures set out in the recovery plan. While international experts can be engaged to develop projects the capacity of the agencies and ministries to manage this work and to preserve knowledge and ownership beyond project completion will also be important.

#### **4.1.5.8.4 Review**

A legal review will be required and possibly new laws established to enable full implementation of the recovery plan, including the financing arrangements for flood risk management. It is imperative that natural hazard management receives the required funding to maintain the systems and assets recommended by the recovery plan.

### **Key Constraints**

The key constraints for implementation are:

- insufficient number of experienced technical staff within ministries and agencies;
- lack of integration within the water management sector. In particular, the FBiH is fragmented and the formation of a single water management agency to manage and coordinate the sector is recommended;
- the Sava basin has to be managed at the river basin level and this will require improved coordination so that BiH is represented by one voice; and
- for long-term success a sound financial footing needs to be provided to the water management authorities to maintain the protective systems and measures.

#### 4.1.5.9 Assessment Methods

The expert team developed a custom template for flood protection assets specifically for this assessment and it was used by all parties as a questionnaire to gather the required data on damage.

The damage in the FBiH were assembled by each canton who in turn gathered the data from the municipalities. This data was then combined by the competent ministry, which applied its own unit rates for damage.

Data on damage in RS and BD was provided in a single table.

Using their experience and knowledge of the damage gathered from site visits, the expert team reviewed the supplied data and discussed it at a roundtable meeting of all parties. Following this, the data on damage was adjusted to ensure consistency, particularly between the FBiH and RS.

#### 4.1.5.10 References

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## 4.1.6 Housing

### 4.1.6.1 Reconstruction and Recovery Needs, including Build Back Better (BBB)

One of the primary reasons of housing damage and destruction was the construction of homes in at-risk areas (lowlands prone to flooding or hillsides prone to landslides) and without obtaining building permits. It is thus vital to disseminate basic information on the importance of ensuring that areas have been assessed for any potential risks of flooding and/or landslides prior to building homes and inform people of the risks associated with building in at-risk areas.

Furthermore, no new houses should be constructed without first obtaining a building permit to assure that they are not built in areas that are prone to flooding and landslides.

#### 4.1.6.1.1 BBB: Reduce Risks and Vulnerabilities to Future Disasters

In regard to BBB, it is recommended that relocated units be constructed with energy efficiency measures given that legislation will be adopted in BiH making it a requirement that every new dwelling must have a category 'C' energy efficiency certificate. Cost estimates for new units that meet future requirements for energy efficiency have been developed and included in the BBB calculations.

### 4.1.6.2 Vision and Guiding Principles

The damage caused by the flooding relates to the ongoing process of facilitating the return of those displaced during the war, namely some of those affected by the floods are returnees that have now been displaced for the second time. The government of BiH has guidelines and a vision for the return of war affected displaced persons and will have to include those affected by the flooding in that vision. Prioritisation will become a key issue in the future, namely whether those affected by the war or those affected by the flood disaster should be assisted first.

### 4.1.6.3 The Sector Recovery Plan

#### 4.1.6.3.1 Prioritisation and Sequencing

It is essential that all affected communities, engaging both men and women, are involved in the planning and implementation of the recovery and reconstruction process. Affected individuals and households must be informed and encouraged to ensure that they rebuild in areas that are not at risk in order to avoid a similar death toll in the future. Recovery and reconstruction in the housing sector must equally take into consideration recovery in other sectors, including livelihood, transport, electricity, water and sanitation, agriculture and access to social services, including health and education. Finally, it is crucial that vulnerable groups, such as Roma or conflict IDP, refugees and returnees are not



overlooked in the recovery and reconstruction process and that in some cases they may require additional support.

Some of the administrative records, including land titles, have been lost in the floods. Therefore, assistance must address the issues of land rights/titling and the loss of records.

### **Short-term (1-12 months)**

- As a first priority in order to avoid further fatalities and injuries, hazardous buildings and structures that (1) risk collapse and (2) are in areas at risk of landslides should be identified. People must also be informed about the importance of assessing areas prior to return/reconstruction for any potential risks and to understand the risks associated with building in at-risk areas.
- Information on all damage and related losses needs to be identified and consolidated and the BiH authorities should prepare a detailed assessment of housing with full transparency of the information collected and categorisation of the damage establishing priority lists for each municipality and Brcko District.
- The criteria for the identification and selection of potential beneficiaries should be developed.
- Budget funds at the entity/state level to be used for reconstruction/relocation of houses should be allocated.
- A state managed coordination mechanism should be established to assure that donations are allocated to priority areas.
- The municipalities and Brcko District should develop detailed lists of potential beneficiaries in the priority areas.
- Legal obstacles to the collection and disbursement of donations for housing and other infrastructure at the entity and state level need to be identified and overcome.
- Specific subprojects for the repair of houses should be developed.
- Approval by donors and/or the State and/or entities need to be secured.
- Subprojects need to be implemented.
- Monitoring should be conducted at the state, entity and/or municipal level.

For those flood-affected households that incurred damage to their homes and flats that is repairable and are able to return, priority interventions in the short term include the repair of their homes through contractors or the provision of shelter recovery kits (tools, construction material, protective equipment, etc.) that will enable them to repair the

damage. As many have lost their livelihood, shelter recovery strategies should equally consider livelihood recovery/restoration that will allow returnees to generate income. In the short term, this could include cash-for-work (focusing on the removal of debris and infrastructure reconstruction, including homes and community infrastructure) as well as the restoration of productive assets. Addressing the needs of vulnerable household members (e.g., pregnant women, the elderly, children, persons with health needs, etc.) should also not be overlooked in the return and shelter recovery process.

For those who are not able to return to their homes immediately, either because it has been destroyed or because it is located in an at-risk area (due to landslides or landmines) or because they require special assistance (mentally or physically disabled, elderly, etc.) permanent solutions must be found. As the majority of temporary accommodation is in public buildings, notably schools, or in over-crowded collective centres it is crucial to find permanent solutions. New homes or apartment buildings should be constructed for these families.

The priorities for the first twelve months thus include:

- repair of 80% of damaged flats;
- repair of 50% of damaged housing units; and
- relocation of 100% of those whose houses were destroyed.

#### **Medium-term (12-36 months)**

Reconstruction and relocation will continue during this period with the following priorities:

- development of specific subprojects for the repair of houses;
- approval by donors and/or the State and/or the entities;
- implementation of subprojects; and
- monitoring at state, entity and/or municipal level.

The priorities for the first twelve months thus include:

- repair of the remaining 20% of damaged flats; and
- repair of the remaining 50% of damaged housing units.

Priorities will have to be continuously updated as some are addressed directly through donor funds, while some beneficiaries may be able to do the repairs on their own.

### Long-term (3 years and beyond)

The repair of the flooded units may continue during this period if repairs and relocation are not completed by the end of the third year. Priorities will require continuous updating as some are addressed directly through donor funds and some beneficiaries may be able to do the repairs on their own.

#### 4.1.6.4 Costing

Costs for reconstruction and recovery needs were calculated on the basis shown below.

- The cost of reconstruction needs for destroyed houses was calculated based on a house of 42 square metres net. The reason for the difference in the damage assessment and assessment for reconstruction (75 square metres compared to 42 square meters) is the current legislation in BiH that dictates the size of dwellings for return and reconstruction programmes. This decision to apply the legislation to the construction of new dwellings was made in consultation with the local authorities.
- The cost of reconstruction needs for flooded houses and flats are the same as the damage figures.
- The cost of household goods and other household items are the same as the damage figures.
- The cost of land and essential services for relocated units is similar to the losses calculated for destroyed houses.

*Table 70 - Summary of reconstruction costs*

Entity/District	Damage (millions EUR)
Republika Srpska	221.34
Federation of BiH	189.87
Brcko District	8.50
<b>Total</b>	<b>419.71</b>

Recovery costs have been calculated based on the following:

- recovery costs covered the demolition and the removal of rubbish, which includes the cost of removing the destroyed houses and all items from damaged houses (including furniture, etc). This recovery cost is similar to the one calculated in losses in Section 5;

- recovery costs for temporary shelter, which includes the cost of accommodating those permanently displaced in temporary shelters. Assumptions were made in terms of the time period they will need to be accommodated in temporary shelters.

*Table 71 - Summary of recovery costs*

Entity/District	Damage (millions EUR)
Republika Srpska	2.63
Federation of BiH	4.75
Brcko District	0.31
<b>Total</b>	<b>7.69</b>

*Table 72 - Summary of reconstruction and recovery costs*

Entity/District	Damage (millions EUR)
Republika Srpska	223.98
Federation of BiH	194.62
Brcko District	8.80
<b>Total</b>	<b>427.40</b>

*Table 73 - Summary of reconstruction and recovery costs with BBB*

Entity/District	Damage (millions EUR)
Republika Srpska	224.30
Federation of BiH	197.36
Brcko District	8.90
<b>Total</b>	<b>430.56</b>

#### 4.1.6.5 Implementation Arrangements

Donor funds will be essential for repairing the damage to the housing stock. Time is of the essence, given that no construction works can be carried out in the period November - March because of the winter temperatures. Thus, it is essential to start implementation of repair and reconstruction programmes as soon as possible.

Housing reconstruction programmes, whether funded by donors or local contributions, should take into account the following:

- donor funds must be implemented by organisations that have the knowledge and expertise for these types of projects;
- mechanisms for quick contracting must be allowed to avoid lengthy tendering and contracting procedures;

- reconstruction projects should be integrated projects, meaning that they should not only fund the repair of the housing units but should also contain income generation and livelihood components to ensure that the beneficiaries can generate an income;
- BiH authorities at the state and entity level must coordinate all activities to make sure that priorities are respected, projects are properly coordinated and that there is no duplication;
- standards for reconstruction have to be developed to ensure that all beneficiaries are treated equally. Ideally, the same standards applicable to war returnees should be applied to those affected by the flood disaster;
- priorities and procedures for the selection of municipalities/locations and beneficiaries have to be developed to make sure that the most vulnerable and those that do not have alternative accommodation are included in the various programmes. The criteria must not be too complex to allow for the timely identification of beneficiaries; and
- monitoring and evaluation of donor funds should be carried out by an independent organisation.

#### **4.1.6.6 Assessment Methods**

Below is a summary of how the assessment of flood damage to the housing sector was conducted in BiH.

A questionnaire was designed and distributed to focal points in the FBiH, RS and District Brcko. The data on damaged and destroyed houses was provided by the local authorities; however, other data related to the demographics and utility connections was not provided. The short timeframe for the provision of data (5 days) did not allow for the gathering of detailed data.

The methodology for the assessment of damage, losses, reconstruction and recovery needs was developed during the data collection. This methodology was developed in close consultation with the focal points in RS, FBiH and District Brcko. The methodology is described below. All unit cost calculations were reviewed and commented on by the focal points and NGOs with substantial reconstruction experience in BiH.

### **1. Housing Units**

Three categories of damage were defined.

1. Flooded homes
2. Flooded flats
3. Houses destroyed due to landslides

Please Note: A fourth category 'At Risk' houses covered houses located close to landslides that are still habitable but may be in the path of a landslide tomorrow if it rains. We have included these houses in the report, but as a separate category together with a cost estimate for relocation.

## A. Flooded Houses

We assumed the average area for houses to be repaired as 65 square metres net. This estimate was based on measurements and observations made during the field visits.

Six flood levels were defined.

1. Water under 90 cm
2. Water under 250 cm
3. Water over 250 cm

Less than 90 cm used because the windows are at an elevation of 90 cm; less than 250 cm was used because the ceiling is at 250 cm.

Two time frames were developed for each of the defined levels listed above, based on whether the water was in the unit for less or more than five days. The reason for this is that more repairs are necessary (specifically sanitary) if the water stayed in the unit longer. Specifications and cost estimates were developed for each case and a 10% contingency was added because there are many old houses and a percentage occurrence was assigned to each case. This percentage was assigned based on field inspections. The table below shows the occurrence factors assigned.

Table 74 – Flooded houses - assigned occurrence factors

	Water less than five days			Water more than five days		
	Water < 90	Water < 250 cm	Water > 250 cm	Water < 90	Water < 250 cm	Water > 250 cm
<b>Occurrence</b>	<b>15%</b>	<b>25%</b>	<b>10%</b>	<b>10%</b>	<b>25%</b>	<b>15%</b>

The average cost of the reconstruction of a house was calculated based on the factors listed above using the bill of quantity and accompanying cost estimate. The value is 5,010.66 EUR per house.

Damage and reconstruction costs are the same for flooded houses.

## B. Flooded Flats

We assumed an average area of 50 square metres net for apartments and 10 square meters net for common areas. Again, this was done based on field measurements and observations.

Specifications and cost estimates were developed for each case and a 5% contingency was added (there are many newer buildings); a percentage occurrence was assigned to each case. This percentage was assigned based on field observations. The table below shows the occurrence factors assigned.

*Table 75 - Flooded flats - assigned occurrence factors*

	Water less than five days			Water more than five days		
	Water < 90 cm	Water < 250 cm	Water > 250 cm	Water < 90 cm	Water < 250 cm	Water > 250 cm
<b>Occurrence</b>	<b>25%</b>	<b>50%</b>	<b>10%</b>	<b>5%</b>	<b>5%</b>	<b>5%</b>

The average cost for the reconstruction of a flat was calculated based on the factors listed above using the accompanying bill of quantities and cost estimates. The value is 2,658.72 EUR per flat.

Damage and reconstruction costs are the same for flooded flats.

### **C. Destroyed Houses**

We calculated the damage value for a destroyed house unit as 75 square meters net. The value is 30,421.87 EUR per unit and includes a 5% contingency.

We used a 42 square metre net calculation for the reconstruction of destroyed houses. The size is based on the Ministry for Human Rights and Refugees of BiH (MHRR) standard for a family of four and follows the principles applied for the reconstruction of housing units after the war for returnees. The cost of the new unit is estimated at 17,026.02 EUR and includes a 5% contingency.

The parcel is estimated at 6,135.50 EUR (300 square metres at 20.45 EUR/square metre), while utility connections were estimated at a little more than a quarter of the price of the new unit at 4,499.37 EUR/unit.

Please Note: the cost of the unit includes a septic tank, hence only connection to electricity and water are necessary.

### **D. Demolition and Rubbish Removal**

Demolition and rubbish removal for destroyed houses was estimated at 357.90 EUR per housing unit. The estimate was based on field observations calculating the amount of demolition and rubbish removal that would have to be done.

Rubbish removal for flooded houses and flats is estimated at 51.13 EUR per housing unit.

## 2. Household Goods and Other Assets

### A. Household Good

The value of household goods was estimated based on market prices for an average family size of 3.2 family members. A full list of specifications can be provided if required. The estimate is 3,681.30 EUR per household.

As with the damage to houses, an occurrence factor was assigned to each of the six flooding scenarios. In addition to the occurrence factor, we also reduced the loss of household items for cases where the water was very low. The reason for this is that many items were lifted/saved in those cases.

*Table 76 - Household goods - assigned occurrence factors*

	Water less than five days			Water more than five days		
	Water < 90	Water < 250 cm	Water > 250 cm	Water < 90	Water < 250 cm	Water > 250 cm
<b>Loss</b>	<b>50%</b>	<b>100%</b>	<b>100%</b>	<b>75%</b>	<b>100%</b>	<b>100%</b>
<b>Occurrence</b>	<b>15%</b>	<b>25%</b>	<b>10%</b>	<b>10%</b>	<b>25%</b>	<b>15%</b>

The value of personal household goods is calculated to be 3,323.40 EUR per family.

### B. Other Assets in Houses

Other assets in houses (documents, clothes, etc.) were estimated at 511.29 EUR per household.

As with the damage to houses, an occurrence factor was assigned to each of the six flooding scenarios. In addition to the occurrence factor, we also reduced the loss of other assets for cases where the water was very low. The reason for this is that many items were lifted/saved in those cases.

*Table 77 - Other assets in house - assigned occurrence factors*

	Water less than five days			Water more than five days		
	Water < 90	Water < 250 cm	Water > 250 cm	Water < 90	Water < 250 cm	Water > 250 cm
<b>Loss</b>	<b>50%</b>	<b>100%</b>	<b>100%</b>	<b>75%</b>	<b>100%</b>	<b>100%</b>
<b>Occurrence</b>	<b>15%</b>	<b>25%</b>	<b>10%</b>	<b>10%</b>	<b>25%</b>	<b>15%</b>

The value of other household goods is estimated at 460.16 EUR per household.



### 3. Temporary Shelter

Temporary shelter was estimated based on the figures obtained from the IOM at a cost of 15.34 EUR/capita/day. It was assumed that 30% would return by the 6<sup>th</sup> month, 60% by the 7<sup>th</sup> month, 70% by the 12<sup>th</sup> month and 100% after the 15<sup>th</sup> month.

### 4. Assessment Implementation

Both entities and Brcko District agreed to the methodology and the unit costs used for the assessment. Information was shared with all counterparts throughout the assessment. The final figures, which match those that are included in the attached spreadsheet, were also sent to them and no comments have been received.

#### *Annex 2 - Effect of the flood on housing stock - FBiH*

MUNICIPALITY	No. of destroyed houses	No. of damaged houses and flats	% of total housing stock affected
Domaljevac-Šamac	4	1669	95.5%
Odžak	10	1800	22.8%
Maglaj	214	2035	22.3%
Orašje	70	1595	21.0%
Sanski Most	25	1245	7.7%
Sapna	45	200	5.9%
Žepče	98	450	5.2%
Kladanj	11	251	4.6%
Doboj Istok	36	108	3.4%
Živinice	67	750	3.3%
Zavidovići	76	471	3.2%
Tuzla	329	1365	2.9%
Olovo	10	131	2.8%
Srebrenik	62	508	2.8%
Lukavac	51	500	2.3%
Usora	8	50	2.3%
Teočak	7	56	2.3%
Zenica	245	610	1.7%
Gračanica	73	259	1.6%
Kalesija	58	146	1.4%
Ključ	2	65	0.9%
Tešanj	6	124	0.7%
Čelić	2	30	0.7%
Gradačac	28	75	0.6%
Vogošća	41	25	0.5%
Travnik	15	100	0.5%
Hadžići		58	0.5%
Ilidža		164	0.5%
Kakanj	13	65	0.4%
Banovici	20	25	0.4%
Ilijaš		37	0.3%

Visoko	23	33	0.3%
Vareš	2	18	0.3%
Pale-Prača		2	0.3%
Petrovac		4	0.1%
Breza	2	2	0.1%
Goražde	4		0.0%
Novi Travnik		2	0.0%
Jajce	1	2	0.0%
Busovača	1	1	0.0%
Bihać		6	0.0%
Centar (Sa)	1		0.0%
<b>Total</b>	<b>1,688</b>	<b>15,667</b>	<b>3%</b>

### *Annex 3 - Effect of the flood on housing stock - RS*

MUNICIPALITY	No. of destroyed houses	No. of damaged houses and flats	% of total housing stock affected
Šamac	0	4,500	61.33%
Jezero	0	97	16.28%
Bijeljina	60	6,940	14.50%
Vukosavlje	0	293	13.51%
Donji Žabar	0	170	11.10%
Doboj	5	3,500	9.70%
Šekovici	3	302	7.87%
Prijedor	10	2,750	7.20%
Srbac	0	594	7.05%
Modrica	41	789	6.83%
Celinac	3	345	4.67%
Laktasi	3	786	4.63%
Kostajnica	0	69	2.88%
Banja Luka	0	2,511	2.85%
Bratunac	7	178	2.29%
Lopare	28	133	2.07%
Petrovo	3	67	1.95%
Ostra Luka	0	25	1.61%
Milici	3	67	1.42%
Derventa	0	200	1.37%
Novi Grad	1	144	1.22%
Kotor Varos	0	80	0.88%
Brod	0	48	0.64%
Prnjavor	5	105	0.59%
Ribnik	12	5	0.50%
Vlasenica	7	19	0.49%
Han Pijesak	0	10	0.47%
Ugljevik	4	27	0.45%
Šipovo	0	20	0.34%
Kozarska Dubica	2	34	0.32%
Osmaci	0	6	0.25%
Pelagicevo	0	6	0.23%

Zvornik	0	25	0.11%
Gradiska	0	23	0.10%
Rogatica	0	6	0.09%
Knezevo	3	0	0.06%
Srebrenica	0	2	0.04%
Mrkonjic Grad	1	1	0.02%
<b>TOTAL</b>	<b>201</b>	<b>24,877</b>	<b>5.28%</b>

***Annex 4 - Effect of the flood on housing stock – BD***

<b>MUNICIPALITY</b>	<b>No. of destroyed houses</b>	<b>No. of damaged houses and flats</b>	<b>% of total housing stock affected</b>
Brcko	54	762	2%
<b>TOTAL</b>	<b>54</b>	<b>762</b>	<b>2%</b>

### 4.1.7 Facilities and Services

#### 4.1.7.1 Reconstruction and Recovery Needs, including Building Back Better (BBB)

Four local governments will require substantial reconstruction of physical infrastructure and the full or partial replacement of assets, including computers, servers and other office equipment. In particular, the one-stop-shop citizen support centres will need to be re-established as they were located exclusively on the ground floor in order to facilitate citizen access. The process of recovering municipal files, however, is likely to be less straightforward and expedient. Unlike vital records, land registry information and social service beneficiary files were kept in the form of paper records and will require the formation of verification commissions that will validate requests by individual claimants in regards to land ownership and eligible benefits. The process is likely to take up to 18 months.

The welfare centres in the corresponding municipalities will also need to be reconstructed and refurbished with a similar process to follow related to beneficiary verification.

In order to improve disaster resilience servers will need to be located on a higher floor within the municipal administration building while paper files will need to be stored in a similar fashion. Fire and waterproof filing cabinets will also need to be secured to improve disaster resilience. Emergency protocols enacted upon the declaration of an emergency will need to be developed and instituted with training to follow suit. Training on disaster management for the relevant municipal staff will also need to be developed and delivered. Considering the number of instances where homes were built in potential landslide areas the municipalities will need to be equipped with better zoning enforcement mechanisms.

In order to improve the general standard of living in affected areas and enhance overall communal wellbeing the reconstruction rehabilitation and refurbishing of cultural facilities and services should not be sidelined and should be undertaken parallel to other revitalisation processes within the targeted 18-month timeline.

In line with the BBB principle, reconstruction will include energy efficiency and accessibility for disabled citizens as key considerations with 20% of the cost added to recovery estimates for buildings.

*Table 78 - Recovery and reconstruction needs of administration facilities (all levels of government)*

	RECOVERY NEEDS			RECONSTRUCTION NEEDS		
000 EUR	SHORT TERM	MEDIUM TERM	TOTAL	SHORT TERM	MEDIUM TERM	TOTAL
<b>TOTAL</b>	5,803.16	4,371.55	10,174.71	19,863.69	766.94	20,630.63
<b>FBiH</b>	3,379.64	2,561.57	5,941.21	9,264.61	383.47	9,648.08
<b>RS</b>	2,423.52	1,809.97	4,233.50	10,599.08	383.47	10,982.55

Full access to services will only be restored once the one-stop-shop facilities have been reconstructed and refurbished.

#### **4.1.7.2 Vision and Guiding Principles**

The recovery in this sub-sector in Republika Srpska will need to be coordinated with the overarching Local Government Development Strategy that oversees standards for improved service delivery. No such strategy currently exists in the Federation of BiH. Recovery efforts at the municipal level will need to be communicated to and consulted on with the relevant representatives of civil society organisations and other interested parties. Where available, municipal development strategies will need to be integrated in the recovery plan with strategy revisions to take place as appropriate.

#### 4.1.8 Health

##### 4.1.8.1 Reconstruction and Recovery Needs, including Building Back Better (BBB)

Reconstruction needs in the health sector of BiH, which includes investment in flood-damaged health facilities, including furniture and equipment, are presented in total for BiH and separately for the FBiH and RS. Over an estimated 18-month recovery period, the needs for recovery and building back better (BBB) will include compensation for the loss of revenue by the respective Health Insurance Funds and Public Health Institutes (PHI) in RS and the FBiH. Funds will also be required to address the cost of increased morbidity, including access to health services for uninsured patients who have lost their livelihood. Priority public health programmes were all taken into account, including maintaining enhanced disease surveillance until the health risks return to pre-disaster levels, disease prevention campaigns to include immunisation and vector control to mitigate new health risks, long-term mental health/psychosocial treatment and support to vulnerable groups. However, the representatives of health authorities in the FBiH and RS have stressed that these programmes need to be continuously supported and maintained for a longer period than the period estimated for the actual recovery phase. In addition, the health authorities in the FBiH and RS identified the need to strengthen preparedness and disaster risk management.

###### 4.1.8.1.1 Vision and Guiding Principles

The recovery objectives are aligned fully with health reform objectives in the FBiH and RS, including ongoing reforms of primary healthcare/family medicine in BiH and development/implementation of public health policies, strategies and action plans in RS, FBiH, BD and BiH as a whole.

###### 4.1.8.1.2 The Health Sector Recovery Plan: Prioritisation and Sequencing

The priorities as expressed by the health authorities in BiH include the fast restoration of service delivery capacity in the affected areas, ensuring continuity of care and treatment for the affected population, and addressing new health risks that have arisen as a consequence of the flooding.

In summary, the total damages and losses for the RS were estimated at 27.26 Million EUR and for FBiH at 25.92 Million EUR, amounting to 53.18 Million EUR in estimated reconstruction and recovery needs for the whole of BiH. These are inclusive of costs of reconstruction and repair to a better standard of the affected facilities and the compensation (recovery) of the increased costs and loss of revenue expected. Certain amount (255,646 EUR) is considered for the strengthening of the ministries of health preparedness and disaster risk management.

Table 79 – Health sector reconstruction and recovery needs, including BBB

Damage (in EUR)	Republika Srpska Total	Federation of BiH Total	Brcko District Total	Bosnia and Herzegovina Grand Total
Facilities, including equipment and furniture	4,092,427.26	1,703,558.08	-	5,795,985.34
<b>Loss</b>				
Estimated duration of recovery period: 6 – 18 months	Republika Srpska Total	Federation of BiH Total	Brcko District Total	Bosnia and Herzegovina Grand Total
<b>A. Loss of Revenue</b>				
1. Loss of revenue for the Health Insurance Fund and PHI	17,311,662.57	17,230,009.77	-	34,541,672.33
<b>B. Higher Costs</b>				
2. Increased cost due to increased morbidity	3,612,743.95	3,629,864.56	0	7,242,609.02
3. Increased cost of disease surveillance after the disaster	16,145.58	502,088.63	0	518,234.20
4. Increased cost of disease prevention campaigns	184,209.26	585,429.20	0	769,638.47
5. Increased cost of vector control campaigns	1,238,066.70	1,403,848.49	0	2,641,915.20
6. Cost for long-term mental health psychological treatment	675,160.93	740,095.00	0	1,415,255.93
7. Strengthening MoH preparedness and disaster risk management	127,822.97	127,822.97	0	255,645.94
<b>Total increased costs</b>	<b>5,854,149.39</b>	<b>6,989,148.85</b>	<b>0</b>	<b>12,843,509.41</b>
<b>Total loss (Total A + B)</b>	<b>23,165,811.96</b>	<b>24,219,159.13</b>	<b>-</b>	<b>47,384,971.09</b>
<b>Total damage and loss</b>	<b>27,258,239.21</b>	<b>25,922,717.21</b>	<b>-</b>	<b>53,180,956.42</b>
<b>Total reconstruction needs, including Building Back Better</b>	<b>4,092,427.26</b>	<b>1,703,558.08</b>	<b>-</b>	<b>5,795,985.34</b>
<b>Total recovery needs, including Building Back Better</b>	<b>23,165,811.96</b>	<b>24,219,159.13</b>	<b>-</b>	<b>47,384,971.09</b>
<b>Grand total reconstruction and recovery needs, including BBB</b>	<b>27,258,239.21</b>	<b>25,922,717.21</b>	<b>-</b>	<b>53,180,956.93</b>

## 4.1.9 Education

### 4.1.9.1 Reconstruction and Recovery Strategy

Educational institutions were identified as in need for interventions even prior to the flood. The school authorities specified priorities for improvement such as the repair of windows, plumbing, heating systems, roofs, facades, fencing and school safety. Although the exact data on the needs for repair and maintenance before the floods was not completed, it can be concluded that the facilities were not prepared to face the challenges of a natural disaster.

The Build Back Better (BBB) principle implies the need to reconstruct in a quality and flood-resistant manner in order to prevent further damage by natural disasters. Through improvements such as procuring better quality windows and flooring we could ensure that the next possible flood will not cause the same level of damage. On the other hand, the possibility for reconstruction could also be used for other improvements, such as access for children and people with disabilities (e.g., wider doors and ramps). Estimations of reconstruction needs adding 10% to the cost of the estimated damage to cover BBB. Since it is of crucial importance to complete the reconstruction before the beginning of the next school year (September 2014) all of the reconstruction needs are specified in the short-term phase.

Besides reconstruction, the education institutions have additional recovery needs. The recovery needs imply the cost of the losses, but also activities for empowering affected children.

The recovery figures include the provision of individual school kits and the provision of educational content during the summer breaks for children in the most affected areas. So-called 'child friendly spaces' are designed to provide a safe structured and protective environment for children and families in order to enable a sense of normalcy in daily life. As such, they will provide workshops for the development of life skills, educational, recreational and health activities, psychosocial support, etc.

Finally, the recovery needs include Disaster Risk Reduction education activities in order to provide better preparedness in the event of future natural hazards. The total cost for reconstruction and recovery activities is estimated at 14.16 million EUR.



Table 80 - Reconstruction and recovery needs for education institutions (EUR)

Entity	Reconstruction Needs		Recovery Needs	
	Short Term (0- 12 months)	Mid Term (12- 36 months)	Short Term (0- 12 months)	Mid Term (12- 36 months)
RS	4,080,109.21	-	2,142,312.98	378,355.99
FBiH	4,760,127.41	-	1,365,149.32	424,372.26
BD	5,112.92	-	981,680.41	20,451.68
TOTAL SHORT/ MID TERM	8,845,349.54	-	4,489,142.72	823,179.93
TOTAL RECONSTRUCTION/ RECOVERY	8,845,349.54		5,312,322.65	
GRAND TOTAL	14,157,672.19			

#### 4.1.10 Livelihoods and Employment

##### 4.1.10.1 The Recovery Strategy

###### 4.1.10.1.1 Enterprise Recovery and Decent Employment

Approximately 66,720 wage workers employed in enterprises in the FBiH, RS and DB have been directly affected by the May floods. An estimated 3,000 have already lost their jobs in the direct aftermath of the floods, leaving an additional 13,500 wage workers at high risk of immediate job loss. Recovering and protecting their livelihoods would imply a coherent Enterprise Recovery and Decent Employment Promotion Strategy at the local level. This challenge can only be met through a joint effort of authorities at the municipal and canton level, the private sector, including public and private business and financial service providers; workers and employers organisations, civil society organisations and international agencies in order to address the immediate, short-term and medium to long-term recovery priorities.

This would entail a series of targeted interventions to safeguard jobs and simultaneously start working on the 'labour supply side'. The latter would encompass **enhancing the financial abilities** of enterprises, supporting the **replacement of equipment and tools** and **improving the skills** of workers. Career counselling and 'start your own business training' for wage workers at risk of losing their job would help prepare them for alternative livelihood strategies such as self-employment.

On the other hand, it is necessary to start operating in a medium-term perspective on the 'demand side' in order to support local authorities **in creating the conditions and an enabling environment for disaster resilient enterprises to grow in number and scope. This would help the local market to expand and create additional demand for labour.** It 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. This would help to formulate well targeted policies that directly improve the business environment with a view to ensuring that the needs of future and existing micro and small businesses are taken into account.

In the longer-term perspective, action should be taken to Build Back Better (BBB) and to enhance Disaster Risk Reduction (DRR) in relation to enterprises and employment. Such measures should include the **strengthening of infrastructure and physical assets as well as the capacity of people to anticipate and cope with disasters in the future.** A suitable programme would be based on two pillars: **(1) prevention** to avoid construction of businesses in disaster prone areas (floods and landslides) and **(2) preparedness** by taking measures, both structural and non-structural, to reduce the likelihood and impact of disasters, protect premises and staff and to take steps to limit the potential damage. Financial incentives may be required for enterprises to incorporate prevention and preparedness considerations gradually into their business model.

Table 81 - Recovery needs for Employment and Livelihood linked to enterprises

Recovery Needs for Employment and Livelihood linked to enterprises (agriculture, industry and services)					
Category	Details of the recovery needs	Likely duration of recovery	Costing principles		Impact on employment and livelihood
RECONSTRUCTION NEEDS					
Premises	Total reconstruction or repair	Medium and long-term	Cost of reconstruction or replacement	442.27 million EUR	Recover 3,000 jobs permanently lost and protect an additional 13,500 jobs at high risk, reduce livelihood loss of dependents
Equipment and Machinery	Total replacement or repair		Cost of repair or replacement		
Raw Material	Supply of materials	Short term	Cost of new material		
Finished Products	Removal and cleaning of destroyed products	Short term	Cost of labour, cost of disposal		Creation of short term jobs
BBB and DRR	Installation of flood protection measures	Medium and long-term	Cost of construction	38,346.89 EUR per hazard-prone enterprise	Creation of resilient jobs and livelihoods
LOSSES TO INCOME/EMPLOYMENT					
Reduced business operation and productivity	Restore infrastructure through employment sensitive strategies to ensure that mirco and small businesses have access to market and bidings	Short term	Cost of reconstruction	resources embedded in reconstruction programmes from different sectors	Prevention of additional suspension of labour
Reduction in turnover	Revitalise local economy and stimulate domestic demand through a <b>Recovery Strategy for Enterprises and Decent Employment</b>	Short, long and medium term	Cost of programming and project implementation	94.08 million EUR	Decent Work opportunities
BBB and DRR	Enhance preparedness for future risk	Medium and long term	Series of trainings for capacity building on Multi-Hazard Business Continuity Management		Creation of resilient jobs and livelihoods

The Recovery and Decent Employment Promotion Strategy should consist of a 'package' of multiple key interrelated components or 'entry points' to bridge the continuum from immediate job preservation to longer-term local development that includes better disaster coping mechanisms and worker protection at the workplace. The following components are proposed to form a coherent programme that moves from immediate assistance (short term, early recovery components, 6-12 months) into subsequent rehabilitation, throughout a 36-month timeframe (medium term interventions) to long-term interventions (5 years or more).

#### **4.1.10.1.2 Short-term (6-12 month timeframe)**

- Short cycle skills training and kits for recovery and construction related skills.
- Through existing MFIs and/or the local banking system launch a rapid finance programme for enterprises (possibly grants or concessional credits for micro and small enterprises, and credit lines at feasible terms for medium and large enterprises) to recover full operation, replenish inventories, repair equipment and reconstitute working capital.
- Creation of temporary employment during the recovery and reactivation of forward and backward linkages of the various sectors (power supply, input supply, public infrastructure repairs and other related needs) in order to foster the reactivation of the economy in affected areas and sectors.
- Assist the quick recovery of assets and livelihoods for the most vulnerable groups, including Roma and displaced communities, through a multidisciplinary employment recovery project implemented by local government and local NGOs.
- Short-term vocational and business start-up and management training for job seekers and micro/small entrepreneurs specifically targeted at the most vulnerable women and youth and implemented by existing public and private training providers.

#### **4.1.10.1.3 Medium-term (1-3 years' timeframe)**

- Enhance access to innovative employment services (e.g., career counselling, coaching, internships and training) in cooperation with local institutions (e.g., local labour offices and training centres) for lifting the employability of the most vulnerable and unemployed workers.

- Enhance the capacity (software and hardware) of local public and private business service providers as well as financial service providers (MFIs and banks) to cater for start-up entrepreneurs, especially amongst the youth, women and former wage workers transitioning to self-employment.
- Support capacity building for local institutions and entrepreneurs by instigating ToT on 'Multi-hazard Business Continuity Management', including climate change adaptation.

#### **4.1.10.1.4 Long-term (5 years' or more timeframe)**

- Support to authorities to create an enabling environment for disaster resilient enterprises that would, for example, enhance the legal and regulatory framework, strengthen the rule of law, reduce the informal economy, promote an entrepreneurial culture and enhance social dialogue.
- Facilitate and establish canton/municipal broad-based public-private dialogue mechanisms to define local economic and disaster risk reduction strategies based on risk assessments, value chain assessments, local economic development potential and launch development programmes and interventions. Recovery resources are used to reinforce development trends in selected sectors (e.g., tourism, agricultural product processing).

Subject to the availability of funding, such interventions would be implemented progressively across BiH in flood-affected municipalities in the FBiH, RS and BD. The proposed Enterprise Recovery and Decent Employment Promotion Strategy is intended to provide guidance for concerned ministries at the national and entity level as well as for local stakeholders to plan, budget, implement and monitor a comprehensive employment rehabilitation response.

### 4.1.11 Crosscutting Themes

#### 4.1.11.1 Gender

##### 4.1.11.1.1 Agriculture, Land Ownership and Housing

Theoretically, women and men have equal rights in Bosnia and Herzegovina. Legally there is no discrimination against women with regard to access, ownership or inheritance of land or other property. In the FBiH 26% of land and property are currently registered under women's names and almost 40% in RS, yet in practice women in rural areas often surrender their rights in favour of male relatives.

Traditions that view land and property as a male prerogative remain strong: there is a lack of awareness amongst women concerning their right to own and manage property. Interviews described cases of manipulation and exploitation of women by family members over housing, including sexual exploitation of widows seeking to remain in their marital home. The latter cases were far from rare.

The floods were most devastating for smallholder farmers (less than two hectares), for whom agriculture is their sole source of subsistence and income, as all their crops and fodder was destroyed. Statistics are not yet available, but this group is known to be large with a high percentage of female households. Some argue that material damage has a proportionally greater impact on single women, because they have no other income or livelihood options. Increased migration over recent years has resulted in overall female-led households now standing at one in four nationally, much higher in some areas.

More flood-affected women than men have been accommodated in collective centres, many of them elderly. Prior to the disaster, 28 collective centres housed primarily war-displaced female-led families of which 8% were war widows. Many have been unable to return home because they lack basic livelihoods for support or for reasons of personal security. The lack of privacy, especially for breastfeeding mothers, has been a major complaint about the collective centres. The BiH military and police have not yet been trained in gender and exclusion.

Post-war housing constructed for IDPs and refugees, particularly Roma, tended to be unregistered and of poor quality with much of it on low-lying land, which is now flooded. Again, in several areas a higher proportion of war-displaced families are female-led.

There is a widely held perception that because of prevailing norms and attitudes flood-affected women will experience greater difficulty compared to men in obtaining house reconstruction assistance. Women rarely participate in decision-making on rural development and lack the necessary information on both programmes and construction to be able to make informed decisions; therefore, they are less likely to benefit equally from repair and other programmes.

*“We can always assume single mothers face great challenges but recovery will have all the usual suspects for social exclusion, and any response must **not** see all as equal: clear priorities must be set.”<sup>43</sup>*

### **Recommendations**

- Equitable and transparent land, housing and property priorities and restitution for men and women, irrespective of marital status, must be ensured.
- Default joint titling and joint registration of recovery assisted land, housing, property and productive resources must be ensured for married women and unmarried women alike, so they are able to benefit equally from titling and registration programmes.
- Titling and registration programmes must be accompanied by awareness-raising initiatives aimed at educating women and men about women’s right to access use and control land and other productive resources.
- Meaningful participation of women, including marginalised and excluded women, in decision-making processes relevant to housing, land, property and agriculture must be ensured.
- Clear and transparent criteria for reconstruction assistance must be provided and equitable numbers of women and men trained in safe construction and DRR, with special assistance for those unable to carry out repair work on their own.
- Cash for work assistance to men and women must be balanced equally.
- Replacement costs of household goods and furnishings should be directed to women as these are linked to women’s work and home-based income.
- Cash compensation must be provided to vulnerable individuals completely reliant on small-scale subsistence agriculture.
- S.O.S telephone help lines should be expanded to provide psychological support and services for flood affected women and girls, and boys and men.
- Housing and compensation issues for war victims must be urgently addressed.

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<sup>43</sup> Adnan Kadribašić, expert advisor to the Agency for Gender Equality of BiH.

#### 4.1.11.1.2 Employment and Livelihood

*“Women will definitely face greater challenges in continuing their business or self-employed initiatives. The fact is that women are both running their businesses and managing their households. Women will need to get both remediation of flood effects in their homes as well as on their business and it will take much more time, efforts and financial resources. It will affect more women than men to resolve issues derived from floods and landslides”.<sup>44</sup>*

Women in Bosnia and Herzegovina are disproportionately unemployed and underpaid compared to men. Less than one-third of women are active in the labour force and earn less than half of what men earn. Disparities and conditions are even more extreme for Roma men and women. One of the two main issues emphasised by the Convention for the Elimination of all Forms of Discrimination Against Women (CEDAW) Committee in its 2013 report on BiH was the need to achieve equal opportunities for women and men in the labour market, with special attention to disadvantaged groups of women.

It is not yet known how many jobs will be lost in the formal employment sector. Women are registered owners of one-third of businesses in the flood-affected areas, although some of them are owners in name only. Most women interviewed were involved in agriculture and/or small enterprise before the flooding; most felt that the damage to livelihoods – particularly agricultural – would have a far more serious effect than the loss or damage to houses.

Whilst recognising that both men and women contributed hugely to helping their neighbours and communities immediately after the flood, it was reported in most locations that women performed much longer hours of community clean-up work than men.

Informants felt that statements about women’s greater workload would “likely be laughed off,” but they reflect the reality underlying economic and other gaps between women and men in Bosnia and Herzegovina.

Where businesses have been flooded, estimates are that employees - especially women - may have been cleaning at the workplace for as long as two months with no guarantee that their jobs will still be there. The Municipality of Bijeljina imposed an obligation for all civil servants to work on the recovery: men were sent to work on the embankments, while women were required to work in the humanitarian aid centres some times for 14 hours; this was regardless of personal needs and in contravention of a number of equity labour laws. The Organisation for Security and Co-operation in Europe (OSCE) is now monitoring the situation, as the increased unpaid work burden on women is of great concern.

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<sup>44</sup> Esmir Spahic, Senior Expert Associate at the Department for Development, Entrepreneurship and Social Affairs in the Municipality of Tuzla.



More women than men are employed in agriculture and seventy per cent of women work as unpaid family labour. Women's unpaid labour is a significant contributor to economic wellbeing yet rarely factored into accounts. In Organisation for Economic Co-operation and Development (OECD) countries women spend an approximate average of 4.5 hours per day on housework and family care compared to 2.3 hours per day for men; it is reasonable to assume that this is similar in BiH and that it has increased because of the disaster. Women's domestic responsibilities are expected to be a major factor in their slower return to economic activity.

Generally, respondents believed that the same criteria will apply to male and female owned enterprises seeking support. There is a strong feeling that it will be more difficult for women to get support to re-establish small home-based enterprises, because the risk is seen to belong to the individual women as opposed to a family. Several women with small specialised services, such as cake making or sewing, did not expect their businesses to recover for a long time, as under currently conditions there is little call for luxury items.

Most said that women need equal opportunities to benefit from interest-free loans, favourable terms with deferred payments, special start-up initiatives, lower interest rates and help with re-establishing markets. Two agricultural women expressed reservations about taking loans with no foreseeable way to repay it. Fruit growers noted that while they still have fruit the price for it has dropped to a fifth of the normal price, in spite of the scarcity, because people are worried about contamination. Three people mentioned that the government should pay the incentives it has owed to farmers for the past two years, while several emphasised the need to engage women's organisations in assistance planning and prioritisation in order to prevent sexual exploitation and abuse of post-war recovery programmes.

The concept of 'recovery projects' for women was controversial. Training in jam-making and other home production was advocated but there was also the view that micro-enterprises can trap women on the fringes of economic activity. Some argued that women's projects add to the time burden for women with little financial gain and deflected attention and funds away from political empowerment and more strategic economic equity initiatives.

*"Workloads are already a big factor holding women back and now they are working even more, so women's own business recovering will be delayed. Home life must be restored first, so women will have to do even more reproductive work than before and for a long time to come".<sup>45</sup>*

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<sup>45</sup> Adnan Kadribašić, expert advisor to the Agency for Gender Equality of BiH.

### **Recommendations**

- Ensure transparency in the distribution of recovery funds, especially when distributed as cash, and ensure resources are equitably provided to women and men.
- Strengthen economic empowerment programmes for women as part of Disaster Risk Reduction.
- Compensate women for their additional burden of unpaid labour after the floods.
- Establish dedicated funds for the rapid re-establishment of women's small and home-based enterprises.
- Engage young people registered with the employment bureaus to help others with post-flood cleaning and to help free women's time.
- Prioritise the recovery of schools, social and children's services and safe houses so that women can retain their employment.

#### **4.1.11.1.3 Other Sectors**

The transport, energy and water and sanitation sectors were perceived to have less potential for different impacts on women's and men's respective recovery ability. Transport was mentioned for the importance of repairing minor as well as main roads for rural women to be able to access public transport and for children to travel safely to school. Similarly, rural micro hydro projects must be recognised as equally important as large power stations. Recovery priorities for women in these sectors included provision for mobility, access and communications in areas lacking public transport, access to water and disinfectants and access to information about planned development and changes.

#### **4.1.11.1.4 Additional Concerns about Inequality**

Although not part of the six focus sectors for PDNA damage and losses calculations, three additional topics were raised repeatedly and merit inclusion. These were psychological support needs, coordination and corruption, and disaster preparedness/risk reduction.

*"Women I met would change their faces so many times during the conversation, due to the difficulties of the situation they have to cope with: frustration, anger, lacking power, being weak, nobody asking her... Women put themselves last all the time and they will suffer; psychological help is needed"*<sup>46</sup>.

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<sup>46</sup> Adnan Kadribašić, expert advisor to the Agency for Gender Equality of BiH.

**Psychosocial needs:** More than half of respondents described the need for psychological help for flood victims, particularly women. Others disagreed, feeling that the problems facing women were social, economic and structural and should be addressed at such a level. However, the unaddressed trauma and losses afflicted on previously war-affected and displaced women now compounded by fresh devastation are evident. Two respondents recognised that men and boys also need support to cope with loss and psychological problems safely.

**Coordination:** Several people spoke about lack of coordination in the early response, particularly food distribution, and were concerned about the implications for an organised and fair recovery. There were no criteria for entitlements and problems occurred when people received different goods or quantities, for no apparent reason.

Problems described in the emergency phase included CSOs being stopped from providing assistance by the Red Cross after the Government of RS decision to centralise all aid. Bijeljina and Doboј reported that for an extended period very little help was received by anyone.

Equal to or greater than the concern for gender equity in recovery planning was the need to prevent misuse of assistance funds. In the emergency phase, there were reported incidents of exclusion from food distribution based on political affiliation; two respondents noted that politics is more important than gender when it comes to determining who gets aid.

Almost all described the need to be very cautious about corruption and were concerned about likely misuse of funds and the need for a strong control mechanism to make sure those who need help will get it. It seems vital, especially during an election year, to depoliticise recovery planning and aid. It is felt at the state level that a precondition for fair equitable recovery assistance should be to include gender and/or human rights expertise in all recovery processes.

*“In uncoordinated situations, the voices of the loudest will be met first. Demobilised soldiers are the biggest and most influential interest group in the country; they are always men and they always get priority, especially in employment. This has been seen through twenty years of pensions and other benefits, leaving budgets empty for women victims of war, safe houses and services for other groups. This aspect must not be allowed to drive recovery, but no institution has taken the lead to coordinate, so this may be a problem”<sup>47</sup>.*

**Preparedness and DRR:** Also emphasised by many as critically important is the need for equal and meaningful involvement of women in planning to reduce risks and mitigate the impact of future disasters.

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<sup>47</sup> Adnan Kadribašić, expert advisor to the Agency for Gender Equality of BiH.

## Recommendations

Involve equal numbers of men and women, including from marginalised groups, at decision-making levels in state bodies and organisations working on reconstruction, recovery, disaster preparedness and risk reduction.

- Expand SOS telephone support help lines.
- Gender analysis and impact assessment must precede infrastructure reconstruction to ensure different needs and priorities are being equitably met and that women and men benefit equally, from design through construction to delivery. 'Beneficiaries' must be disaggregated by sex, wealth status and household type to validate who benefits from infrastructure projects.
- Provide training in gender-sensitive disaster preparedness and response planning for municipal governments, police, civil defence and CSOs, involving women, girls, boys and men. Prepare gender-responsive disaster plans, including mapping of vulnerable groups.
- Ensure compliance with existing requirements for disaggregated statistics at all levels of government.

### 4.1.11.1.5 Conclusions

It is clear that the floods had very different impacts on women and men, and the information reported here indicates that recovery needs and priorities are also different. The reconstruction process cannot ignore the very unequal starting places of women and men in BiH. Strengthening resilience against future shocks demands that attention be paid now to reducing inequalities that create vulnerability. Funding for women's economic and political empowerment, and for equal participation in all disaster-related discussions, is key to building back better to reduce future disaster risks.

Table 82 - Gender specific recovery needs by items

Description / Intervention	Value (EUR)	Short term (6-12 months)	Medium term (1-3 years)	Long term (5+ years)
Unpaid labour compensation to women whose houses were damaged/destroyed: 2 hours/day x min. wage (EUR 0.89) x 2 mos x ~43,249 women (# to be confirmed)	4,617,165.60	127,822.97	4,489,342.63	-
Cash compensation of home garden losses: most vuln FHH with <2HA & no other source of income 5000 hh x 500	1,278,229.70	127,822.97	1,150,406.73	-
Improve collective centre accommodation: privacy, facilities & services	10,225.84	10,225.84	-	-

Dedicated grant fund to re-start women's uninsured small and home-based enterprises	2,556,459.41	25,564.59	1,533,875.64	997,019.17
Gender-sensitive needs analysis for all affected areas with focus on vulnerable groups	25,564.59	5,112.92	20,451.68	-
Require financial recovery contributions to integrate both accountability measures and gender equality indicators				
Enforce laws with respect to non-discrimination and pay equity in employment; government collection & use of sex-disaggregated statistics				
Information campaign on reconstruction programs & entitlements	25,564.59	5,112.92	20,451.68	-
Ensure the equitable and full participation of women and gender experts in all recovery decision-making, implementation and evaluation processes.				
Training: Gender in Disasters, Response & Recovery x 5	102,258.38	20,451.68	81,806.70	-
Expansion of telephone support/SOS lines x 12 months	30,677.51	10,225.84	20,451.68	-
Women's Housing Land & Property rights campaign	255,645.94	51,129.19	204,516.75	-
10 x Gender in Preparedness planning and training	71,580.86	20,451.68	51,129.19	-
	-	-	-	-
<b>TOTAL</b>	<b>8,973,372.43</b>	<b>403,920.59</b>	<b>7,572,432.68</b>	<b>997,019.17</b>

Table 83 - Summary of gender specific recovery needs

000 EUR	SHORT TERM	MEDIUM TERM	LONG TERM	TOTAL
<b>TOTAL</b>	<b>419.26</b>	<b>7,556.89</b>	<b>997.02</b>	<b>8,973.17</b>
FBIH	184.07	3,139.33	398.81	3,722.20
RS	214.74	4,228.38	577.76	5,020.89
BD	20.45	189.18	20.45	230.08

### 4.1.11.2 Security

#### 4.1.11.2.1 Implementation and Cost of Landmine and UXO Survey and Clearance

The present methodology for landmine mine clearance in BiH focuses on the original concept of 'demining'. Demining<sup>48</sup> covers a range of activities that lead to the removal of the threat from landmines and explosive remnants of war (ERW). These include survey, risk assessment, mapping, marking, clearance, post-clearance documentation and the handover of cleared or otherwise released land. Physical clearance is only one part of the demining process, but it is the most costly part. Therefore, under current conditions caused by the flooding it is important to get a general assessment (non-technical survey) of the situation to avoid any excessive over spend on clearance. In other words, it is important that any potential threat is identified early in the immediate/short-term, marked off and prioritised for clearance in the short to mid-term.

The most recent concept to conduct landmine clearance<sup>49</sup>, as outlined in International Mine Action Standards (IMAS), is to conduct clearance through a land release process. The land release process consists of establishing and improving the definition of where mines/ERW are to be found (and where they are not). This is done through the application of all reasonable means until it can be shown, with justifiable confidence, that mines/ERW are either not present in an area or, if they were found to be present, have all been destroyed or removed from that area.

The nature of the reasonable effort required to implement the process varies depending upon the specific local circumstances and conditions, the stage reached in the land release process and the implications of new information discovered as the process progresses.

Practical effort is normally applied through non-technical survey (which includes all appropriate non-technical methods), technical survey and clearance. Although it is typical for the process to advance from non-technical survey through technical survey to clearance, there is currently no requirement for it to follow any one sequence. Planners, operators and decision-makers should keep the situation under review at all times, identifying all relevant sources of information, techniques and methods and making use of them whenever it is appropriate, effective and efficient to do so.

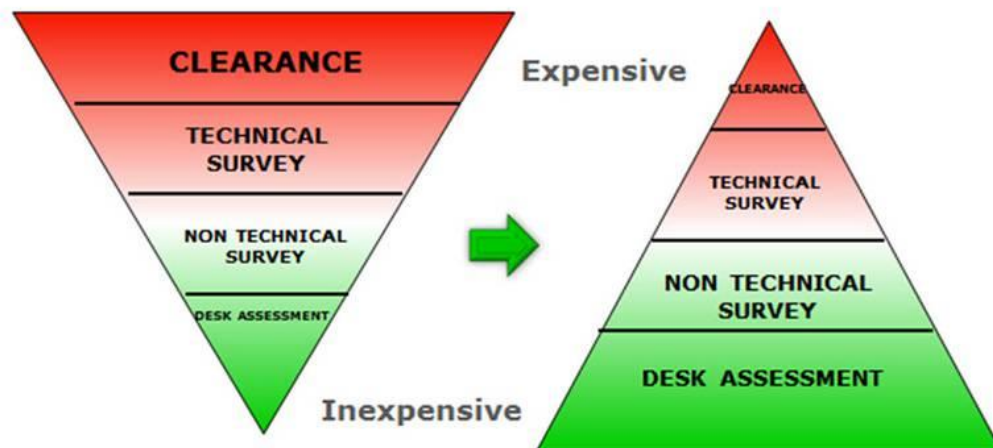
Because all known or suspected mined areas prior to the flooding were marked and fenced there should be no need to conduct a complete re-survey of all areas that were flooded as described in the demining process. By following the land release approach and studying the information and data collected it should be possible to complete a thorough non-technical survey leading to technical survey and clearance in the affected areas. By ensuring only actual mined areas are contracted out for clearance, valuable time and resources would be saved.

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<sup>48</sup> Reference; A Guide to Mine Action and Explosive Remnants of War, Third Edition, GICHD, Geneva, April 2007. ISBN 2-940369-02-X

<sup>49</sup> Reference; IMAS 07.11 Land Release First Edition (Amendment 2, March 2013)

Graph 24- Land Release Concept



For the short term recovery phase it is recommended that BHMACH continue with the original concept of demining and in the medium term look at developing the land release concept with help from international partners. The processes involved for immediate recovery to 'building back better' to the mid-term is outlined below.

- Non-technical (desk top survey) of all extended SHAs
- Replacing marking and fencing of SHAs
- Technical Survey and marking of new SHAs
- Clearance of confirmed SHAs
- Mine Risk Education (MRE) community liaison in all affected areas

These activities will need to be factored in on the planning horizons and time and resources should be an important consideration before estimating the cost of a survey or clearance activity. It is no use allocating funding if the resources are not available or winter weather stops clearance. Certain activities will need to be conducted immediately while other activities can be done more slowly in the medium to mid-term.

One of the main activities to be conducted will be the survey process. All SHAs that have been flooded or contain landslides will need to be reviewed in a non-technical survey with information that has already been gathered from the field during the emergency phase. The information gathered from the non-technical survey will help establish as to whether an area is contaminated or not. If there are indications that mines are present then further investigation should be conducted by implementing a technical survey. The survey

process should be done on a priority scale based on potential risks to the local population and key infrastructure.

Concurrently while the survey is being conducted, mine marking and fencing teams should be reinstating permanent minefield marking where emergency marking has been placed or existing marking has been destroyed. Again fencing tasks should be prioritised based on the potential risks to the local population and key infrastructure.

Technical survey is the key link to initiating a mine clearance task. Mine clearance is an expensive operation and needs to be planned and executed so clearance teams are in mined areas clearing mines and not just producing square meters of processed land. The technical survey should confirm boundaries around the mine contaminated area and also the presence of mines. Again, technical survey tasks need to be prioritised based on potential risks to the local population and key infrastructure. A good example would be occupied houses or roads that have suffered landslides from SHAs.

The clearance of an SHA should be initiated upon confirmation of mine contamination through technical survey. Again, clearance tasks need to be prioritised based on potential risks to the local population and key infrastructure.

At present, it is very difficult to calculate the entire cost of the clearance as at the time of writing the information given was mainly estimated from the initial feedback from BHMAL regional and sub-offices. A detailed non-technical survey will need to be conducted to get a better picture of the situation on the ground. The current situation is now defined as follows:

- from the initial 920 km<sup>2</sup> of flooded area approximately 300 km<sup>2</sup> was assessed to be in mine affected areas;
- of this 300 km<sup>2</sup> of flooded area BHMAL identified approximately 105 km<sup>2</sup> that could potentially contain mines and UXO that have migrated from the suspected hazardous areas (SHAs); and
- within the 105 km<sup>2</sup> a total of 40 km<sup>2</sup> was marked up as SHAs.

The clearance of mines and UXO is an expensive activity so it is important that clearance contractors are contracted to clear known mine and UXO contaminated areas. If a clearance contractor does not find or locate any mines/UXO then questions will need to be raised as to why an area was put out to contract and what happened in the survey process.

As raised in the methodology section, the land release concept should be used by applying all reasonable effort until it can be shown with justifiable confidence that mines/ERW are either not present in an area or, if they were found to be present, have all been destroyed or removed from that area. This methodology allows for a more cost effective approach and in many cases removes the requirement for a full technical survey or clearance, both of which are expensive activities.



If any area is suspected to be hazardous but no mines have been identified then it would be acceptable to check a certain percentage of the area with either mine detectors, mine detection dogs or mechanical mine clearance assets. If no mines are found then all reasonable effort has been applied. The present cost of 1.02 EUR for technical survey and 1.53 EUR for clearance is based on applying a full manual mine clearance method, which is slow in time and expensive in resources. If a land release concept is accepted and methodology for applying all reasonable effort developed then the cost of survey and clearance could be greatly reduced.

The land release process needs to be well managed and the decision-making and control of activities should be coordinated only by BHMAC. If commercial contractors are involved then full supervision should be maintained at all times. The best approach for land release would be to train BH Armed Forces or Civil Protection in the process, as they are part of the existing national structure and would have no commercial gain. The commercial companies could then focus purely on implementing the clearance contracts once the presence of mines has been confirmed.

#### 4.1.11.2.2 Short-term Recovery

The table below shows a list of activities required for the short-term response (3 – 6 months and 6 – 12 months).

*Table 84 - Security short-term recovery needs*

Activity	Quantity	Unit cost in EUR	Total Cost in EUR
Non – Technical Survey of SHAs (Area reduced by 60%)	105 km <sup>2</sup> (Area reduced to 42 km <sup>2</sup> )	102.26	10,737.13
Technical Survey of high priority SHAs (10% of 42 km <sup>2</sup> )	42 km <sup>2</sup> 10% of area = 4,200,000 m <sup>2</sup>	0.51	2,147,425.90
Clearance of confirmed high priority SHAs (10% of 4.2 km <sup>2</sup> )	10% of 4.2 km <sup>2</sup> = 420,000 m <sup>2</sup>	1.53	644,227.77
Emergency access and Clearance of Landslides with mechanical support	51 suspected locations	1,533.88 per landslide.	78,227.66
Fencing and marking Teams	5 x (5 person) teams for 3 months	920.33 per month per team	69,024.40
Emergency marking materials and equipment	300 kilometres	51.13 per kilometre	15,338.76
MRE/Community Liaison teams	10 x (3 person) teams for 1 month	766.94 per month	23,008.13
UXO recovery and clearance	3 x (5 person) teams for 3 months	920.33 per month per team	8,282.93
Technical Survey of Medium	42 Square kilometres	0.51	6,442,277.70

priority SHAs. (30% of 42 km <sup>2</sup> )	30% of area = 12.600,000 m <sup>2</sup>		
Clearance of medium priority SHAs (30% of 12.6 km <sup>2</sup> )	30% of 12.6 km <sup>2</sup> =3,780,000 m <sup>2</sup>	1.53	5,798.05
<b>Total (up to one year)</b>			<b>15,236,600.32</b>

#### 4.1.11.2.3 Mid-term Recovery

The table below shows a list of activities required for the mid-term response (1 – 3 years) when we aim to 'Build back better'.

Table 85 - Security mid-term recovery needs

Activity	Quantity	Unit cost in EUR	Total Cost in EUR
Technical Survey of Medium Priority SHAs. (60% of 42 km <sup>2</sup> )	42 Square Kilometres 60% of area = 25,200,000 m <sup>2</sup>	0.51	12,884,555.41
Clearance of Medium Priority SHAs (60% of 25.2 km <sup>2</sup> )	60% of 25.2 km <sup>2</sup> =7,560,000 m <sup>2</sup>	1.53	11,596,099.87
<b>Total (1.5 - 3 years)</b>			<b>24,480,655.27</b>

**Total cost in 3 years**

**39,717,255.59 EUR**

**Please Note:** This figure is purely a projected figure based on current data and information at time of writing. Once survey teams are deployed and information is received then the level of expected contamination should be reduced. The cost of the survey and clearance is based on the current commercial pricing for clearance contracts, if a land release concept is implemented this figure should be reduced.

## 4.2 Guiding Principles for Sustainable Recovery

### 4.2.1 Guiding Principles

The guiding principles of a post disaster recovery strategy are to be defined nationally, by the stakeholders concerned. In this case, the BiH authorities at all levels, taking into account the demands and needs expressed by the affected population, and in accordance with their respective priorities and their financial and technical capacities.

When a disaster of this magnitude affects a country it tends to exceed its capacities, both in financial terms as well as its possibility to absorb and utilise the resources it requires in the short term. That is why a recovery strategy leads to a recovery framework that puts in perspective the priorities in terms of feasibility in the short, medium and long term.

There are some internationally recognised principles that are expected to guide a recovery and reconstruction process. These are known as the core principles and are summarised in the box below.

Some issues that must guide the recovery process may be indicated from the outset. The recovery Strategy is to be framed within long-term programmes and plans.

Disaster risk reduction is to be introduced systematically alongside resilience building in the country's strategic vision, as new vulnerabilities and fragilities will have been created by the disaster.

This implies that previous priorities are to be re-contextualised in the face of the opportunities that arise. As such, it must be considered that the disaster creates a new possibility for prosperity. Job creation programmes may help jumpstart and expand growth through the recovery process and reconstruction investment.

An integrated perspective on security and risk reduction is to be seen as a factor of competitiveness. Thus, adaptation to climatic variations and climate change generate resilience and are also a risk reducing factor. In this context energy efficiency, clean production and green development does not only mitigate climate change, but they also generate competitiveness.

Figure 19 - Internationally recognised guiding principles for assessing and undertaking disaster recovery<sup>50</sup>

- Adhere to the core principles of humanitarianism, impartiality and neutrality.
- Acknowledge the national ownership of PDNA (demand-driven, country-led process, with the fullest possible leadership and engagement of national authorities in assessment, recovery planning and implementation).
- Support local ownership (fullest possible engagement of local authorities and community-based).
- Organisations in the planning and execution of recovery, and building specific capacities where needed.
- Provide coordination at all stages of the process and at all levels, ensuring collaboration and partnership between the international donor community and inclusive of NGOs, civil society and other stakeholders engaged in the PDNA.
- Adhere to the principle of *Primum non nocere* - 'first, do no harm' - ensuring that the process does not have a detrimental effect on life-saving relief to the affected population and on the country.
- Adopt a conflict-sensitive approach and ensure that the assessment does not exacerbate existing tensions, and that the recovery strategy takes into account potential disaster-related conflicts.
- Support and strengthen national and local capacities to lead and manage recovery and reconstruction.
- Ensure transparency and accountability in the PDNA process as well as in post-disaster recovery and reconstruction.
- Integrate DRR measures in the recovery process to enhance the resilience of affected populations and countries with regard to future disasters.
- Develop a recovery plan that addresses the gaps created by the disaster and which effectively helps people in building back better and reduce future risks without expanding recovery needs and priorities into a full-fledged development plan that goes beyond the disaster.
- Have a gender perspective.
- Focus on the needs of the most vulnerable sections of society, including female-headed households, children, orphans, the landless, people with special needs, the youth and the elderly.
- Promote equality to prevent discrimination of any kind on grounds of race, colour, nationality, ideology, sex, ethnicity, age, language, religion, disability, property, and birth, among others.
- Mainstream crosscutting issues such as gender, environment, governance, and human rights, HIV/AIDS, among others.

<sup>50</sup> Adapted from PDNA Guide, 2014, vol. A, p. 15.

## 4.2.2 Disaster Risk Reduction and Long term Sustainable Development

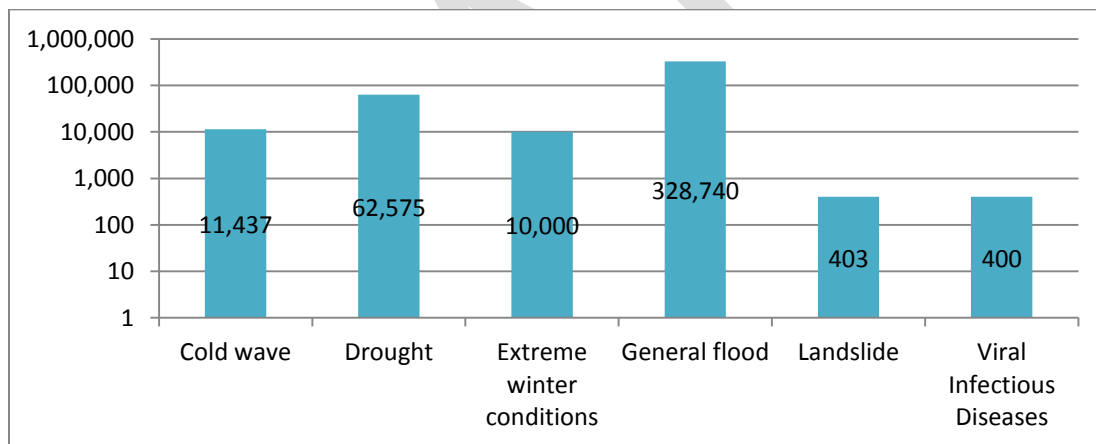
### 4.2.2.1 Executive Summary

The May floods illustrate how highly exposed and vulnerable BiH is to natural hazards. From the effects of the floods across the board, a clear perspective arises on the overall level of vulnerability and risk of the country to natural disasters prior to the May 2014 extreme precipitation.

Based on those effects, quantified in each sector, the conclusion can be made that there is a need for a deeper analysis and increase investment in risk reduction infrastructure and the medium and long term, beyond the recovery and reconstruction needs to overcome the effects of the disaster.

### 4.2.2.2 Disaster Risk Profile of BiH

*Graph 25 - Population affected by the disasters in BiH since 1999*

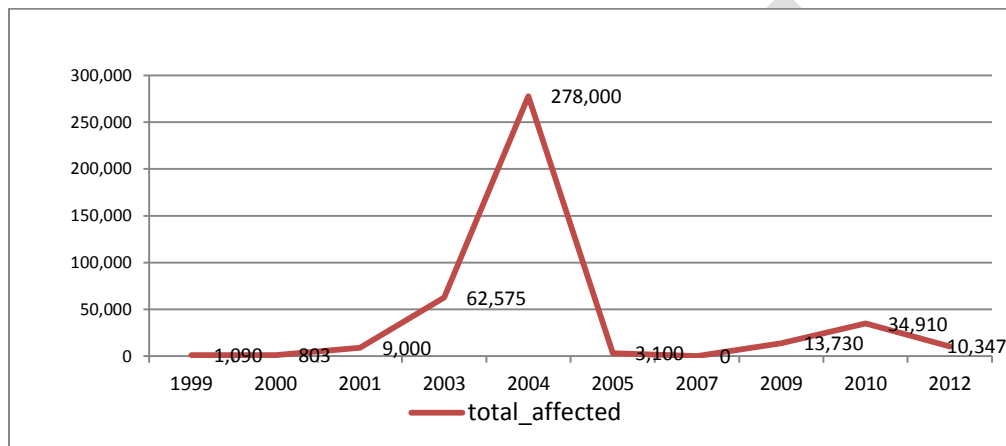


Not so distant history records illustrate how BiH is exposed to floods, earthquakes, droughts, heat waves, landslides and wild fires. Data from the Centre for Research on the Epidemiology of Disasters<sup>51</sup> gives an approximate picture of the country's disaster hazards and risk on the basis of number of events and affected population. Quantification of its economic, social or environmental consequences has not been sufficiently studied. It must be pointed out, that in the face of the risks posed by climate change the country has adopted an adaptation policy, which should be expanded to become a risk reduction policy as adaptation to climate change and risk reduction are to be seen as integral resilience

<sup>51</sup> OFDA CRED, EM-DAT: The OFDA/CRED International Disaster Database, [www.em-dat.net](http://www.em-dat.net) - Université Catholique de Louvain - Brussels – Belgium.

building policies. It must be stressed that such policies, if appropriately formulated, have economic and social synergic effects and lead, through enhanced resilience, to a more competitive stance for the country that adopts them. The required investment associated with them is not to be considered as an additional cost. By the same token, good environmental management and a reduction of environmental degradation practices, such as deforestation, unplanned urbanisation and intrusion into riverbeds altering watersheds, should be part of these policies.

Graph 26 - Yearly affected population by disaster in BiH



Recently the intensity and frequency of some of these perils has dramatically increased<sup>52</sup>. Development, urbanisation and an overall increase in the fixed capital stock of the country also increases the value of the asset exposed to these perils and hence the risk. Aging infrastructure, war and lack of investment has contributed to the vulnerability of the existing infrastructure.

#### 4.2.2.3 Hazards

BiH experienced major floods in 1976, 2004, 2010 and recently in May 2014. In total 2,500 km<sup>2</sup> of the country's territory is prone to flooding, in particular the River Sava and its tributaries. The 2004 flooding destroyed 20,000 ha of farmland and affected 300,000 people in 48 municipalities. In 2010, heavy precipitation resulted in extensive flooding in the entire territory<sup>53</sup>. The floods of May 2014, which initiated this RNA, are the most extensive and the amount of precipitation the largest recorded in the last 120 years. The disasters from flooding and subsequent landslides and mudflows have claimed lives, destroyed houses, interrupted both road and railway transportation and affected

<sup>52</sup>Climate Change Adaptation and Low Emission Development Strategy for Bosnia and Herzegovina (adopted by the Council of Ministers of Bosnia and Herzegovina on 08 October 2013.)

<sup>53</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

livelihoods in a vast part of the country. The hardest hit areas were around the Sava and Bosna rivers.

The mountainous geography of BiH often compounds disasters. Landslides and mass movements are frequently triggered by seismic activity, rainfall or both. Unplanned construction and exploitation of forests has increased landslide vulnerability over the last 15 years. Large landslides have occurred around the area of Zenica, Tuzla and the surroundings of mines such as Breza, Koritnik, Vareš and Smreka.<sup>54</sup> The May 2014 extreme precipitation caused about 3,000 identified landslides affecting many communities, and damaging roads and houses. Many houses were completely destroyed and some were categorised as inhabitable.

BiH is also exposed to droughts, earthquakes and wildfires. For instance, in 2002 and 2003 extreme heat and drought affected 60% and 40% of the country's agricultural production, respectively, generating major food crisis and affecting up to 200,000 people<sup>55</sup>. Earthquakes are also a threat as the country lies within a zone subject to earthquakes of between 7 and 9 degrees intensity on the Mercalli-Cancani-Sieberg Scale<sup>56</sup>. Fourteen destructive earthquakes within this range of intensity have been registered during the twentieth century. Wildfires have also resulted in major economic losses. Recent ones occurred in 2003 and 2007.

The highest exposure, based on the population exposed, is to seismic and flood hazards, the latter far exceeding the former. Given that both tend to create land mass movements, landslide exposure is also very relevant as shown in the table below.

*Table 86 - Hazard intensity level and number and percentage of people exposed*

Hazard	Very High	High	Medium	Low	Very Low	No Data
	No. exposed (%)	No. exposed (%)	No. exposed (%)	No. exposed (%)	No. exposed (%)	No. exposed (%)
<b>Seismic</b>	0 (0.00%)	374,873 (9.97%)	3,383,265 (89.99%)	1,495 (0.04%)	0 (0.00%)	1 (0.00%)
<b>Flood</b>	56,129 (1.49%)	521,106 (13.86%)	2,011,291 (53.50%)	101,175 (2.69%)	1,069,930 (28.46%)	2 (0.00%)
<b>Landslide</b>	0 (0.00%)	5,565 (0.15%)	19,382 (0.52%)	1,760,053 (46.81%)	1,974,631 (52.52%)	2 (0.00%)

**Source:** Adapted from the WHO e-Atlas of disaster risk for the European Region - Volume 1. Exposure to natural hazards (version 2.0). Available online at: <http://www.who-eatlas.org/europe/statistics/bosnia-herzegovina-stats.pdf>

<sup>54</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

<sup>55</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

<sup>56</sup> Natural Disaster Risk and Risk Assessment in South East Europe

#### 4.2.2.4 Vulnerability

Illegal and unplanned construction in hazard prone areas, poor enforcement of building codes, unsustainable agricultural practices, deforestation and erosion increase vulnerability. Continuous maintenance is also important to ensure resilience. For instance, after the 2010 floods the identified weaknesses in the flood protection system were not fully addressed. Housing developments in flood plain areas and on hilly areas exacerbate the risk.

The war also had a major effect on the existing infrastructure. Much of the country's infrastructure was destroyed during the war. For instance, up until 1992, satisfactory flood protection structures were available in BiH; however, 50% of the capacity was damaged or became obsolete during the war and this increased the flood vulnerability of the country.<sup>57</sup>

The aging infrastructure also contributes to the vulnerability: 80% of housing units are older than 30 years. Commercial and public buildings are also old, with 60% of service sector buildings and 92% of education buildings older than 30 years. Moreover, urbanisation is estimated at 80% of the total population due to mass wartime migration from rural to urban areas. This makes most buildings and urban areas susceptible to hazards such as earthquakes.

Inadequate emergency preparedness and response leaves communities vulnerable to natural disasters. For example, according to risk assessment of BiH conducted in 2011<sup>58</sup>, the fire service is significantly depleted in terms of material and technical resources and equipment. Having a sound response system, not only for fire but also to other perils is important to reduce disaster vulnerability.

#### 4.2.2.5 Climate Change

According to a climate change adaptation study conducted in BiH<sup>59</sup>, the level of annual precipitation has not significantly changed over the past decade; however variability of rainfall has increased through the frequency and magnitude of floods and drought. For example, there have been five drought years since 2000 (2000, 2003, 2007, 2011 and 2012).

As experienced in the floods of May 2014, low-lying areas adjacent to the River Sava and its tributaries are at an increased likelihood of flooding. Early spring and late fall precipitation is expected to contribute to the overflowing of the rivers Sava, Una/Sana, Vrbas, Bosna and Drina. Exposure to catastrophic droughts is expected to increase in north and south-eastern regions of the country, around the areas surrounding the cities of

<sup>57</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

<sup>58</sup> Risk Assessment of Bosnia and Herzegovina regarding natural and other disasters

<sup>59</sup> Climate Change Adaptation and Low Emission Development Strategy for Bosnia and Herzegovina (adopted by the Council of Ministers of Bosnia and Herzegovina on 08 October 2013.)



Mostar and Bijeljina. Meanwhile, much of the central area of the country is expected to face increased temperatures and periods of extremely low precipitation leading to increased likelihood of forest fires<sup>60</sup>.

Climate change affects many sectors of the economy, especially when coupled with other factors of stress such as urbanisation, inappropriate land use and overexploitation of non-renewable natural resources or deforestation beyond the natural recovery ratios. This has a negative impact on the agriculture sector by reducing crop yield, which in turn leads to increased food prices. The water sector suffers from poor and degraded infrastructure and current estimates are that 57% of water leaves the country unused<sup>61</sup>. Adaptation approaches will need to focus on improved water through watershed and river basin management and appropriate flood protection and irrigation. Currently this is limited by a lack of reliable data, which is a situation that needs to be addressed urgently. Infrastructural improvements (both flood protection and water storage infrastructure) are part of the needed solution, along with mechanisms to manage water supply and distribution better. A related topic is the generation of energy through hydropower. Risks associated with climate change have not yet been systematically considered in strategies and management plans for hydropower development. Extreme variability of flow will create significant challenges for the hydropower sector, particularly during the low water periods. This needs to be addressed through improved management of water resources at the watershed level.

Climate change needs to be incorporated into risk assessment and risk reduction planning processes, with particular emphasis on floods. Climate change is multifaceted and cross-sectoral and has major implications for disaster management in terms of operating at different scales and across different sectors. In a wider development context, the impact of climate change and disasters affects vulnerable and marginalised groups, with little coping resources, the most. Hence, strategies for disaster risk management should pay special attention to these groups.

#### **4.2.2.6 Risk reduction and Building Back Better**

To have a better perspective of the extent and crosscutting nature of risk reduction, consider the systemic weaknesses identified for each sector. In each case, recommendations are made on what should be done to reduce the existing risks as well as improve capacity and strengthen infrastructure so that they are more resilient to future extreme events.

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<sup>60</sup>Bosnia and Herzegovina - Environmental and Climate Change Assessment. International Fund for Agricultural Development, 2010. Available online at: <http://operations.ifad.org/documents/654016/0/bosnia.pdf/b9a05c73-e0b2-46c6-b04a-5640a9ecff86>

<sup>61</sup>Climate Change Adaptation and Low Emission Development Strategy for Bosnia and Herzegovina (adopted by the Council of Ministers of Bosnia and Herzegovina on 08 October 2013.)

The concept of building back better is very broad ranging from strengthening physical infrastructure to improving organisations and capacity building. A United Nations International Strategy for Disaster Risk Reduction (UNISDR) report that draws lessons learned from post disaster projects around the world<sup>62</sup> lists some of the important components of building back better. These are (i) making disaster reduction part of the national agenda, (ii) empowering local communities to mitigate the risks, (iii) ensuring that schools and hospitals are resilient to protect lives as well as ensure continuity of service after a disaster, (iv) advancing integrated disaster risk reduction and environmental sustainability and (v) capacity building. Investment in these five spheres will lead to comprehensive resilience by ensuring that national development strategies incorporate measures for disaster risk reduction.

Having a national level strategy will create an enabling environment for risk sensitive development, budget allocation and nationwide coordination. It will also give agencies clear mandates and ensure that all pre and post disaster activities are efficient. Empowerment of communities and NGOs will enable that risks are identified easily and reliable information flows quickly to the concerned government bodies. Strengthening public buildings, especially schools and hospitals, will ensure continuity of services during and after a disaster. Investment in these facilities will not only curtail the potential losses resulting from the immediate effects of a disaster but will also help in the recovery effort.

All rehabilitation and reconstruction work should take into account future risks. This entails understanding of potential hazards, projection of exposure growth and an assessment of future vulnerabilities. Rehabilitation can be used as an opportunity to boost resilience and ensure sustainable development that protects the environment as well. This should be complimented by investment to build technical and institutional capacity. Below are the reconstruction and recovery recommendations for each sector.

#### **4.2.2.7 Agriculture**

Disaster risk reduction strategies in the agriculture sector should address both multi-hazard risk reduction as well as adaptation to climate change. These strategies consist of four thematic pillars: (i) creating an enabling environment; (ii) setting up monitoring systems, (iii) applying prevention and mitigation measures and (iv) instituting preparedness measures.

Key measures to reach these goals

##### **Capacity Building**

- Strengthen the capacity of Meteorological Institutes for the provision of enhanced weather information and early warning tailored to the needs of the agricultural sector.

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<sup>62</sup> Building back better next time, UNISDR

- Improve local capacity in the use and interpretation of early warning messages and weather forecasts for enhanced disaster preparedness in the agriculture sector.
- Strengthen the capacity of the ministries of agriculture in the area of post-disaster damage assessment for the agriculture, livestock, fishery and forestry sectors.
- Build the capacity of the ministries of agriculture and extension services on agricultural practices, including agricultural building design for improved disaster risk management and climate change adaptation (for piloting and dissemination through extension services).

### **Policy Development**

- Develop policy recommendations that address the overall sources of the risks to communities.
- Enhance land use planning, social, economic and environmental development planning, including watershed/river basin management at the country and regional level.
- Develop community-based disaster risk management plans at the municipal level.

### **Raising Awareness**

- Raise the awareness of the population on Disaster Risk Management and Climate Change Adaptation.

#### **4.2.2.8 Energy**

Given the current level of exposure and vulnerability of the energy sector, interventions should occur at different levels: governance (cross boundary cooperation on river management) and planning (land use planning), flood protection measures at the watershed level and sector specific interventions. This section will address the latter category of resilience activities with the objective of strengthening the sector's ability to provide continuity of service and its speed of recovery to return to normal operations following an extreme event.

Taking into account factors such as the ageing profile of the infrastructure and assets, the governance structure of the sector, the impact of climate change and the dynamic topographic features of the country, it is recommended to build the resilience strategy around the lines of action below.

- Better understand future flood risks: Improve hazard data for areas near energy sector assets and identify assets at risk.
- Develop response options: review management practices, physical/structural options and review plant design parameters.
- Investment prioritisation: conduct cost/benefit studies of options, establish a risk management strategy and review the investment portfolio for adjustments.

Some of the activities integrated into the recovery plan are:

- conducting risk assessment studies (hydrological and geological studies, exposure assessment);
- revising emergency operation plans;
- providing on-site flood protection measures if assets cannot be relocated, where the grid has been affected by landslides and building back better through rerouting;
- ensuring slope stability for coalmines where flooding and landslides occurred (active draining, construction of retaining walls, etc.), diverting water around coalmine concessions (ring ditch, evacuation channels, etc);
- more resilient energy applications, such as phasing out the 35kV voltage level and installing performance power line breakers with remote control, etc.

#### 4.2.2.9 Transport

The May 2014 floods and landslides have further increased vulnerabilities in the transportation system of the country. For instance, major landslides that occurred in locations such in Kosova village, on road M17, have exacerbated the risk that even low intensity future rainfall and flood events may reactive landslips and lead to major damage and traffic disruption.

Road and railway embankments have also been weakened by rushing floods. In places such as Samac railway station, floods of lesser intensity could potentially destabilise the rails in the future if they are not strengthened. Similarly, the extensive loss of vegetation and high ground saturation has created the risk that even low intensity rainfall could create mudflows in the future. Several riverbanks have been partially washed away or weakened by the recent floods and are at higher risk of erosion.

Many culverts are currently blocked and if unattended will increase damage to roads and embankments. The disaster might also have left the foundation of damaged bridges totally or partially undermined, making them unstable and more susceptible to future failures.

Tunnels that were already vulnerable are now at greater risk due to the build-up of significant water pressure above them that is now flowing through the structural walls and linings. This flow of water is widening the cracks and could cause concrete blocks to fall off and resulting in catastrophic accidents.

A practical approach for proposing build back better reconstruction requirements is to draw from lessons learned in other countries that have experienced or are exposed to similar risks and have effectively reduced these risks. Completely protecting or strengthening infrastructure is not only economically prohibitive but, in most cases, also technically impractical. However, several measures can effectively reduce future risks. To protect roads and railways from flood damage some of the following can be applied:

- raising embankments;
- widening embankments, to increase their mass to resist flows;
- lessening the gradient of embankments, to reduce damage from high velocities;

- constructing new embankments and protecting existing ones;
- building culverts where embankments cross flood plains;
- increasing bridge spans to make room for major rivers;
- providing better drainage at the top and bottom of cuttings;
- improving pier and abutment foundation design; and
- improving watercourses, both upstream and downstream, to reduce the possibility of torrents.

All improvements of the flood damaged transport infrastructure should be prepared in coordination with flood protection improvements, as they are highly interrelated. For example, protecting port docks from future flooding risk entails improving defence systems and barriers.

To protect transportation networks from landslides there are two available options. The first is to rebuild the network in the same location by mitigating the risk of landslide while the second is to realign the road or railway. This should be informed by detailed cost benefit analysis.

#### **4.2.2.10 Water, Sanitation and Flood Protection**

##### **4.2.2.10.1 Water and Sanitation**

Many aspects of the water and sanitation system proved to be resilient to the floods. For many of the affected areas, water supply was restored within one week and water quality was brought back to potable levels within two weeks. As such, build back better possibilities in water and sanitation sector are relatively limited and primarily linked to better planning and preparation of emergency procedures and water sensitive spare parts.

The preventable damage suffered by water and sanitation systems comprised largely of the inundation of electronic systems and machinery in pumping stations, and vehicles and other equipment owned by municipalities. Damage of this nature could have been minimised had there been an adequate early warning system and emergency procedures in place to relocate sensitive equipment to safer areas. These can include storing critical water sensitive spare part in advance in a safe place (so the replacement and restoration of services is faster), and development of procedural manuals, for the case of floods, that would define the roles and responsibilities of different stakeholders during the flood warning and response period.

Periodic de-silting of wastewater channels is important. Although this did not prove to be an impediment in the restoration of sanitation services after the floods, given that existing wastewater systems are mixed flow gravity systems, they will clog without regular cleaning.

#### 4.2.2.10.2 Flood Protection

The current water management and governance of the river and its tributaries is not ideally suited for efficient flood protection. There is lack of sufficient flood and torrent protective structures and no sustainable, systematic, long-term management system. As a first step towards disaster risk reduction, water management systems of the Sava River and its tributaries need to be strengthened. Measures include:

- reformation of organisational/institutional forms in the field of flood management between the entities, cantons water agencies, municipalities etc., leading to efficient communication with the population and activities in the flood hazard zones;
- increased communication and pre-event programming (preparedness stage) between the civil protection organisations and flood management organisations;
- greater and more adequate funding for water management limiting inspection, maintenance and prevention measures;
- greater continuity in water management organisational structures to avoid the loss of knowledge and experience;
- increased flexibility amongst public institutions in the field of water management and flood management, with emphasis on connectivity between centres of competences in the Sava River Basin;
- increased communication between water management and land use control agencies such as urban developments, forestry and agriculture. The management of forest land in particular can greatly impact river flow during flooding events; and
- greater transparency and communication across the public institutions that are in charge of flood management in the Sava River Basin countries (Slovenia, Croatia, Serbia and BiH).

In addition, a lack of reliable data is an additional major impediment to the implementation of disaster risk reduction practices in Bosnia and Herzegovina. Consequently, data collection is an essential first step of reconstruction aimed at disaster risk reduction. These surveys will allow the government to develop a future flood resilient programme. Data required includes:

- dyke surveys to identify spots that require raising or strengthening;
- river and canal surveys to inform de-silting works in river and channel beds;
- reconstruction of gauging stations is also critical, since many of them have been damaged by the heavy inundation;
- greater emphasis should also be paid to flow prediction models as well as to the impact of climate change on river flows. This should also be used to inform hazard mapping, and the maps should be used as the basis of land use planning; and
- given the frequency of flooding in the Sava basin, effective and efficient early warning systems are essential. An improved early warning system enables better responses to be put into action quickly and improves the safety to the public and civil protection staff.

### 4.2.2.11 Housing, Facilities and Services

#### 4.2.2.11.1 Housing

##### Reconstruction

There are many buildings that are not damaged but, due to the instability of the surrounding area, are highly vulnerable to subsequent landslides. Given the high cost of building a new home and of relocating to a safer area, it is natural that owners of these houses would want to go back to their houses and resume their lives. However, several steps should be taken to ensure that these houses are fit for habitation. Some of these measures are:

- damaged houses should not be rebuilt in the same location using the same material and design standards as before;
- risk assessment of the entire area where these houses are located should be carried out for all the major natural hazards;
- survey and vulnerability assessments of individual buildings, initially categorised as at-risk, should be carried out by engineers;
- the decision to allow reconstruction should be informed by both technical and economic feasibility studies of rehabilitation work at an area and individual building level;
- a combination of area wide protection investments (e.g., flood protection systems) and building specific mitigation measures (e.g., using water proof materials) should be employed;
- houses in extremely high risk area should not be rebuilt;
- incentives should be created for residents to build back better; and
- residents should be encouraged to use locally available and recycled construction material, especially salvaged material from damaged buildings.

##### Resettlement

If a decision not to reconstruct is made, the second option available is resettlement. This entails construction of new houses as well as development of infrastructure and services to support the new influx of people in the area. Besides economic feasibility of resettlement programmes, other concerns of residents, such as cultural, heritage and land ownership, should be fully taken into consideration. Several measures can be taken to ensure that resettlement is resilient:

- complete land use zoning that takes into account all of the natural hazards should be carried out before people are resettled in a new location;

- given that the frequency and magnitude of extreme events and the concentration of building assets is going to increase in the future, it is important to incorporate these projections when constructing new protections such as flood protection systems;
- improved construction standards, design codes and new engineering technologies should be used to make all future construction more resilient to natural hazards;
- several resettlement options should be proposed and detailed cost benefit analysis should be carried out to choose the best options. This is important given the high cost of resettlement; and
- all stakeholders must be engaged for the success of resettlement programmes.

### **Communication and Training**

Effective communication, training and knowledge sharing will be a key for the successful execution of both reconstruction and resettlement efforts. Below are main actions that should be taken.

- Awareness raising campaigns should be carried out to educate communities about the risk they face from natural hazards.
- Training on safe construction practices should be available to building industry professionals such as architects, engineers and contractors.
- Education on effective recycling and reconstruction techniques should be available to both homeowners and professionals to re-use material from the damaged houses effectively.
- Lessons learned in different parts of the country should be shared in an organised fashion to develop a national best practice guideline that will be useful for current and as well as for future reconstruction and resettlement efforts.

### **Improving institutions and regulations**

- Laws, strategies and plans on building standards should be established at a national level to ensure that all future construction are resilient.
- Land and building license permit regulations should be enforced to ensure that no illegal buildings are constructed.
- Plans should be developed to ensure that construction materials are available at reasonable prices, given the expected demand increase from multiple sectors after a natural disaster.

#### **4.2.2.11.2 Public Facilities and Services**

The loss of Public documents is a frequent and disastrous consequence of such flooding. In countries such as Bosnia that rely heavily on paper documents for governmental records, the destruction of these records can cripple government systems for many months after the disaster. Purchasing of fire/water proof filing cabinets for safe storage of files can greatly assist in the protection of essential paper documents. Documents that are



accessed less frequently, particularly those that are being archived, should be relocated from ground floor to upper floors of the municipal administration to limit future damage.

The impact of the loss of paper-based records can be avoided by digitalisation files where possible. Nevertheless, aspects of government that are conducted digitally are also vulnerable in floods. The location of large electronic equipment, such as computer and data servers, in the basement floor of public buildings is currently widespread in BiH. The practice should be changed, and this equipment should instead be located on higher floors of municipal administration offices.

Instituting emergency protocols for the safeguarding of sensitive materials in case of disaster and providing appropriate training can also greatly help in preparing public staff for disaster events.

#### 4.2.2.12 Livelihood and jobs

Measures for Disaster Risk Reduction in the employment and livelihood sectors should follow a two-pronged strategy of prevention and protection. It is recommended to carry out risk assessment for enterprises in BiH to control future risks through:

- **prevention** to avoid the construction of businesses in flood-prone areas; and
- **protection** by taking measures, both structural and non-structural, to reduce the likelihood and impact of floods and to protect premises and take steps to limit potential damage. These measures should include the strengthening of infrastructure and assets.

#### Strengthening infrastructure and assets

- **Prevent water from entering the building** by installing permanent or removable barriers to seal doors, windows and other openings, such as toilets and drains. Other products include airbrick covers, non-return valves on drains and pipes and flood sacks.
- **Reduce the damage caused by water entering the building** by raising electrical sockets, wiring and controls for ventilation systems, using lime-based plaster instead of gypsum and raising large equipment. Use of flood resistant materials in the construction of new buildings or extensions to existing infrastructure is also recommended.
- **Regularly back up computer data and store important records and information** such as insurance policy details in a safe place above flood level, preferably on an upper story of a building.

## Strengthening capacity

Training staff for multi-hazard business continuity management including the preparation of plans of how business will respond if flooding looks likely. Such training may entail:

- lists of important contacts including insurance companies, key customers and suppliers, flood incident line and evacuation contacts for staff;
- maps showing locations of key equipment and where to shut off electricity and other services;
- a plan to protect business property and minimise disruption;
- key procedures for employees;
- insure businesses against flooding, store insurance policies and an inventory of important possessions somewhere safe above flood level, such as an upper story of building. Keep photographic evidence. An independent appraisal of the potential cost of repairs and replacements can also help;
- train employees on actions to take in the event of a flood or on receiving a flood warning; and
- train employees on procedures to follow in the event of a flood warning. This includes understanding the dangers of flooding and how to evacuate the building safely.

### 4.2.2.13 Mine Action

A major concern is the effect of landslides and flash flooding within the pre-defined suspected hazardous areas (SHAs) containing landmines and unexploded ordnance (UXO). In several cases, landslides occurred on hillsides causing earth and associated debris to travel downhill covering roads, houses and associated infrastructure. At the time of writing, 51 of the 3,000 landslides reported were in SHAs. It was also established that landmines and UXO had migrated from known SHAs, either from the force of fast flowing currents or as a result of erosion of the soil. In certain circumstances landmines and UXO had subsequently moved in fast flowing currents of floodwater and were deposited in new, previously safe, areas. A total area of 105 km<sup>2</sup> was identified as potentially containing landmines and UXO from flooding.

The Posavina and Brcko region was one of the worst hit areas for flooding and several reports from residents indicated that a high number of mines and UXO had been found in and around houses and surrounding areas. In other areas reported landslides varied in size. Some were just small deposits of earth, trees and vegetation blocking a road or access route that could be cleared immediately, while others were large and in some instances had covered houses in several meters of earth and debris. In several locations the SHAs were situated above houses, roads, and utilities (water and electricity supplies) and the landslides had taken part or all of the SHA, moving the suspected mine contamination and everything else in its path.

The recovery activities are categorised into short-term/emergency, medium-term and long-term phases. In addition, institutional support is planned for the BiH mine action authorities to amend and improve survey and procedures to make better use of resources and speed up the process of releasing safe land back to affected communities.

- In the emergency phase, it is planned to gain access to the potentially contaminated 105 km<sup>2</sup> through emergency clearance with mine marking erected in order to warn the local population and reconstruction personnel of the present dangers. All repair and reconstruction activities will be restricted until the mine/UXO clearance is completed and the area is secure. The risk of a mine or UXO accident or incident will be high until the survey and clearance activities have been completed.
- Activities planned for the medium term
  - All locations (houses, gardens, roads, bridge abutments, infrastructure including power lines and water supplies) within a known SHA or potential SHA will need to be surveyed for potential mine and UXO contamination to enable essential services to start reconstruction activities.
  - If mine/UXO contamination is confirmed, clearance will need to be prioritised based on the availability of assets.
  - Roads and infrastructure will need to be opened. In many cases earth that may contain landmines has been removed and deposited close by, so at some point during the medium term recovery phase these earth deposits will need to be cleared so construction workers can commence work.
- Planned long term activities
  - All SHAs that have been identified in the short/medium term will need to be cleared.
  - A lot of fertile agricultural land that was not given a high priority in the medium term will need to be surveyed and cleared. It should be noted that the whole clearance process will also be complicated by the additional contamination of debris and mud resulting from the floods. Farmers and land workers will remain to be at risk until these areas are surveyed and cleared.
  - Existing SHAs that were already identified will also need to be cleared to remove the threat of landmines and UXO completely, thereby removing all mine/UXO risk after any future flooding disaster.

In order to effectively recover from the disaster, make more effective use of resources and speed up the handover of safe land the following activities for strengthening institutional capacity are planned.

- In order to effectively implement the survey and clearance required, BHMAL should adopt the land release methodology to speed up the process of declaring

areas mine free and reduce the overall cost of clearance. Consideration should be given to training BH Armed Forces and Civil Protection in this process.

- BHMAL should be provided with international technical assistance to:
  - develop the wider management processes within the organisation;
  - draft new clearance procedures for areas affected by landslides and flooding;
  - revise the current Mine Action Strategy to reflect the changed situation and ensure that set targets can be achieved with expected funding and present resources; and
  - implement the land release methodology.
- BHMAL fundraise (through a mine action portfolio) should:
  - explain what resources they require and the tasks they want to conduct. It should include the priority indicators so that donors can view the requirements and get clear expectations on the expected outputs/outcomes of projects. This portfolio document should be done in partnership with BH Armed Forces and Civil Protection so that all mine clearance needs and capacities are identified.
  - address present equipment shortfalls (for BHMAL, BH Armed Forces and Civil Protection).

#### **4.2.2.14 Disaster Risk Reduction and Long Term Sustainable Development**

Disaster Risk Reduction and long term sustainable development requires the mainstreaming of disaster risk management into all development work. Future economic growth, climate change, aging infrastructure etc. will increase disaster risk unless they are considered during the planning, design and implementation of all new rehabilitation projects. The first part of this section describes the existing DRM institutional arrangement in BiH and recommends improvements to ensure sustainable development. The second part of the section outlines a disaster risk management framework distributed across the five strategic pillars and gives recommendations for each pillar.

#### **4.2.2.15 Institutional arrangement**

The following section on institutional arrangements for DRM in BiH is adopted from a joint assessment conducted by UNDP, WMO and national consultants<sup>63</sup>. This work consulted a wide range of DRM stakeholders in BiH and the results were presented to national stakeholders during a National Policy Dialogue held in Sarajevo on 21 and 22 June 2010. The recommendations of this report are still relevant for building resilient infrastructure and communities and are summarised in this section. Since then there have been additional initiatives, such as the establishment of a National Emergency Response Plan, which outlines how agencies in BiH should reorganise in order to react to disasters.

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<sup>63</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

**Governance:** BiH has limited central government with the majority of government responsibilities transferred to the two entities: the Federation of Bosnia and Herzegovina (FBiH) and the Republika Srpska (RS). FBiH and RS have separate constitutions, laws and institutional structures. FBiH is highly decentralised and has ten cantonal governments, while the RS has one centralised government. Brcko District (BD) in north eastern Bosnia and Herzegovina is the third administrative unit. It is a neutral self-governing administrative unit under the sovereignty of Bosnia and Herzegovina.

**Enabling environment:** The core legal act pertaining to DRR in the country is the Framework Law on the Protection and Rescue of People and Material Goods from Natural and Other Disasters (2008). All laws, plans and activities at the entity, cantonal and municipal levels must be harmonised with it. This Framework Law is designed more for enhancing emergency response than focused on disaster and risk management. To date, there is no national strategy aimed at DRR and none is mandated by law.

**Institutional Framework:** The country's institutional framework is fragmented and lacks vertical and horizontal cooperation. The system for civil protection is headed by the Ministry of Security through the Sector for Protection and Rescue at the state level. However, the responsibility for measures taken to deal with protection and rescue is placed by the entities and Brcko District. The Ministry of Security and the State Coordinating Body of BiH take the leading role only in the event of a large-scale accident with trans-boundary effects or which cannot be resolved at the entity level.

**Funding and Budgets:** There is no coherent framework for DRR funding. Government funding for DRR exists only in the form of targeted budgeting. In accordance with the organisation of the public administration system in BiH, all public administration structures have their own budgetary resources and their own independent sources of financing. This explains the complicated system of relations in the activities aimed at introducing DRR and why the system of budgeting for DRR is not firmly established.

## **Recommendations**

A number of recommendations were discussed and endorsed by the National Policy Dialogue in BiH in June 21-22 2010 regarding institutional arrangements<sup>64</sup>. Some of the recommendations, such as the establishment of a National Platform for Risk Reduction (NPRR), have already been accomplished. However, the NPRR is currently limited to conducting annual conferences and is yet to create a strong working group that continuously addresses disaster risk issues at the national level. This section lists relevant recommendations that still need to be addressed. These recommendations will help ensure that Disaster Risk Reduction is a national and a local priority and has a strong institutional basis for implementation.

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<sup>64</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

- **To clarify the roles and responsibilities within DRR, increased cooperation and improved communication between all relevant sectors and agencies is required.** To promote and support dialogue, the exchange of information and coordination among relevant agencies and institutions at all levels with the aim of fostering a unified approach towards DRR is a prerequisite for an effective DRR programme in BiH. This also includes the promotion of community participation in DRR through the adoption of community-specific policies, the promotion of networking, the strategic management of volunteer resources, the attribution of roles and responsibilities and the delegation and provision of the necessary authority and resources.
- **To initiate efficient financial planning to ensure that DRR has its own budget allocation** there is a need to allocate resources centrally for the development and implementation of disaster risk management policies, programmes, laws and regulations on DRR in all relevant sectors and authorities and at all administrative levels, with budgets based on clearly prioritised actions.

#### 4.2.2.16 Disaster Risk Management Strategic Framework

The proposed framework for Disaster Risk Reduction is distributed across the following five strategic pillars<sup>65</sup>: (i) risk identification and assessment, (ii) strengthening and enhancing emergency preparedness, (iii) institutional capacity building, (iv) risk mitigation investments and (v) introducing catastrophe risk financing in the longer term. The underlying principles of this framework are that both loss of life and the economic impact of disasters can be reduced through advance planning and investment.

#### 4.2.2.17 Risk Identification and Assessment

In 2011, the Protection and Rescue Sector of the Ministry of Security carried out the first Risk Assessment regarding natural and other disasters using a unified methodology on the whole territory of BiH. The methodology includes identification of all hazards for the territory of BiH, assessment of the vulnerability of people, property and critical infrastructure and systematic dimensioning of risks, their likelihood, causes and consequences (expressed in human, material and or financial losses) as well as capacities. However, BiH still lacks modelling tools that are useful for probabilistic and scenario analysis and interactive GIS based tools that are important for visualisation and communication of risks.

### **Recommendations**

Given BiH's exposure to multiple hazards, a national level multi-hazard risk modelling tool should be developed. The model should have regional modules aligned with decision making in BiH. The work under this component should include (i) probabilistic generation

<sup>65</sup> World Bank Disaster Risk Management Series No. 9 "Preventable Losses - Saving Lives and Property"

of all hazards, (ii) development of an asset and population exposure database and (iii) determination of the vulnerability of different asset types. This would allow estimation of monetary losses for each municipality, canton, entity or geographical area covered. The understanding of potential economic losses would help the country review physical, human, and financial exposures; in prioritizing mitigation investments and in updating emergency plans and procedures and developing appropriate capacity building programmes.

#### **4.2.2.18 Strengthening and Enhancing Emergency Preparedness**

There are operational centres at all organisational levels; however, the state does not have adequate overall contingency arrangements for emergency response. Resources are currently allocated in an ad hoc manner. Outside of the government bodies, the Red Cross trains personnel for emergency preparation and response. Over the last few years, BiH has formed and established a crisis operations centre within the office of the Protection and Security Sector of the Ministry of Security of BiH.

The meteorological observation networks in BiH is rather limited, mainly consisting of manned stations with obsolete observation technology. Both services currently have only one operational automatic weather station, which is not in online mode. In addition to lacking online hydrological and meteorological observations, the services miss weather radars and other modern observation tools. No hydrological models are currently available, which impedes the forecasting of water discharge or river flooding. Both institutes lack the capacity to produce very short-term weather forecasts or real time observations<sup>66</sup>.

#### ***Recommendation***

Effective and efficient early warning systems are required for disaster operations. An improved early warning system enables better responses to be put into action quickly and improves safety for the public and civil protection staff. A single meteorological and hydrological forecast system for all the countries that make up the Sava basin would meet this aim. This system would require real time inputs from rain gauges, rain radar and river gauging stations and would incorporate a meteorological model to predict rainfall and a hydraulic model to forecast river flows and levels and the consequential impact on flooding and debris flow events. Continuous improvements to the system would be necessary to deal with the inherent uncertainties involved in regional forecasting and to improve its reliability.

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<sup>66</sup> IPA Beneficiary Needs Assessment- Bosnia and Herzegovina

#### **4.2.2.19 Institutional Capacity Building**

There is no particular agency responsible for natural disaster awareness raising. In terms of education, at the university level there is a degree programme in civil protection and rescue. Some efforts to increase awareness through the distribution of leaflets, brochures and posters have proved to be successful. BiH organises various annual seminars, trainings, workshops and roundtables about DRR focused on protection and rescue. The early warning services are mostly staffed by observers instead of scientifically skilled and adequately trained forecasters. These shortages in technical and human capacity account for the inability of the hydro-meteorological institutions to provide products and warnings at an adequate level.

#### ***Recommendation***

Training of experts in forecasting, modelling and response should be given priority. This is important to improve the capacity of government institutions to assess risks prior to an event and efficiently respond to disasters.

#### **4.2.2.20 Risk Mitigation Investment**

The greatest need in BiH is flood and drought risk management. Landslides have also proven to be a major risk in light of the extensive damage that resulted due to the landslides that occurred following extreme precipitation in May 2014. A comprehensive cost benefit analysis of all options, including the rehabilitation of the existing flood protection system and construction of a new system, should be carried out so that future investment will be well informed.

#### ***Recommendation***

Recommendations given by each sector for reconstructing and building back better damaged infrastructure should be prioritised based on the availability of funding and the return on investment.

#### **4.2.2.21 Risk Financing**

Establishment of broad based catastrophe risk financing and insurance would make government communities and businesses more resilient to disaster. Given the widespread damage and losses experienced due to the May 2014 flooding by agriculture and public and private property, and their overall impact on the budget and people's livelihood, various risk financing and transfer mechanisms would be beneficial for BiH.



Three countries in the region - Albania, Serbia and Macedonia - already participate in a Catastrophe Risk Insurance Facility, which was launched by the World Bank and other partners in 2010. Some of the key lessons learned from these countries in the past few years include<sup>67</sup>:

- daily management of disaster risk insurance programme should be carried out by an independent professional body;
- sufficient capital and actuarially sound pricing are essential for financial sustainability of an insurance programme; and
- to increase the demand for insurance and improve the penetration rate, residents should be made aware of the risk they face and the benefits of buying insurance.

### ***Recommendations***

Different options that the government of BiH could consider for managing natural disasters<sup>68</sup> are listed below.

- **Sovereign disaster risk financing:** Development of financial strategies to increase the financial response capacity of government in the aftermath of natural disasters, while protecting their long-term fiscal balances.
- **Property catastrophe risk insurance:** Development of competitive catastrophe insurance markets to increase property catastrophe insurance penetration amongst homeowners and small and medium enterprises.
- **Agricultural insurance:** Development of agricultural insurance programmes for farmers, herders and agricultural financing institutions (e.g., rural banks and microfinance institutions) to increase their financial resilience to adverse natural hazards.
- **Disaster micro-insurance:** Facilitate access to disaster insurance products to protect the livelihood of the poor against extreme weather events and promote Disaster Risk Reduction in conjunction with social programmes such as conditional cash transfer programmes.

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<sup>67</sup> Protecting Businesses and Homeowners in Southeast Europe and the Caucasus, Stories of impact.

<sup>68</sup> Adopted from the World Bank Disaster Risk Financing and Insurance Program (<https://www.gfdr.org/node/337>)

### 4.3 The Recovery Strategy Components and Priorities

The recovery strategy comprises two complementary types of interventions that are to be seen as synergistic: Reconstruction and Recovery. The first is based on the damage suffered, the reconstruction and repair of those with the inclusion of measures for Disaster Risk Reducing not to recreate the vulnerabilities exposed by the disaster and with some measure of improvement, warranted by the necessary sustainability and resilience in the face of changing risks, as they were exposed by the disaster. The second derives from the negative effects that the physical destruction of assets caused, comprises a series of recovery measures and investment intended to compensate those that suffered, reactivate activities that were affected, through the recuperation of production, restoration of basic service provision to the delivery of services by government institutions at all levels.

These investments and interventions may be undertaken in diverse ways, ranging from direct government action to decentralised and de-concentrated programmes, including direct execution by beneficiaries. In all cases, they imply resource mobilisation that, in the case of BiH, will exceed the financial capacities of government at different levels.

Priorities then will be guided by two main elements. The first is the urgent need to restore and recover essential elements. This applies to issues such as the planting season (in order to avoid a new crop being lost), the provision of shelter and heat to households (before the onset of winter), restarting the school year on time and the relocation of the population at risk. The latter either permanently or temporarily for those whose houses need to be reconstructed or relocated, since it is unlikely that this process will be completed in less than six months.

The second relates to the capacity to both access financial resources to undertake such activities and to execute these investments promptly, based on the country's economy and government's absorptive and implementation capacities.

The recovery and reconstruction process is to be undertaken in a way that does not create macroeconomic instability, expand deficits or generate larger ones, both in terms of fiscal policy and external balances, as well as not to generate a spike in prices.

Main priorities to underscore are, in the short term, the restoration of economic activity to jumpstart income and compensate for affected livelihoods and to preserve jobs for both men and women, focused on those segments of the population with higher unemployment.

It is considered strategically important to utilise, as much as possible, local capacities for the reconstruction process, thus providing new employment opportunities. Competitive national enterprises are to be supported in their technological and operational capacities, within the internationally and nationally supported objective to increasing prosperity and create jobs in BiH.

### 4.3.1 Cross-sectoral Themes

The recovery and reconstruction implies coordination and interaction among sectors and, particularly on issues like Disaster Risk Reduction, gender and environmental management a synergy of interventions has to be sought.

The recommendations included in the respective sections, most notably those that refer to flood protection and watershed management and the recuperation of livelihoods and revitalisation of economic activities, are to be undertaken across sectors.

The crosscutting inter-sector approach has strategic consequences such as the following:

- gender equality and non-discriminatory treatment generate prosperity, but they are not just a factor of equity;
- Disaster Risk Reduction is a means of competitiveness as it avoids negative impact on the economic performance of enterprises and the economy in general;
- unresolved security issues associated with landmines and UXO remain a risk in human, economic and social terms and should be addressed as a priority;
- the impact of the disaster on the public administration, through disruption of their activities, causes temporary personal and institutional losses;
- inter-sectoral linkages create positive synergies in the recovery and reconstruction process;
- rapid recovery of growth and economic dynamism are tied to effective and rapid utilisation and financial mobilisation of resources.

There is the need to have an integrated holistic perspective in the phase of Disaster Risk Reduction, as it is to be seen as synergic to competitiveness.

### 4.3.2 Links to Sector Development Plans and the National Strategy<sup>69</sup>

It is widely recognised both internally and by the international community that BiH needs to improve competitiveness and productivity, attract investment and make economic policy reforms. It is also recognised that BiH has economic potential in specific sectors, such as energy, and in sub-sectors, such as high-value agriculture, wood products, tourism, and light manufacturing. Various international donors consider the agribusiness sector to be critical for alleviating poverty, because a substantial share of those living below the poverty line live in rural areas and depend on agriculture.

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<sup>69</sup> See for example: USAID/Bosnia and Herzegovina Country Development Cooperation Strategy, 2012-2016 ([http://pdf.usaid.gov/pdf\\_docs/pdact703.pdf](http://pdf.usaid.gov/pdf_docs/pdact703.pdf))

“High unemployment rates, especially among youth, low rates of investment and growth, a complicated and non-transparent business climate and a low level of social support for the less-well-off in society are the key issues to be addressed by a coherent and comprehensive reform agenda”<sup>70</sup>.

In light of these pre-existing conditions, the disaster recovery assessment findings pose a challenge to the country in terms of the:

- size of damage, which puts pressure on the investment capacity and absorption ratio;
- amount of losses, which impacts negatively on GDP;
- food insecurity, which poses a threat as major agricultural areas have been affected;
- balance of payments deficit; and
- potential for increased poverty.

In the preparation of this assessment the conclusion has been reached that the recovery process must be synergic and consistent with the pre-disaster outlook. From the perspective of the country and its partners this ought to be consistent with the EU accession process and the World Bank Group's strategic pillars for the Eastern Europe and Central Asia region: (i) deepened reforms for improved competitiveness, (ii) social sector reforms for inclusive growth and (iii) climate action for sustainable growth.

BiH has numerous sectoral and sub-sectoral strategies to guide the country's development: at least 66 different sectoral strategies. Most of them are not formally adopted or implemented by the relevant entity or state level authorities. The weak capacity and the multiple and duplicative levels of institutions limit the ability of BiH to establish and manage a host country-owned strategic framework. Assisted by the international community, BiH has elaborated essential strategy and policy papers in recent years. The earlier Medium-Term Development Strategy (MTDS) 2004–2007 (originally PRSP - Poverty Reduction Strategy Paper) has been replaced by the Country Development Strategy (CDS) 2009–2014. A Social Inclusion Strategy (SIS) synchronises economic development efforts with social sector activities. ADC together with other international donors such as DIFD, DEZA and the EU Delegation have provided financial assistance to the Directorate for Economic Planning (DEP) of the Council of Ministers of BiH (CoM). The CoM is in charge of monitoring implementation of CDS and SIS. Both strategies are in line with EU guidelines, principles and approaches.

The primary goals of these strategies are economic growth, poverty reduction and EU accession. Further important strategy papers are the Education Strategy document and the corresponding implementation plan, the Strategy for Vocational Education and Training 2007–2013, the Public Administration Reform Strategy, the Local Self-Government

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<sup>70</sup> R. Daviddi, Address to the participants of the International Business Forum in Sarajevo on Wednesday, 11 June 2014.

Development Strategy, the Action Plan on Roma Housing, Health and Employment (BiH co-launched the Decade for Roma Inclusion 2005-2015), the BiH Youth Strategy 2009–2014, the BiH Gender Action Plan 2009–2014 and the BiH Mine Action Strategy 2009–2019.

However, state level strategies and action plans are largely missing, particularly in the sectors where central level ministries do not yet exist (e.g., health, social services and agriculture).<sup>71</sup>

Under Stabilization and Association Agreement (SAA), which BiH signed with the EU, BiH receives cooperation for the implementation of adopted policies and international agreements. The EU provides guidance on reform priorities as part of the European Partnership.<sup>72</sup>

As the European Bank for Reconstruction and Development points out, “A small open economy such as Bosnia and Herzegovina can reach its full economic potential only by integrating closely with wider regional markets. Regional integration, both physical and commercial, will become even more important in the new strategy period as Bosnia and Herzegovina now has a border with the EU as of 1 July 2013, following Croatia’s accession to the EU”<sup>73</sup>.

In light of these challenges and the observed consequences of the flooding, some issues brought to the fore by the flood disaster urgently need to be addressed. These could easily turn into opportunities for acceleration of some of the pending tasks that have so far limited progress. Certainly issues like flood protection and risk reduction not only lend themselves to but actually depend on renewed and strengthened regional cooperation, deepening BiH relations with other enlargement countries and Member States.

In a more concrete sense, steps in the right direction would be to anchor the recovery process to measures such as:

- incentives and support to revitalise economic activity in affected depressed locations that will generate demand and income and allow for a refocusing of goals, given the pre-disaster challenges and slow economic performance;
- higher reconstruction investment costs are to be seen as a risk reduction consideration that could lead to more sustainable development;
- increased resilience would reduce the vulnerabilities and risks that are currently exacerbated by the disaster to include

<sup>71</sup> Taken from: Bosnia & Herzegovina, Country Strategy 2011–2013, Austrian Development Cooperation, ([http://www.entwicklung.at/uploads/media/0427\\_Country\\_Strategy\\_BiH\\_fin\\_Screen\\_02.pdf](http://www.entwicklung.at/uploads/media/0427_Country_Strategy_BiH_fin_Screen_02.pdf))

<sup>72</sup> Among these are the requirement for stability of institutions guaranteeing democracy, the rule of law, human rights, and respect for and protection of minorities.

<sup>73</sup> Document of the EBRD, strategy for Bosnia and Herzegovina, as approved by the Board of Directors at its meeting on 15 January 2014, (<http://www.ebrd.com/pages/country/bosniaandherzegovina/strategy.shtml>)

- better protection against floods and integrated watershed management and control;
- integrated early warning systems, and
- stabilisation of slopes and the protection of areas where landslides pose a new threat.

#### 4.3.3 Key Assumptions and Constraints

The recovery strategy after the recent flood disaster assumes a rapid and coordinated approach by all levels of government in BiH and a more rapid procedure for procurement, approval and operational budgetary procedures.

Transparency and disclosure on the use of external funds and in the execution of the budgets will ensure cooperation and the commitment of international cooperation to the recovery effort. Increased efficiency of internal financial procedures to reduce time lapse for approval of investments and execution of programmes and projects is required.

Constraints to the rapid launching of a recovery strategy relate mostly to internal procedures and the potential limitations in the absorptive capacity of the different levels of government.

## 5. ANNEXES

### 5.1 Background and Terms of Reference

#### **Bosnia and Herzegovina**

Floods May 14-19 2014

Recovery Needs Assessment: Scope and Methodology<sup>74</sup>

#### **Terms of Reference**

#### **Background**

##### **The Disaster Event**

During the third week of May 2014 heavy rains fell over Bosnia and Herzegovina BiH causing massive flooding in the northern, eastern and central parts of the country bordering Croatia and Serbia. These regions received more than 250 (and in some areas up to 300) litres of rain per square meter, which is the highest amount measured in BiH in the last 120 years. The rainfall caused sudden and extreme flooding of several rivers (Bosna, Drina, Una, Sava, Sana and Vrbas) and their tributaries as well as landslides and mass population movements. Urban, industrial and rural areas were completely covered with water, cut off and left without electricity and communications with damage to roads and transport facilities. Consequently, a vast number of houses were destroyed, damaged or were underwater leading to a significant number of displaced households. The effects on productive services were varied with a large impact particularly on the agriculture sector, affecting livelihoods and potential food supply. This is potentially the most serious natural disaster experienced by BiH in the past 120 years, affecting approximately a third of the country and touching more than one million people (more than fourth quarter of the 3.8 million population of BiH). It affected cantons in the Federation (FBiH) and municipalities in Republika Srpska and Brcko District <sup>75</sup>.

A very relevant security hazard is linked to the fact that over 70% of the flood-affected zone is contaminated by landmines/UXO which, due to the flooding and landslides, have migrated and mine awareness signs have been washed away. Therefore, as the water recedes and cleanup tasks are undertaken, the location and deactivation of landmines and UXO will enhance the difficulty and cost of the process.

<sup>74</sup> To be undertaken in accordance with the internationally agreed Post Disaster Needs Assessment methodology (PDNA) adjusted to the institutional and context specific process agreed with the Bosnia and Herzegovina Government.

<sup>75</sup> The number of confirmed casualties to date is 24 (7 in the Federation and 17 in the RS), while the number of missing persons is unknown (authorities have opened phone lines for reporting missing people). More than 40,000 thousand people have been evacuated from their homes (800 by helicopter) with numbers rising as evacuation efforts continue, FENA, May 20, 2014



### National Response

The relevant governing authorities in the Federation (FBiH), Republika Srpska (RS) and Brcko District (BD) declared a state of emergency. A joint Operations Centre was established and managed by the State Ministry of Security and Civil Protection, which is responsible for consolidating data for the needs assessment and the distribution of aid. The Operations Centre has issued a consolidated countrywide list of needs that currently cannot be met by international donor and national resources. As the immediate response and immediate emergency phase continues, the Government of Bosnia and Herzegovina requested technical assistance from the International Community for a Recovery Needs Assessment.

### International Response

The response of international organisations active in the country (the EU, Red Cross, NATO, EUFOR, OSCE, the UN and bilateral actors such as the US and others) to relief and life-saving needs has been massive. More than 20 Countries have also contributed to the response operations.

Based on the EU, UN and World Bank Joint Declaration of 2008 to respond to crisis and assessment requests from governments, the three partners immediately responded to this request by deploying specialists for an assessment mission. A coordination team composed of the three institutions and the Government of BiH was formed and agreed on the current ToR. Assessment teams incorporate representatives from the FBiH, RS and Brcko District and relevant international and national stakeholders.



## Objectives of the Assessment

The purpose of the assessment is to conduct a thorough damage, loss and needs assessment with a view to:

- determining the socioeconomic impact of the disaster, including the cost of the damage and losses to the physical structures, disruption of essential public services, and alteration of community processes resulting from the disruption of governance process;
- establish the costing of the identified needs in all key sectors to formulate a recovery strategy for early, medium and long term recovery and reconstruction;
- review and, as appropriate, revise strategies to reduce risk and 'build back better', including the identification of new emerging activities associated with the recovery and reconstruction effort proposed after the current disaster; and
- provide an analytical basis for the mobilisation and coordination mechanism of resources, including those with the European Union, World Bank, the UN system and international donors, to implement the recovery result framework with the inclusion of early recovery needs.

## Deliverables

The assessment process will result in an internationally technically supported government owned report outlining the following sections:

- the result of the disaster in terms of the human impact, level and cost of damage and loss of infrastructure and disruption of public services;
- responses to the disaster, both from the national and international side; and
- sector and crosscutting needs organised and prioritised in a Recovery Strategy, presenting the early, medium and long term recovery and reconstruction needs with information concerning priority, cost and timeline.

## Methodology

The methodology integrates the WB/EU and UN methodology for assessment of the impact of the disaster on the flood-affected areas, which will include a comprehensive assessment of the effects and impact of the disaster from the municipal to the state level, combining social, economic and financial aspects of the effects of the disaster.

The assessment will take into consideration early recovery requirements as well as longer-term rehabilitation and reconstruction needs. The assessment includes the identification of measures for disaster risk management designed to mitigate the occurrence of future disasters.

The assessment will make extensive use of data from existing secondary sources from reports and records provided by the different levels of government, relevant sector agencies, and information gleaned from all available sources at the time of the assessment, including maps, records and media reports. As information requirements

make it necessary, primary sources on the effects and needs will be generated through surveys, focused group discussions and other data gathering methods.

The assessment will be carried out in the phases shown below (see the timeline box below).

Training on the methodology to be applied during the assessment - to be provided to the national teams and focal points designated by government and the international experts that will be part of the assessment.

Preparatory and Desk Review Phase – This will include an initial desk review to collect baseline information, determine the scope of the respective sector-wide reviews, identify information gaps, prepare data collection templates and identify and rapidly hire field data collection consultants.

Analytical Work and Sector Strategic Reviews - When most of the data on the damage is available, selected sector teams will be mobilised to visit the affected areas in order to consult with cantonal, municipal and district authorities, other relevant public/community representatives, NGOs and other stakeholders, including UN and EU operations on the ground. This will be followed by a review and analysis of the data by sectoral/core teams to prepare the draft sector and crosscutting reports, including impact, damage, losses and needs.

### **The Assessment Team**

The team shall be comprised of a group of persons/experts combined from state and government institutions supported by members of the International Community (WB, EU, UN agencies, SDC, ECPM and US DOD).

The team will set up the operation at the EU Delegation Office in Sarajevo and provide twofold activities to run in parallel.

1. Sarajevo based coordination team or Secretariat, dealing primarily with setting up the baseline, data processing, analysis, consolidating data from various sources and drafting the report.
2. Field/Sector teams will comprise a combination of experts from state and government institutions and the international community. They will be responsible for collecting data from the affected areas, field assessments and consolidation of the sector and crosscutting reports.

### **COORDINATION TEAM**

The Coordination Team, composed of the representatives of state and government, EU/WB/UN, will be responsible for ensuring technical, logistical, strategic and conceptual coherence across the regions affected by the disaster to be consolidated in the report that will reflect state and government efforts, strategies and priorities for recovery. This team shall:

- 1) serve as the secretariat of the assessment;
- 2) coordinate the day-to-day functions of the individuals within the teams;
- 3) ensure that a sufficient number of assessments are conducted;
- 4) ensure significant participation of area-affected stakeholder input and prioritisation identification;
- 5) conduct cross-sectoral/theme analysis of the sectoral reports to provide a sound and defensible analytical basis for the prioritisation of recovery investment across sectors and timeframes;
- 6) ensure adequate logistical and administrative support for sectoral teams;
- 7) organise and conduct orientation training, including sectoral and crosscutting issues training;
- 8) manage the processes of review and consolidation of assessment drafts;
- 9) ensure that effective strategies to increase capacities for recovery are included in the PDNA;
- 10) support the development of a post-assessment monitoring structure and other structures needed for the formulation of the recovery framework;
- 11) conduct end-of-mission debriefings, including, as appropriate, draft texts, briefs and similar documents to support the mobilisation of recovery resources; and
- 12) manage resources to support the conduct of the assessment.

### SECTOR TEAMS

The sector teams shall combine expertise along the six priority sectors agreed with government entities.

1. Transport (and communications)
2. Energy
3. Housing and local infrastructure (to cover education, health and social services facilities)
4. Agriculture (including livestock, fisheries and forestry) and other relevant productive services
5. Water and Sanitation (including flood control)
6. Livelihood and Employment

The following crosscutting issues will be addressed through the assessment of the above-mentioned sectors: Gender, Environment and Disaster Risk Reduction, Security and Landmines.

These will include, inter alia<sup>76</sup>:

- livelihood specialists working on the impact on employment;
- agriculture specialists;
- engineers (specialists in main infrastructure sectors such as transport, and energy);

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<sup>76</sup> A matrix will be prepared listing these expertise and the identified experts from state and government institutions and international ones.

- Housing specialists (working on the recovery of housing and human settlements);
- Water and Sanitation specialists;
- Social Inclusion specialists (dealing with collective centres and displaced and vulnerable categories);
- Social Sector specialists in Education, Culture and Health (working on identifying the needs for the restoration and recovery of basic social services);
- Gender specialists (to include gender equity across all sectors);
- Environmental specialist (dealing with waste management, debris management and environmental impact);
- Security specialists (working on landmine issues and the human security perspective);
- Governance specialists (working on the resumption of interrupted governance functions); and
- Disaster Risk Management specialists (to work towards disaster resilience across the sectors).

### ***Miscellaneous Requirements***

The assessment will require the following:

1. confirmation of counterpart agencies and institutions for day-to-day facilitation and coordination; and
2. requirements from the government authorities, including
  - geographic scope of the flooding (based on the officially designated affected municipalities and districts);
  - baseline information disaggregated at the municipal level for physical, social and economic infrastructure;
  - existing inventories of physical, social and economic infrastructure damage;
  - disaggregated data on origin and present location of IDPs;
  - pre and post damage high resolution satellite imagery.

### **TIME FRAME**

<b><u>Activity</u></b>	<b><u>Completion Date</u></b>
Formation of the Coordination Team, collection of baseline data	25-28 May
Orientation training on methodology	29-30 May
Mobilise sector teams	30-31 May
Field visits by the sector teams	31 May to 6 June
Data analysis and preparation of sectoral reports	7-14 June
Finalisation of the sector annexes and the main report	15-17 June
Presentation of the report	18 June

**Expected Outputs**

The main output of the assessment is a concise report that presents the findings of the assessment, analysis and specific recommendations for recovery in the form of coherent programmatic actions and a costed recovery strategy. The recommendations for recovery measures/programmes and activities may be specific for (i) the state Government and both the entities/district), (ii) development partners and humanitarian agencies and (iii) communities and households.

DRAFT

## 5.2 List of Participants in the Assessment, by Sector

	Surname	Name	Organization/Institution
Livelihoods and Employment	Abadžić	Amra	Brcko District Government
	Ahdouga	Mohamed Arezki Mokhtar	UNDP
	Bukvic Jusic	Elma	USAID
	Dautović	Hajrija	Ministry of Civil Affairs of BiH
	Gajević	Amila	Federal Ministry of Labour and Social Policy
	Glibo	Luka	Development and Employment Fund of RS
	Karić	Dina	USAID - FIRMA Project
	Karišik	Danijela	Development and Employment Fund of RS
	Kličković	Rajko	Ministry of Labour, War Veterans and Disabled Persons Protection
	Kuzman	Nevena	RS Ministry of Finance
	Mikulić	Amela	FMERI
	Petrović	Darko	WFP
	Radić	Dragana	ILO
	Rešo	Kenan	Labour and Employment Agency of the FBiH
	Sarajelić	Amir	USAID - GOLD Project
	Šarenac	Dragana	Pension and Disability Insurance Fund
	Schweitzer	Julian	ILO
	Semiz	Biljana	Ministry of Labour, War Veterans and Disabled Persons Protection
	Skoko	Aida	USAID - GOLD Project
	Tanović	Lejla	ILO
Water and Sanitation (including flood control)	Unaki	Tomoko	WB
	Veselinović	Siniša	Labour and Employment Agency of BiH
	Alford	David	UNICEF
	Čengić	Haris	Ministry of Civil Affairs of BiH
	Čolić	Irnela	Ministry of Foreign Trade and Economic Relation of BiH
	Dragičević	Đorđe	BD Government
	Đukić	Nenad	Ministry of Agriculture, Forestry and Water Management
	Đurbuzović	Šejla	Ministry of Foreign Affairs of BiH
	Gabrić	Stjepan	WB
	Sajid	S. Anwar	WB
	Hadžimešić	Jasmina	EU Delegation to BiH
	Hadžović	Hazima	FMPVS
	Hodžić	Atif	Ministry of Foreign Trade and Economic Relation of BiH
	Ivanović	Aleksandar	RS Ministry of Spatial Planning, Civil Engineering and Ecology
	Keller	Hans	SDC - Swiss Embassy
	Kojić	Dušan	Ministry of Civil Affairs of BiH
	Kotorić	Sadmira	Gender Centre

	Lozo	Zdravko	RS Ministry of Spatial Planning, Civil Engineering and Ecology
	Papež	Jože	Administration for Civil Protection of Slovenia
	Pljevaljić	Aleksandar	VODE Srpske
	Radojević	Veselin	BD Government
	Školjić	Roksanda	Sava Watershed River Agency Sarajevo
	Woods	Patrick	EU Team RNA/EUCM - Flood and Risk Assessment
	Zulić	Sandi	SDC - Swiss Embassy
Energy	Ergin	Erdem	WB
	Ibričević	Amila	EUSR/EU Del
	Ivošević	Jelena	RS Ministry of Industry, Energy and Mining
	Janković	Milan	RS Ministry of Industry, Energy and Mining
	Malović	Dženan	WB
	Muminović	Admir	Government of Brcko District
	Obradović	Nemanja	Ministry of Foreign Affairs of BiH
	Šošće	Eldara	Federal Ministry of Energy, Mining and Industry
Housing and Local Infrastructure	Anđušić	Aleksandar	IOM
	Arifagić	Edis	UNDP
	Barakovic	Alaga	Government of Brcko District
	Barićanin	Vasko	RS Ministry of Refugees and Displaced Persons
	Blagojević	Novka	RS Ministry of Administration and Local Self-governance
	Ćevriz	Nebojša	RS Ministry of Refugees and Displaced Persons
	Femić	Olga	UNHCR
	Golubović	Predrag	RS Ministry of Administration and Local Self-governance
	Griekspoor	Andre	WHO
	Hadžikadić	Elvis	UNDP
	Jašarević	Suzana	Hilfswerk Austria International HWA
	Kabil	Sanja	UNICEF
	Kodžaga	Muris	Hilfswerk Austria International HWA
	Komar	Enisa	Ministry of Foreign Affairs
	Kovačević	Bojan	UNDP
	Međedović	Aldin	Federal Ministry of Education and Science
	Mihić	Jadranka	EUD
	Mijanović	Slavko	RS Ministry of Spatial Planning, Civil Engineering and Ecology
	Mladina	Ivica	Government of the FBiH
	Mujanović	Rifet	Brcko District Government
	Polić	Dženita	EUD
	Ramhost	Sanscho	EU
	Serdarević	Samir	FBiH Civil Protection Agency
	Simmonds	Stephanie	UNFPA
	Skrobanja	Milan	RS Ministry of Spatial Planning, Civil Engineering and Ecology

	Stemmler	Sarah	IOM
	Stergar	Robert	UNESCO
	Timotija	Milena	UNESCO
	Yonemitsu	Masanobu	OSCE
Agriculture	Brković	Nijaz	FMPVIS
	Davis	Adam	EU Team RNA/EUCM
	Jordanović	Olivera	WB
	Klisura	Aziz	FMPVIS
	Pijunović	Vlado	FAO
	Šahović	Dževdet	Government of Brcko District
	Shawky	Ahmed	WB
	Torić	Benjamin	USAID/SIDA FIRMA
	Trifković	Vladislav	RS Ministry Agriculture, Forestry and Water Management
	Vražalica	Alma	Ministry of Foreign Affairs of BiH
	Zahiragić	Munira	Federal Agency for Statistics
Transport and Communication	Bjelobaba	Bojana	Post offices of RS
	Bogojević	Nataša	RS Railways
	Čavar	Ivan	FBiH Roads
	Čivičić	Svjetlana	Government of Brcko District
	Duraković	Želmina	FBiH Railways
	Đurić	Milena	RS Roads
	Ilić	Snježana	RS Railways
	Kamenjašević	Mensur	Government of Brcko District
	Marić	Silvana	Federal Ministry of Transport and Communication
	Pejić	Darinka	Post offices of RS
	Pjanić	Vedran	RS Roads
	Poletanović	Gordana	M:TEL
	Potkonjak	Mila	Post offices of RS
	Sansom	James	EU Team RNA/EUCM
	Stanić	Marko	M:TEL
Cross Cuttings	Clifton	Deborah	UNWOMEN
	Lucic	Dijana	EUFOR
	Guzman	Fernando	EUFOR
	Collinson	Paul	UNDP
	Kesete	Yohannes	WB
	Porobić	Jasmin	UNDP
	Saito	Keiko	WB



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### 5.3 List of Field Visits made for the Assessment

Nr.	Date of departure	Date of return	Itinerary	Team members names	Group
1	23-may-14	23-may-14	Tuzla, Doboj, Bijeljina	Vlado Pijunovic	Agriculture
2	24-may-14	24-may-14	Brčko, Šamac, Modriča, Odžak, Maglaj, Zavidovići	Vlado Pijunovic	Agriculture
3	31-may-14	31-may-14	Orašje, Domaljevac-Šamac, Banja Luka, Čelinac	Vlado Pijunovic	Agriculture
4	31-may-14	31-may-14	Brčko	Ricardo Zapata Marti, Hossein Kalali, Jadranka Mihic, Andre Griekspoor, Stephanie Simmonds	Core
5	01-jun-14	01-jun-14	Sanski Most, Ključ, Šipovo	Vlado Pijunovic	Agriculture
6	01-jun-14	02-may-14	Banja Luka	Andre Griekspoor, Stephanie Simmonds	Health
7	03-jun-14	03-jun-14	Doboj	Marinos Skempas, James Sanson, Mensur Hodzic and Yohannes Kessete.	Transport
8	03-jun-14	03-jun-14	Zenica	Joze Papez; Patrick Woods; Adam Davies; Peter Spruyt; Jasmina Hadzimesic	Water and Sanitation
9	03-jun-14	03-jun-14	Bijeljina, Doboj, Orašje, Domaljevac-Šamac, Šamac, Zenica, Maglaj, Tuzla	Katsuyuki Fukui, Erdem Ergin and Dzenan Malovic	Energy
10	03-jun-14	03-jun-14	Nemila	Elvis Hadzikadic	Housing
11	03-jun-14	03-jun-14	Milići, Bratunac, Srebrenica	Vlado Pijunovic	Agriculture
12	04-jun-14	04-jun-14	Doboj	Joze Papez; Patrick Woods; Adam Davies Peter Spruyt Jasmina Hadzimesic	Water and Sanitation
13	04-jun-14	04-jun-14	Zenica	Sadmira Kotoric, Aldina Fafulovic, and Tomoko Unaki	Cross-cutting: Roma
14	04-jun-14	05-jun-14	Maglaj, Zavidovići, Doboj, Modriča, Šamac, Orašje, Odžak, Brčko, Bijeljina, Tuzla	Faruk Jusufovic, Samir Serdarevic and Sanscho Ramhorst	Housing
15	05-jun-14	05-jun-14	Maglaj, Doboj	Elvis Hadzikadic, Edis Arifagic and two representatives from state institutions	Housing
16	05-jun-14	05-jun-14	Brčko, Bijeljina	Julian Schweitzer; Tomoko Unaki,	Livelihoods and Jobs

				Dragan Radic and Darko Petrovic	
17	05-jun-14	07-jun-14	Tuzla, Brčko, Banja Luka	Paul Collinson and Ada Gradascevic	Cross-cutting: Security / De-mining
18	05-jun-14	06-jun-14	Area of rivers Sava and Drina	Adam Davies, Joze Papez, Patrick Woods, Hans Keller	Water and Sanitation
19	06-jun-14	06-jun-14	Tuzla, Lukavac, Olovo	Julian Schweitzer; Tomoko Unaki, Dragan Radic, Darko Petrovic and Deborah Clifton	Livelihoods and Jobs + Cross cutting: Gender
20	07-jun-14	07-jun-14	Domeljevac - Šamac	Elvis Hadzikadic, Edis Arifagic	Housing
21	07-jun-14	07-jun-14	Mostar	Ricardo Zapata Marti	Core
22	09-jun-14	09-jun-14	Zenica, Maglaj, Doboj	Sajid Anwar, Stjepan Gabric and Hamzah Saif	Water and Sanitation
23	09-jun-14	10-jun-14	Bijeljina, Brčko	Ahmed Shawky, Luis Samoilov and Vesna Petrovic	Agriculture

## 5.4 Assessment of the Damage made to the Cultural Monuments, Cultural Institutions (museums, archives, libraries, cultural houses) in Bosnia and Herzegovina in the flood-affected areas

### 5.4.1 Introduction<sup>77</sup>

Team for cultural heritage completed the survey within the area that was affected by catastrophic floods. The area of Bosnia and Herzegovina examined is of total surface of 2644 square kilometers and it has been administratively divided in eight governing areas. (Maglaj, Doboj, Šamac, Domaljevac, Bijeljina, Orašje, Odžak and Brčko district). Within concerned area are located 23 national monuments and 40 monuments that are on preliminary list of national monuments. Out of the above mentioned 63 monuments 5 monuments are directly affected and damaged by the flood.

In regard to the Cultural institutions, and total number of 12 cultural houses, 4 libraries and 1 museum were examined. Major damage has been detected on 4 libraries with severe damaged library funds. One of the libraries, located in Doboj, has suffered major structural damage on the building itself.

The Museum in Doboj was also affected directly by flooding which caused some substantial damage on the facilities, however due to increased humidity museum's funds and collections are damaged as well.

This area has a lot of cultural centers with small and large capacities. Twelve buildings are in jeopardy and among those 5 has significant damage in equipment and especially on ethnological fund (instruments, national costumes, ethnographic collections etc).

Religious objects have suffered a lot of damage from the flood same as residence objects and housing in that area. The total numbers of twenty five buildings from all three confessions are flooded. Damage is very similar on these and is demanding same methodology of intervention on them.

From the above mentioned it has been evident that a total number 48 monuments, sites and / or cultural institutions within concerned area were exposed to the damages caused by the floods. The assessment carried out estimating damages at 2.07 Million EUR. It needs to be noted that damages on some of the buildings and collections, are still preliminary, especially these damages on the ethnological collections and funds, that beside values of the object itself an component on intangible heritage losses is to be taken into consideration.

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<sup>77</sup> Milena Timotija arch and Robert Stergar arch

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Sava (Atik) mosque, the site and remains of the architectural ensemble in Brcko			
Built heritage - National monument	<ul style="list-style-type: none"> <li>• Authentic mosque has been completely destroyed, but the architectural ensemble of the Atik (old) mosque has been rehabilitated on its original site. The whole object can be conserved as it was before disaster. Since the basement was flooded, new project recovery will apply only to that part of the building.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>• Mosque's basement was flooded.</li> <li>• There is some moisture on the walls, especially under the window where the water entered.</li> <li>• Installation equipment are destroyed (equipment for floor heating)</li> </ul>
	<ul style="list-style-type: none"> <li>• The property is not threatened by theft and plundering.</li> <li>• The object is now protected from the external influences.</li> <li>• Since most of the building is not damaged, it is used for its original purpose.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>• Object is used in accordance with the safeguards applicable regulations</li> <li>• <b>10%</b> of existing historical buildings require preservation measures (about <b>120</b> square meters)</li> </ul>
	<ul style="list-style-type: none"> <li>• For this level of damage there are experienced and qualified professionals available to carry out necessary repair.</li> <li>• There are local skilled craftsmen available for new project intervention but there are no qualified professionals for conservation and restoration on local level.</li> <li>• There are necessary conservation materials and equipment.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>• Security is ensured.</li> <li>• The object construction is stable.</li> <li>• There is no danger of collapsing any part of the building</li> </ul>
	<ul style="list-style-type: none"> <li>• The protected area covers the actual scope of the site.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>• For the level of damage on this object there are available restoration materials, labour, architects, structural engineers and specialists in the country.</li> </ul>

**Loss estimation:**


Repair works on the objects with preceding and preparatory work:  
12,271.00 EUR

Furniture and equipment:  
5,112.92 EUR

TOTAL : 17,383.92 EUR

The architectural ensemble of the Islahijet in Brčko (One building)			
Built heritage - National monument	<ul style="list-style-type: none"> <li>The architectural ensemble of the Islahijet consists of the Islahijet Centre and four residential-cum-commercial properties with storage facilities, and the row of properties opposite the Islahijet Centre.</li> <li>This building is for educational purposes.</li> <li>The structure of the building and all constructive elements can be conserved and remains as authentic.</li> <li>The ground floor needs a new preservation measures and complete renovation of the interior.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>The ground floor was flooded.</li> <li>There is moisture on the walls on the level of 70 centimeters.</li> <li>The floors cover are destroyed (wooden floor)</li> <li>Electrics installations are not damaged.</li> <li>There is electric power but temporary only on the first floor</li> <li>The wooden furniture is completely destroyed (school tables, chairs, etc.)</li> </ul>
	<ul style="list-style-type: none"> <li>The property is not threatened by theft and plundering.</li> <li>The object is now protected from the external influences.</li> <li>Since most of the building is not damaged, it is used for its original purpose.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>Object is used in accordance with the safeguards applicable regulations</li> <li><b>20%</b> of existing historical buildings require preservation measures (about <b>210</b> square meters)</li> </ul>
	<ul style="list-style-type: none"> <li>For this level of damage there are experienced and qualified professionals available to carry out necessary repair.</li> <li>There are local skilled craftsmen available for new project intervention but there are no qualified professionals for conservation and restoration on local level.</li> <li>There are necessary conservation materials and equipment.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>Security is ensured.</li> <li>The object construction is stable.</li> <li>There is no danger of collapsing any part of the building</li> </ul>



	<ul style="list-style-type: none"> <li>The protected area covers the actual scope of the site.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>For the level of damage on this object there are available restoration materials, labour, architects, structural engineers and specialists in the country.</li> </ul>
			
<b>Loss estimation:</b>	<p>Repair works on the objects with preceding and preparatory work: 21,474.26 EUR</p> <p>Furniture and equipment: 15,338.76 EUR</p> <p>TOTAL : 36,813.02 EUR</p>		

Land Bank in Brčko			
Built heritage – Provisional List	<ul style="list-style-type: none"> <li>The structure of the building and all constructive elements can be conserved and remains as authentic.</li> <li>The basement was flooded and needs preservation measures and renovation of the interior and its archive documents.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>The basement was flooded.</li> <li>There is moisture on the walls on the level of 1.5 meters.</li> <li>Electric installations are not damaged.</li> <li>There is electric power in the whole building.</li> <li>The wooden bookshelves are damaged especially lower shelves</li> <li>Part of the bank archives such as registrar and other documents are damaged and still moist.</li> </ul>
	<ul style="list-style-type: none"> <li>The property is not threatened by theft and plundering.</li> <li>The object is now protected from the external influences.</li> <li>Since most of the building is not damaged, it is used for its original purpose.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>Object is used in accordance with the safeguards applicable regulations</li> <li><b>20%</b> of existing historical buildings require preservation measures (about <b>200</b> square meters)</li> </ul>
	<ul style="list-style-type: none"> <li>For this level of damage there are experienced and qualified professionals available to carry out necessary repair.</li> <li>There are local skilled craftsmen available for new project intervention but there are no qualified professionals for conservation and restoration on local level.</li> <li>There are necessary conservation materials and equipment.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>Security is ensured.</li> <li>The object construction is stable.</li> <li>There is no danger of collapsing any part of the building</li> </ul>
	<ul style="list-style-type: none"> <li>The protected area covers the actual scope of the site.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>For the level of damage on this object there are available restoration materials, labour, architects, structural engineers and specialists in the country.</li> </ul>

**Loss  
estimation:**



Repair works on the objects with preceding and preparatory work:  
10,225.84 EUR

furniture and equipment:  
5,112.92 EUR

TOTAL : 15,338.76 EUR

## MUNICIPALITY MAGLAJ – NATIONAL MONUMENT – UZEIRBEGOV KONAK

Built heritage - National monument	<ul style="list-style-type: none"> <li>Konak is a Turkish word meaning a house, although in some cases it can also denote the residence of senior officials of state. The Uzeirbegović konak was the home of the wealthy Maglaj family of that name, and was built by Salihbeg Uzeirbegović in about 1875., with the layout appropriate to buildings dating from the transitional period from Ottoman oriental to Austrian and western European architecture.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>Flooded 127m<sup>2</sup> at the ground floor and 100m<sup>2</sup> of the basement, with damage flooring, walls, carpentry, sanitation and office furniture. Water reached the height of 2.10 m.</li> </ul>
	<ul style="list-style-type: none"> <li>The property does not threaten by theft and plundering. The building was closed and provided.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>The building was awarded the Cultural Centre to manage and brought it into the context of tourist attractions. Interior decorating is done by setting the appropriate furniture and antiques. The set is authentic setting four Bosnian rooms. During the season Konak visit about 500 guests of the city.</li> <li>20% of existing historical buildings requiring immediate preservation measures.</li> </ul>
	<ul style="list-style-type: none"> <li>Uzeirbegov Konak is a national monument, and all the works that have been carried out under the constant supervision of the Institute for Protection of Monuments of Federation.</li> <li>While conservation and restoration work after the war were fully utilized the</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>The building is situated on the bank of the river Bosnia, built at traditional structural system with stone walls on basement and ground floor and timbered upper floor. Suffered damage not jeopardizes the stability or safety of the facility.</li> </ul>

	<p>knowledge of local experts and masters.</p> <ul style="list-style-type: none"> <li>• All the necessary conservation materials, equipment and products are available.</li> </ul>		
	<ul style="list-style-type: none"> <li>• protected area covers the actual scope of the site.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>• Materials for restorations, labour, architects, structural engineers, specialists are available.</li> </ul>
	Photos		
<p><b>Loss estimation:</b></p> <p>Repair works on the objects with preceding and preparatory work: 23,212.65 EUR</p> <p>furniture and equipment: 11,606.33 EUR</p> <p>TOTAL : 34,818.98 EUR</p>			

# MUNICIPALITY MAGLAJ – NATIONAL MONUMENT – CHURCH OF ST ELIJAH THE PROPHET

Built heritage - National monument	<ul style="list-style-type: none"> <li>The Church of St Elijah the Prophet in Maglaj was built between 1906 and 1908 in the historicist style, one of many churches built in the late 19th and early 20th century of which relatively few are still extant. It belongs to the type of single-aisled vaulted church with side choirs, a bell tower at the west end, and an apse at the east end. It was built of brick and stone..</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>Flooded 165 m2 at the ground floor with damage flooring, walls, carpentry, church furniture, church inventory.</li> <li>Parish house flooded 70 m2 at ground floor with damage flooring, office, small parish hall and office furniture with the all equipment. Water reached the height of 1.80 m.</li> </ul>
	<ul style="list-style-type: none"> <li>The property does not threaten by theft and plundering. The building was closed and provided.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>During the Austro-Hungarian period the entire economic and social structure of society in BiH changed. The modern age and industrial development defined the final appearance of the town, with the older part located on the right bank and the new on the left bank of the river, linked by a road bridge, and of entirely different structure functionally, architecturally, historically and in terms of townscape.. Maglaj parish was founded by ruling of the Dabar-Bosnia Metropolitanate in Sarajevo in 1883</li> <li>20% of existing historical buildings requiring immediate preservation measures.</li> </ul>
	<ul style="list-style-type: none"> <li>The Church of St Elijah the Prophet is a national monument, and all the works that have been carried out</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>The Church of St Elijah belongs to the type of single-aisled vaulted church with side choirs, a bell tower at the west end, and an apse at the east</li> </ul>

	<p>under the constant supervision of the Institute for Protection of Monuments of Federation.</p> <ul style="list-style-type: none"> <li>• While conservation and restoration work after the war were fully utilized the knowledge of local experts and masters.</li> <li>• All the necessary conservation materials, equipment and products are available.</li> </ul>		<p>end. It is rectangular in plan with its long axis east-west. The walls were built of stone and brick. The surviving walls were used in part following war damage to the property. Suffered damage not jeopardizes the stability or safety of the facility.</p>
	<ul style="list-style-type: none"> <li>• protected area covers the actual scope of the site.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>• Materials for restorations, labour, architects, structural engineers, specialists are available.</li> </ul>

Photos:



### Loss estimation:

Repair works on the objects with preceding and preparatory work:

Church – 16,872.63 EUR

Parish house – 3,579.04 EUR

Furniture and equipment:

Church – 8,436.32

Parish house – 2,812.11 EUR

**TOTAL: 31,700.10 EUR**



NATIONAL LIBRARY IN MAGLAJ			
Archives and libraries	<ul style="list-style-type: none"> <li>• Security is partially ensured.</li> <li>• The property is not threatened by theft and plundering.</li> <li>• There is a higher risk for security than pre-disaster situation.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>- 70 % of library fund has been completely destroyed, entire children's book fund, school books, professional literature and some of the historical books and collection of periodicals.</li> </ul>
	<ul style="list-style-type: none"> <li>• There was complete inventory of the collections but it was damaged during the flood.</li> <li>• Electronic catalogue no longer exists.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>• 95% of secured properties. Targets: furnishing &amp; equipment are secured; supplies (electrical plugs, etc.) are secured; hosted inventories (books, manuscripts, documents, etc.) are also secured.</li> </ul>
	<ul style="list-style-type: none"> <li>• The premises are regularly inspected by the staff of the institutions.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>• No (documentation of tangible cultural heritage)</li> </ul>
	<ul style="list-style-type: none"> <li>• The building temporary ensured present protection for the hosted collections but there is a need to move them to a safer location or storage.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>• No [<i>relevance for disaster risk preparedness</i>]</li> </ul>
	<ul style="list-style-type: none"> <li>• There are many manuscripts and specific books which require particular conservation measures and special protection.</li> <li>• These measures of protection are not ensured yet.</li> <li>• They were provided before the disaster properly</li> <li>• Current needs are:               <ul style="list-style-type: none"> <li>- Equipment for drying the existing moisture</li> <li>- Recovery 200 m<sup>2</sup> of the ground floor, walls and floors that were completely</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Part of the collection saved by the employees because raising equipment and precious books above the water</li> <li>• Books that survived flood have to be moved to a safer location or storage.</li> <li>• Than those books and collections and documents require conservation measures and recovery</li> <li>• 25-28.000 book is irreversibly destroyed</li> <li>• The building needs renovation (walls recovery, new floors, installation repair, equipment etc.)</li> </ul>



	<ul style="list-style-type: none"> <li>- ruined in each room</li> <li>- Conservation measures and special protection for books and documents which survived flood</li> <li>- New interior equipment</li> <li>- Purchase of the new books which are ruined</li> </ul>		
	<ul style="list-style-type: none"> <li>• The library is not sufficiently organized to ensure the safeguarding, proper protection and public accessibility of the affected population's collective memory.</li> </ul>		<ul style="list-style-type: none"> <li>• The library does not have appropriate supplies, equipment, appropriate treatments, restoration laboratories, storage conditions for archives, libraries...</li> </ul>
	<ul style="list-style-type: none"> <li>• This library has sufficient size and number to meet the learning needs of the affected populations.</li> </ul>		<ul style="list-style-type: none"> <li>• The library is <u>closed</u> for public use and need to recovery</li> </ul>
	<ul style="list-style-type: none"> <li>• The building has not ensured conservation or protection for the hosted collections and there is a need to move them to a temporary safe location.</li> </ul>		





**Loss estimation:**

Repair works on the objects with preceding and preparatory work:  
15,338.76 EUR

Furniture and equipment:  
15,338.76 EUR

The collection:  
76,693.78 EUR

TOTAL : 107,371.30 EUR

National Library in Doboj			
Archives and libraries	<ul style="list-style-type: none"> <li>• City Library in Doboj started operations on 9 May in 1946. on the occasion of Victory Day. A decision on the establishment passed the National Board of Doboj. Decision of the Municipality of Doboj from 1994. Was established the National Library of Doboj, which operates as an institution of public service in the municipality of Doboj.</li> <li>• Security is partially ensured.</li> <li>• The property is not threatened by theft and plundering.</li> <li>• There is a higher risk for security than pre-disaster situation.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>- 20 % of library fund has been completely destroyed:</li> <li>- complete children's book fund</li> <li>- professional literature</li> <li>- school reading</li> <li>- history books</li> <li>- archive material.</li> </ul> <p>There is probably more damaged books but there is still no accurate record of what was destroyed.</p>
	<ul style="list-style-type: none"> <li>• There was complete inventory of the collections but it was damaged during the flood.</li> <li>• Part of the inventory was in electric form and that part is saved.</li> <li>• The library owns more than 86,817 monographs.</li> </ul>	<i>Idem</i> Specialized staff	<ul style="list-style-type: none"> <li>• 50% of secured properties.</li> <li>• Libraries area is 390.55 m<sup>2</sup> of which is in constant use it only 215.30 m<sup>2</sup>, because the rest of the space was already a lot of damaged, before disaster.</li> <li>• The object is not structurally stable, so there is a justify need for total structural repairs</li> <li>• furnishing &amp; equipment are not secured; supplies (electrical plugs, etc.) are not secured; hosted inventories (books, manuscripts, documents, etc.) are not secured.</li> </ul>
	<ul style="list-style-type: none"> <li>• The premises are regularly inspected by the staff of the institutions.</li> </ul>	Institution director and staff	
	<ul style="list-style-type: none"> <li>• The building temporary ensured present protection for the hosted collections but there is a need to move them to a safer</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>• No [relevance for disaster risk preparedness]</li> </ul>

	location or storage.		
	<ul style="list-style-type: none"> <li>• There are many manuscripts and specific books which require particular conservation measures and special protection.</li> <li>• These measures of protection are not ensured yet.</li> <li>• They were provided before the disaster properly</li> <li>• Current needs are: <ul style="list-style-type: none"> <li>- Structural repairs of the building</li> <li>- Equipment for drying the existing moisture</li> <li>- Recovery of the ground floor, walls and floors that were completely ruined in each room</li> <li>- Conservation measures and special protection for books and documents which survived flood</li> <li>- New interior equipment</li> <li>- Purchase of the new books which are ruined</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Part of the collection is saved because some of the books were on the first floor.</li> <li>• Books that survived flood have to be moved to a safer location or storage.</li> <li>• Than those books and collections and documents require conservation measures and recovery</li> <li>• The building needs fully renovation (structural repairs, walls recovery, new floors, installation repair, equipment etc.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The library is not sufficiently organized to ensure the safeguarding, proper protection and public accessibility of the affected population's collective memory.</li> </ul>		<ul style="list-style-type: none"> <li>• The library does not have appropriate supplies, equipment, appropriate treatments, restoration laboratories, storage conditions for archives, libraries...</li> </ul>
	<ul style="list-style-type: none"> <li>• This library has sufficient size and number to meet the learning needs of the affected populations.</li> </ul>		<ul style="list-style-type: none"> <li>• The library is <u>completely closed</u> for public use and the object and contains are in a poor condition.</li> </ul>
	<ul style="list-style-type: none"> <li>• The building has not ensured conservation or protection for the hosted collections and there is a need to move them to a</li> </ul>		

temporary safe location.



**Loss estimation:**

Repair works on the objects with preceding and preparatory work:  
76,693.78 EUR

Furniture and equipment:  
46,016.27 EUR


The collection:  
76,693.78 EUR

TOTAL : 199,403.83 EUR

National Library in Samac			
Archives and libraries	<ul style="list-style-type: none"> <li>• National Library in Samac was established in 1952. by Municipal Assembly decision Samac. It operates as an autonomous institution of public service in the area of Samac municipality.</li> <li>• Security is ensured.</li> <li>• The property is not threatened by theft and plundering.</li> <li>• There is a higher risk for security than pre-disaster situation.</li> </ul>	Institution director and staff	<p>65 % of library fund is completely destroyed:</p> <ul style="list-style-type: none"> <li>- children's fund</li> <li>- fund for adults</li> <li>- encyclopedia</li> <li>- professional literature (history, sociology, economics, law, natural, art history, philosophy, religion, history, literature, literary criticism, fiction)</li> <li>- dictionaries</li> <li>- religious book</li> <li>- handbooks</li> <li>- thesauruses</li> <li>- documentation</li> <li>- collection of old and rare books (86 units)</li> <li>- inventories</li> </ul>
	<ul style="list-style-type: none"> <li>• There was complete inventory of the collections but it was damaged during the flood. Complete book fund monograph, 21900, order is processed in "Publiko in 2004," according to established international standards of bibliographic description</li> <li>• The inventory was in electron form so it is saved.</li> <li>• Library fund include 32,250 units of library materials (monographs and serials)</li> </ul>	<p><i>Idem</i></p> <p>Specialized staff</p>	<ul style="list-style-type: none"> <li>• 60% of secured properties.</li> <li>• furnishing &amp; equipment are not secured; supplies (electrical plugs, etc.) are completely damaged and not secured;</li> <li>• damaged are: doors of all the rooms except for the front, as well as a complete inventory of the library such as desks, chairs, cabinets, computers, monitors, heaters. hosted inventories (books, manuscripts, documents, etc.) are not secured.</li> </ul>
	<ul style="list-style-type: none"> <li>• The premises are regularly inspected by the staff of the institutions.</li> </ul>	Institution director and staff	
	<ul style="list-style-type: none"> <li>• The building temporary ensured present protection for the hosted collections but it has to be moved to a safer location or</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>• No [relevance for disaster risk preparedness]</li> </ul>



	storage.		
	<ul style="list-style-type: none"> <li>• There are many manuscripts and specific books which require particular conservation measures and special protection.</li> <li>• These measures of protection are not ensured yet.</li> <li>• They were provided before the disaster properly</li> <li>• Current needs are: <ul style="list-style-type: none"> <li>- Equipment for drying the existing moisture</li> <li>- Recovery of the ground floor, walls (water flooded 1.6 meters high) and floors that were completely ruined in each room</li> <li>- Conservation measures and special protection for books and documents which survived flood</li> <li>- New interior equipment</li> <li>- Considering that is 65% of library fund is ruined there are justify need of purchase a new books and other library fund.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>• Part of the collection is saved because some of the books were on the higher shelves, but most of the books are ruined</li> <li>• Books that survived flood have to be moved to a safer location or storage.</li> <li>• Area of the library is 108.63 m<sup>2</sup>, located in four rooms, three of which are predicted to perform library operations</li> <li>• The building needs fully renovation (assessment of stability, than probably structural repairs, walls recovery, new floors, installation repair, equipment etc.)</li> </ul>
	<ul style="list-style-type: none"> <li>• The archives are not sufficiently organized to ensure the safeguarding, proper protection and public accessibility of the affected population's collective memory.</li> </ul>		<ul style="list-style-type: none"> <li>• The library does not have appropriate supplies, equipment, appropriate treatments, restoration laboratories, storage conditions for archives, libraries...</li> </ul>
	<ul style="list-style-type: none"> <li>• This library has not sufficient size and number to meet the learning needs of the affected populations. In the room where are the library materials, at the same time is space for work</li> </ul>		<ul style="list-style-type: none"> <li>• The library is <u>completely closed</u> for public use and the object and contains are in a poor condition.</li> </ul>

	with all users of library services. This room is also used as a reading room		
	<ul style="list-style-type: none"> <li>The building is not ensured conservation or protection for the hosted collections and there is a need to move them to a temporary safe location.</li> </ul>		
			
<b>Loss estimation:</b>	<p>Repair works on the objects with preceding and preparatory work: 36,813.02 EUR</p> <p>Furniture and equipment: 46,016.30 EUR</p> <p>The collection: 76,693.78 EUR</p> <p><b>TOTAL : 159,523.07 EUR</b></p>		



National Library “Filip Visnjic” in Bijeljina			
Archives and libraries	<ul style="list-style-type: none"> <li>Library “Filip Visnjic” was established 1932. Library is legally defined as the main library for the area of Bijeljina, Ugljevik and Lopare and consists of: two public libraries, 25 schools, two college and two universities.</li> <li>Security is ensured.</li> <li>The property is not threatened by theft and plundering.</li> <li>There is a bit higher risk for security than pre-disaster situation.</li> </ul>	Institution director and staff	3 % of library fund is destroyed but for most of these books there is a duplicate
	<ul style="list-style-type: none"> <li>There was complete inventory of the collections. Inventory is kept in electronic form.</li> </ul>	<i>Idem</i> Specialized staff	95% of secured properties. Targets: furnishing & equipment are secured; supplies (electrical plugs, etc.) are secured;  hosted inventories (books, manuscripts, documents, etc.) are also secured.
	<ul style="list-style-type: none"> <li>The premises are regularly inspected by the staff of the institutions.</li> </ul>	Institution director and staff	<ul style="list-style-type: none"> <li>No (documentation of tangible cultural heritage)</li> </ul>
	<ul style="list-style-type: none"> <li>The building ensured present protection for the hosted collections.</li> </ul>	Specialized staff	<ul style="list-style-type: none"> <li>No [relevance for disaster risk preparedness]</li> </ul>
	<ul style="list-style-type: none"> <li>There are no manuscripts and specific books which require particular conservation measures.</li> <li>These measures were properly provided before the disaster</li> <li>Current needs are:               <ul style="list-style-type: none"> <li>- Recovery of the basement, (The water level in the basement reached 140 centimeters)</li> <li>- New equipment</li> <li>- furnace for heating,</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>Most of the collection is saved because only the basement was flooded</li> <li>The building is structurally stable and suffered no major damage</li> </ul>

	ventilation and electrical system has been damaged		
	<ul style="list-style-type: none"> <li>The archives are sufficiently organized to ensure the safeguarding, proper protection and public accessibility of the affected population's collective memory.</li> </ul>		<ul style="list-style-type: none"> <li>The library has appropriate supplies, equipment, appropriate treatments, storage conditions for archives, libraries...</li> </ul>
	<ul style="list-style-type: none"> <li>This library has sufficient size and number to meet the learning needs of the affected populations.</li> </ul>		<ul style="list-style-type: none"> <li>The library is <u>open</u> for public use and the object and contains are in a good condition.</li> </ul>
	<ul style="list-style-type: none"> <li>The building has ensured conservation or protection for the hosted collections</li> </ul>		



<b>Loss estimation:</b>	<p>Repair works on the objects with preceding and preparatory work: 20,451.68 EUR</p> <p>Furniture and equipment: 10,225.84 EUR</p> <p>The collection: 5,112.92 EUR</p> <p>TOTAL : 35,790.43 EUR</p>
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