

An aerial photograph of a large bridge under construction over a wide river. The bridge features two tall, grey concrete pylons with multiple stay cables. A steel truss structure is visible across the riverbed. In the background, a city skyline is visible under a cloudy sky. The foreground shows residential buildings and greenery.

SERBIA

**Making Transport Infrastructure
More Resilient**

Svetlana Vukanovic

Transport Specialist,

Transport and ICT Global Practice, World Bank

Floods 2014 – a wake up call to natural hazards

- Floods affected **119 municipalities** (out of 165)
- **22% of total population** affected by floods
- **More than 30 municipalities** sustained extensive damage
- **57 lives** were lost
- **32,000 families** were forced out of their homes
- Production of electricity decreased by 25%, due to the flooding of an open-pit coal mine, a key source of lignite-based power generation
- The disaster caused a **recession** in the Serbian economy
- Serbian **economy contracted by 1.8%** in 2014, instead of growing by 0.5% as was previously projected

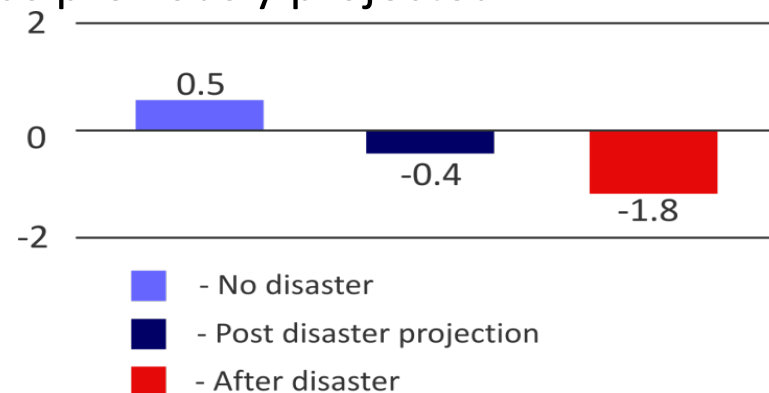


Photo: sas informasiya agentliyi



Photo: Serbian Orthodox Church

**IMPACT OF
DISASTER ON
SERBIA GDP
GROWTH RATE
IN 2014**



Disaster Effects

POST-DISASTER NEEDS, MILLION EUR			
SECTOR	RECOVERY	RECONSTRUCTION	TOTAL
Agriculture	40.6	111.4	151.9
Manufacturing	18.5	51.7	70.2
Commerce	12.8	144.5	157.3
Tourism	0.5	0.7	1.2
Mining and Energy	210.0	202.0	412.0
Housing	58.8	204.5	263.3
Education	2.0	4.3	6.3
Health	2.7	4.4	7.1
Culture	0.1	1.2	1.3
Transport	/	128.2	128.2
Communications	/	12.6	12.6
Water and Sanitation	3.5	24.0	27.5
Environment	2.8	38.7	41.5
Governance	2.3	14.1	16.4
Employment	46.4	/	46.4
Gender	2.0	/	2.0
TOTALS	402.7	942.3	1,345.0

Resilient Reconstruction - Transport and Local Infrastructure



Landslide in Mali Zvornik (RRSP project)



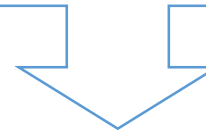
Remedy of Landslide in Mali Zvornik



Government Response

No adequate system was in place to respond to overwhelming needs in a coordinated fashion

Office for Reconstruction and Flood Relief was established in the midst of floods as an **operative (not political) national authority** for relief and recovery



Bank DRM team and sector specialist lead recovery need assessment and assist in developing the support program for the country

Drafting a new set of rules, law and bylaws

Lesson Learned – Policy Innovation

In 7 MONTHS



REPUBLIC OF SERBIA NEEDS TO:

- **Develop a systemic approach** towards risk management and reduction
- Undertake activities and measures on **strengthening prevention**
- Plan and implement **investments** based on understanding risk
- Ensure the highest possible level of **protection of lives and assets** from new floods and other natural disasters
- **Reduce risk and damages** of natural disasters

National Disaster Risk Management Program
Adopted by the Government in December 2014

Policy Innovations - DRCM



- **New legislative framework developed with support of EU, UN and WB**
- **Systemic approach to the DRCM and recovery process: prevention-response-reconstruction**
- **Key innovations based on global best practices and lessons learned:**
 - Establishment of a new national authority for DRCM
 - Prevention based on: Risk Assessments - Risk Reduction and Management Plans
 - Identification of: Areas of increased risk (National authority has the right to restrict/forbid certain activities) and Areas of immediate risk (any activity must be specifically allowed by the Authority, given the very high level of risk)
 - Establishment of a Risk Registry: electronic database for sharing of all information relevant to prevention, risk reduction and response
 - Response based on Rescue and Protection Plans

***Serbia aims to be the one of the first countries in the world with legislation fully aligned with Sendai Framework**

Impacts on transport infrastructure management

BEFORE

- Striking examples of risk-creating infrastructure
- Massive implementation of standard projects for bridges (cookie-cutter design)
- Bridges constructed without hydrologic and geomechanical surveys



AFTER

- For every bridge constructed, a project is prepared with the participation of all relevant experts
- Risk-informed construction
- Hydrologic and geomechanical surveys
- Special focus on landslide remedies

- Relatively modest geotechnical investigations, or lack of any, prior to construction led to misleading conclusions about mechanical properties of rock material and subsequently to dozens of failures. Suspension of construction activities led to delays in project completion on some sections. Due to these reasons the Contractor is, and will, demand compensation claims.

- The new design solutions (under Contractor's responsibility) are to be implemented at much higher construction costs than initially foreseen.
- 60 to 70% of all problems related to extension of deadlines, cost overruns and Contractor's compensation claims are related to unforeseen geological conditions.
- This is to witness the importance of role of geotechnical engineering in major civil engineering projects from the early stage of planning to construction.

Questions Raised as We Work to Improve Road Design, Construction, Operation, and Maintenance

- Knowledge base:
 - Risk mapping - Sampling, updating, prioritizing?
 - Inputs – e.g. map of Landslides, river basins, etc.?
 - Frequency of updating data bases on landslides and a like?
- Monitoring:
 - What are the recommended activities on monitoring of landslides and what preventive measures are shown to be most cost-effective?
 - Are any of the investigatory works for the purpose of monitoring is recommended?
 - Monitoring of remediated cuts during highway exploitation period, is it worthy?
 - Experience with long term monitoring of cuts reinforced with pre-stressed anchors and beam supporting structures (loss of pre-stress force during time, etc.)?
 - Field measurement of suction and its effect on stability of slopes in Japan?
- Maintenance – frequency, responsibility?
- Legislative and institutional:
 - How is cooperation between institutions established
 - Role of citizens and civil society
 - Often, landslides or instabilities of terrain, as well as parts of drainage system are spread over the area which is outside the area under the jurisdiction of road authority. Also, private properties often need to be occupied in order to provide sustainable technical solution. Land acquisition and narrow reserved road area, especially in the settlements are issues causing problems in case of urgent matters. Any recommendation related to this issue?

ANNEX



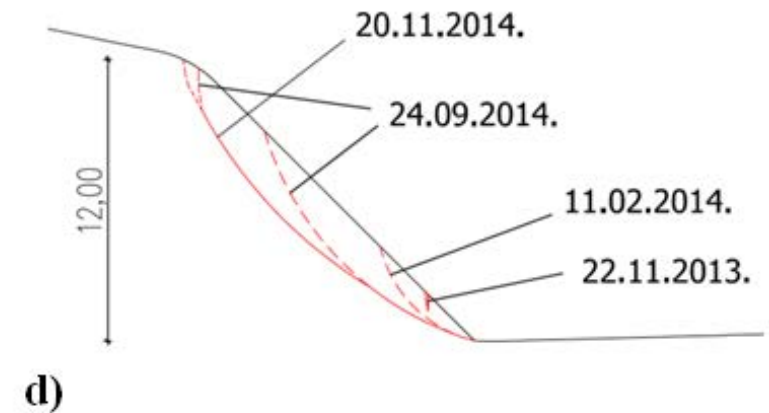
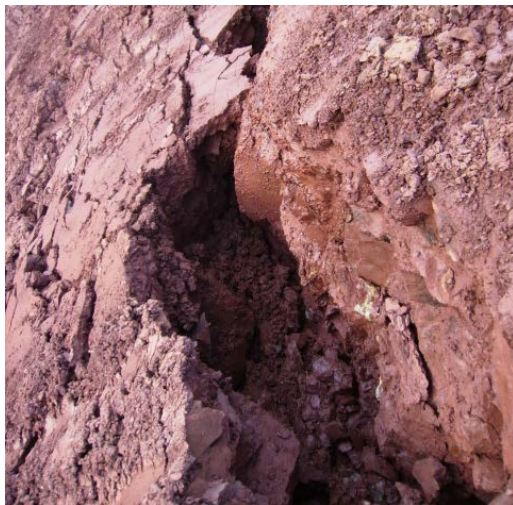


Remedy of Landslide on Road IB28, Landslide in Mali Zvornik



Close up look at the failure progression at km 30+200

- a) 22.11.2013.,
- b) 11.02.2014.,
- c) 20.11.2014.,
- d) Model of failure progression



Policy Innovation – 1st Step

NATIONAL DRM PROGRAM:

- The objective is to support the Government of Serbia to build a **comprehensive program for disaster resilience**.
- Program used as an **umbrella framework** to **coordinate, channel funds, and implement activities** related to reducing and managing risks in Serbia.
- Program relies on **improving coordination of activities between existing structures** within the Government.
- Program developed in partnership with WB, UN, EU and Switzerland.

National Disaster Risk Management Program
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NDRM Program Structure

