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| **Context – the need**  200-300 words  The slow rate of the post-war economic recovery of Bosnia and Herzegovina has been compounded by the negative impacts of climate change on key sectors such as agriculture, energy (hydropower), the environment and, in particular, the frequency and magnitude of flood disasters, which have tripled in frequency in the last decade. In May 2014, Bosnia and Herzegovina experienced its worst flooding in 150 years which resulted in 23 deaths and $2.7 Billion USD worth of damages which is 15% of GDP.  The project target area, the Vrbas River Basin (VRB), is located in the north western part of the country, covering of 12.5% of the total land area of BIH. Of the 28 municipalities that make up the Vrbas basin, 13 have experienced devastating flooding in the past decade.  With flood risks exacerbated by the impacts of climate change, it is imperative that BIH implement adaptation technologies and approaches which are based on a well-developed knowledge base of flood risk to minimize the exposure of people and economic assets. Three key barriers were identified as hindering efforts under the baseline scenario for developing and implementing risk based flood management in the VRB:  **1:** A lack of a comprehensive legislative and policy framework for strategic water and flood risk management, to respond to climate change risks; Fragmentation and gaps in policies and national regulations for long-term flood risk management under climate change.  **2:** Lack of institutional capacities, technologies, equipment, data and tools for hazard, vulnerability, damages and loss assessments on which climate resilient flood risk management can be based.  **3:** Lack of community level resilience technologies and adaptive strategies to minimize flood impact, including lack of a comprehensive and unified flood forecasting, early warning and response system to increase community resilience.  Hence, the project aimed to help the government of BiH and the population of the targeted region to develop adaptive capacity and embark on climate resilient economic activities. |

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| **What actions were taken?**  Activities and achievements included:   * The EU Flood Directive (Directive 2007/60 / EC) has been transposed into the BiH legal framework. The Directive defines the method of assessment and management of flood risk to reduce the harmful effects of floods on people, the economy and the environment. By incorporation of the Directive in the legislative framework of water management sector of the Republika Srpska (RS) a legal basis has been created for flood risk management according to European standards. * A unique Methodology for modelling and mapping flood risks has been defined and accepted by local institutions (water management agencies and relevant ministries). * Draft Spatial Planning and Zoning Policy for the flood areas of the Vrbas Basin was prepared, which included analysis of legislation, existing spatial planning documents and proposal of measures to reduce flood risk. Within the Policy the four (4) flood zones were defined and measures proposed for existing facilities / activities as well as future activities and development of local communities in the context of flood risks in each zone. Also, the Law on Spatial Planning and Construction of the RS has been amended to include the flood hazard and flood risk maps as a tool to be used in planning of measures to protect residents and material goods from natural and other disasters. * Set of guidelines for spatial planning and construction in accordance with flood risk has been created and presented to representatives of local communities in VRB. * A Flood Risk Management Plan has been developed for the Vrbas Basin, for RS part, which contains an overview of all urgent, short-term, and long-term flood risk mitigation measures, including locations for possible flood risk mitigation interventions. The plan envisages the implementation of structural and non-structural measures through an integrated approach to flood risk management within the basin. * The compulsory insurance model has been developed for individual housing for the most common types of disasters: floods, landslides, earthquakes and storms. The goal of the development of this type of insurance is to protect the population from the growing risk of natural disasters, to transfer the risk in order to protect the public budget at all levels from unforeseen expenditures. * A climate change model was developed for the VRB, which was the basis for development of the Flood Forecasting and Early Warning System. * For the purposes of flood mapping, hydrological and hydraulic models (1D and 2D) were developed for the entire Vrbas basin. These models are transferred and used by hydrometeorological institutes while the hydraulic model is transferred to water agencies. * Socio-economic survey was conducted in the Vrbas Basin as a basis for flood risk mapping, which includes an assessment of the vulnerability of women in floodplain areas at risk of flooding. * Hazard maps and flood risk maps were developed and provided to water agencies and municipalities, and a digital terrain model of the Vrbas Basin was created using LIDAR technology. * Model of sensitivity to torrential floods, an erosion map, register of torrents and a cadastre of torrents have been developed. * Automatic real-time hydrometric monitoring network has been established that have sufficient coverage to record hydro-meteorological conditions in the basin. Data collection and processing is centralized in the entity hydrometeorological institutes. The network consists of 7 hydrological, 2 meteorological and 20 precipitation stations and in addition the operational plan and a plan for maintaining the hydrometric network has been prepared. * Water Information System has been improved to include platform for data exchange between water agencies. Experts from water agencies and relevant ministries have undergone continuous training for the use of this System (data entry, analysis, etc.). * System for forecasting and early warning of floods (FFEWS) has been established. The System is based on hydrological modeling, considering climate change scenarios. The model was installed in water agencies of both entities (AVP Sava and JU "Vode Srpske"). The flood forecasting system developed for the Vrbas Basin is linked to the forecasting systems for the Una and Sana rivers, which together represent the basis for further expansion of the flood forecasting service to other basins in BiH. Also, the Protocol on communication of results of forecasting systems within institutions and to civil protection was signed. * Experts from hydrometeorological institutes and water agencies where trained in hydrometric monitoring as well as training in hydrological and hydraulic modeling, while geodetic experts were involved and trained to interpret LiDAR images. * During the project implementation, 20 advanced trainings were held for 179 experts and officials on the use of modern tools and methodologies for improving flood risk management in BiH. * Set of non-structural measures has been implemented in the VRB municipalities including of 21 projects in 12 municipalities. Interventions included regulation of torrential streams, cleaning of riverbeds, strengthening of embankments, bolstering riverbank protection with stone embankments and gabion systems, constructing stormwater drainage systems and reinforcing riverbanks with vegetation, including under an agroforestry management system. * Loss/damage model has been developed for agriculture, business, and housing sector. * Based on the spatial database, the Vrbas GeoPortal was created and operationalized at <http://vrb.pmfbl.org/> The GeoPortal offers to local communities and wider population data relevant to flood risk, such as: flood hazard and risk maps, a model of sensitivity to torrential floods, a register of landslides and torrents, real-time hydrometric measurement data, data on loss/damage in different flood scenarios including climate change. Participatory GIS (PGIS), developed under GeoPortal, is created to support local communities/decision makers in flood risk management at local level. The spatial database is harmonized with the EU INSPIRE directive on spatial data. * In order to improve communication, early reaction and response on upcoming or forecasted flood event, the local civil protection units were equipped with 168 radio stations, 8 digitized sirens and 3 radio relays. Equipping was followed by training on maintenance and use of equipment was held. * In cooperation with local civil protection, flood response plans have been improved including development / improvement of flood protection plans, development of evacuation plans, communication and public awareness plans, etc. New tools such as flood risk maps have been introduced into existing plans (GeoPortal, PGIS) Trainings for first responders as well as flood simulation exercises were conducted in all municipalities. Flood hazard and risk maps were posted on the websites, large scale maps where placed in the premises of local communities. Informative materials on how to act in case of floods where developed and distributed to citizens, and numerous radio and TV shows where organized in order to raise knowledge and awareness on floods. * A series of trainings where organized for agricultural producers and agricultural extension services and relevant ministries on "Agriculture and flood risk: reduction of flood risk and damage in agriculture". |

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| **Achievements**  400-500 words  The applied climate change adaptation technology within the Vrbas project provided key flood risk management actors with significantly better tools for making informed and timely decisions, enabled more efficient coordination between entities and institutions, and improved knowledge about floods and potential climate change hazards at all levels.  Significant progress has been made in policy development, including the transposition of the EU Floods Directive into the RS legal framework. The Vrbas Basin Risk Management Plan (VRB FRMP) is another important outcome in terms of policy development and planning framework that will serve as a basis for replication in other river basins as well as the socio-economic vulnerability assessment methodology that will be applied for developing new initiatives and projects to reduce flood risk in BiH.  The number of complementary non-structural measures were implemented, including development of flood hazard and risk maps, climate change model, DTM, loss/damage model, flood forecasting platform, Vrbas GeoPortal with PGIS tool, procurement of communication tools and improvement of the flood warning system, development of flood zoning policy as well as a series of field non-structural flood risk reduction measures (cleaning of canals and riverbeds, strengthening of banks, agroforestry measures).  Within the Vrbas project, cooperation between hydrometeorological institutes and water agencies in both entities has also been improved. The project developed climate scenarios, very important for the agricultural sector, and comprehensive training on agricultural production in the floodplains was held for representatives of the agricultural advisory service and farmers.  The project has made significant progress in the development of risk transfer instruments by development of insurance model which considered situation assessment of the local insurance market, including research on “readiness to pay” for insurance against natural disasters and an assessment of sustainable insurance products for BiH. Using the positive experiences of developing disaster insurance products in other countries, a similar, insurance model has been proposed for BiH.  Extremely good involvement and cooperation of domestic institutions and agencies in all stages of implementation ensured within the project, is a guarantee of sustainability of achieved results. The systematic and coordinated approach of all relevant institutions and agencies demonstrated through the Vrbas project proved to be the right way to significantly reduce flood risk in the basin area. This project is an example of achieving excellent results in cooperation with domestic institutions, which will serve as a good foundation to ensure additional funds from donors for the implementation of flood risk reduction measures in other basins in BiH. Moreover, UNDP is already preparing a new project named "Increasing investment in flood risk reduction in Bosnia and Herzegovina" with the aim of reducing the risk and risk of floods in the Una, Sana, Vrbas, Bosnia, Ukrina, Neretva and Trebisnjica river basins inhabited by about 1 million people. The Project Proposal is in the final phase of preparation and it should provide 14 million. USD grant funds for the purpose of reducing the risk of floods throughout BiH. Implementation is expected to begin at the end of 2021.  The promo video:  <https://youtu.be/DbA-P-gp2dc>  Additional knowledge management product has been developed  <http://vrb.pmfbl.org/>  <https://www.ba.undp.org/content/dam/bosnia_and_herzegovina/docs/News/E%26E%20Sector/Vrbas%20mape/Banja%20Luka%20mapa%20opasnost%20od%20poplava.png> |

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| **Testimonials**  <https://youtu.be/xDVAWwsI1sc>  <https://www.ba.undp.org/content/bosnia_and_herzegovina/en/home/presscenter/articles/2018/VrbasProjectVjezba.html>  <https://undp-adaptation.exposure.co/datadriven-climate-resilient-flood-management>,  <https://undp-adaptation.exposure.co/forests-fires-floods>  <https://undp-adaptation.exposure.co/floods-livelihoods>  <https://www.ba.undp.org/content/bosnia_and_herzegovina/en/home/presscenter/articles/2019/VrbasOsiguranjeKatastrofe.html>  <https://www.ba.undp.org/content/bosnia_and_herzegovina/bs/home/presscenter/vijesti/2019/VrbasObukePoljporivreda.html> (BIH)  <https://www.nezavisne.com/novosti/bih/Golic-Sliv-Vrbasa-najuredjeniji-u-BiH/565278> (BIH) |

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| **Photos** |