

## **Surveillance of invasive and native mosquito Vectors and pathogens they transmit in Montenegro**

**LOVCEN**

### **Summary**

Mosquito vectors and mosquito-borne diseases are raising threat to Europe, which impact strength is difficult to predict. The main infection sources are dependent on vector and environmental factors, hence the best choice for prevention and control of diseases is surveillance and control of mosquito vectors. For this reason, their surveillance and control require efficient and appropriately standardised methods, integrated knowledge and awareness among researchers, academic educators and policy-makers as well as well-trained young scientists.

The HERIC-CRDS LOVCEN aims to promote all of these values and apply them in the field of vector mosquitoes and mosquito-borne pathogens (viruses, bacteria, protozoa and nematodes). The main idea that led us to propose this HERIC-CRDS project is to endorse all objectives addressed by the call (exchange of knowledge and methodologies, improve higher education, facilitate training of next generation experts, improve the national policies, produce innovation and disseminate the related scientific information) under the umbrella of surveillance of mosquito vectors and diseases they transmit. This will lead to further improvement of the Montenegro Consortium Members (MCM) research and innovation capacities through collaborative research with prestigious European centers, exchange of experience and knowledge, strengthening of human, infrastructural and material resources, establishing the strategic international research partnerships on RTD in vector/pathogen surveillance and control, monitoring and predictions and getting prepared for Horizon 2020.

This will provide to the MCM conditions to reach a level of outstanding EU research institutions in the applied domain and to contribute to sustainable research development in Montenegro. Since in Montenegro cooperation between different research entities in research project and resource management is negligible to now, further development and strengthening of internal links between groups within the MCM to build on this interaction are still needed to generate the new ideas for solving the pressing problems. Expertise of EU and regional partners how to build on this interface will be of the crucial importance. If that happens, MCM will contribute to both strengthening the role and management of the partnering Montenegrin institutions and their visibility to European partners.

As a result of the SWOT analysis an overall strategy was developed to give answer on how to use strengths, eliminate weaknesses, exploit opportunities, and defend threats. This strategy relies on W-O approach, which enables us to address weaknesses and turn them into opportunities. The program planned to be realized through this project forms a coherent set of research, coordination, dissemination, and development actions based on its strategic and specific objectives.

The LOVCEN project will combine diverse set of activities grouped in four work packages: (WP1) Collaborative research on native/invasive mosquitoes and pathogens they transmit in Montenegro and development of non-chemical control measures; (WP2) Twinning through exchange of know-how and experience and dissemination activities; (WP3) Acquisition of research equipment and innovation capacity building and (WP4) Management that will be horizontally connected.

We propose top quality innovative research that represent both cutting edge of RTD for Europe: (a) application of SIT in invasive mosquito control –Montenegro will be the second country in Europe to adopt this technology (b) implementation of the newly released (September 2012) European Centre for Diseases Prevention and Control (ECDC) “Guidelines for the surveillance of invasive mosquitoes in Europe” that are until now implemented only in Belgium this year and planned to be implemented in Greece in Italy next year; (c) mobile phone application for surveillance of invasive and indigenous mosquito species – innovative approach, the Europe first similar application was presented this year; (d) evaluation of novel non-chemical, biodegradable materials for control of mosquito larvae; and at least novelties for Montenegro: (a) identification of mosquito species present in Montenegro and their distribution - last study on indigenous mosquito species in Montenegro was confined to Durmitor mountain 30 years ago; (b) identification of mosquito vector species – never conducted in Montenegro; (c) detection of pathogens carried by mosquito vector species – new for Montenegro; (d) modelling of climate changes influence on MV and MBD - new for Montenegro; (e) survey, dissemination and feedback on stakeholder’s opinions about direction of the research in vector borne disease prevention – never accomplished in Montenegro.

Despite the developed international links MCM still does not have position in the First Division of ERA league in some of the fields of its expertise since it has not strong enough ties with other eminent research centres of similar structure but successful in winning FP7 and/or Horizon 2020 research projects. Many of MCM researchers have very limited opportunities to learn high-tech skills, using the advanced research equipment and technologies. Accordingly, this limits MCM’s vision to participate in Horizon 2020 and other EU research projects which represents a major problem. To eliminate the stated weaknesses and threats, a plan for exchange of know-how and experience and dissemination activities is devised, comprising training visits of MCM's young researchers to international partner institutions, know-how visits of MCM's senior/leading researchers to research partnering organisations and/or other international organizations/consortia and active participation of the applicant's research staff at international conferences.

MCM potential in cooperation with businesses and contribution to the society is still not fully developed and exploited. The involvement of SME HEMCO in collaborative research, training courses and contacts with the stakeholders described in WP1 and WP2 are the right places to improve innovation capacity and initialize this kind of cooperation. Then, in a situation when MCM is truly

vibrant research entity where research ideas thrive and research projects are well and sustainably managed, establishment of new cooperation and prompt orientation towards socio-economic needs will be much easier. Improved research capacity will enable the MCM to provide expert services to SMEs dealing with both control of MV and environmental issues. By providing the Montenegrin SMEs and national government with services such as know-how in: **(1)** surveillance, monitoring and risk assessment programme to prevent introduction of or spreading of invasive vector species and vector born disease, **(2)** non-chemical mosquito control methods, **(3)** numerical weather prediction, **(4)** climate simulation on regional level and **(5)** estimation of impact of climate change on agriculture (feed, food) and human health. By organizing the training courses (open to interested SME participants) in invasive species monitoring and control, climate change impact assessment studies, mosquito surveillance by the mobile phone network, MCM will stimulate development and growth of the SMEs in Montenegro, development of public services and well being of all citizens in the country. In this way, it will contribute to overall economic and social development of Montenegro. Quality of offered products will stimulate investments in commercialisation of MCM innovations both by enterprises and interested stakeholders.

The issue of involvement of young researchers was raised to the front line of the LOVCEN project concept, when Montenegrin consortium has been formed. Project Leader, Dr. Igor Pajović, himself belongs to the category of early stage researchers as well as 10 out of 13 researchers gathered to form MCM. They will all be actively engaged in collaborative research on vector mosquitoes and pathogens they transmit in Montenegro and development of non-chemical control measures (WP1), twinning through exchange of know-how and experience and dissemination activities (WP2), but will also lead acquisition of research equipment and innovation capacity building (WP3) and management (WP4). Introduction of teaching on MV and MBD (**WP2f**) at already existing courses at BTF and Faculty of Medicine, University of Montenegro at the end of the 1<sup>st</sup> project year will raise awareness about the MV and MBD and allow to recruit new students to take their master and PhD thesis in this subjects.

We have clear vision about sustainability of activities started by MCM beyond the 36 months of the LOVCEN project. Ministry of Health and Ministry of Sustainable Development and Tourism of Montenegro already expressed their interest in the thematic area proposed by LOVCEN project (letter copied at the end of the proposal). Staff from MCM institutions, will be actively involved in writing new proposals, utilizing new equipment, training activities and knowledge transfer to SMEs and other businesses in order to provide sustainability for capacities developed during the LOVCEN project. Mosquito surveillance program started by the LOVCEN project will be continued on most sustainable way utilizing KOMARAC mobile phone application developed within WP1. This will also strengthen community participation/support and appreciation of problems posed by MV and MBD diseases. Note that we will already during the project initiate discussion and negotiation with institutions ready to financially support MCM.