



ANNEX A.3.2

**Deliverable A.3: Report of the public impacts and costs
caused by the ‘IMS problem’**

December 2014

Deadline of deliverables: 31/12/2014

LIFE CONOPS (LIFE12 ENV / GR / 000466)

**Development & demonstration of management plans against
- the climate change enhanced - Invasive Mosquitoes in S. Europe**



The **LIFE CONOPS** project “Development & demonstration of management plans against - the climate change enhanced - invasive mosquitoes in S. Europe” (LIFE12 ENV/GR/000466) is co-funded by the EU Environmental Funding Programme **LIFE+ Environment Policy and Governance**.

Implementation period: 1.7.2013 until 31.12.2017

Project budget: Total budget: 2,989,314 €
EU financial contribution: 1,480,656 €

LIFE CONOPS’ Participating Beneficiaries:

 <p>ΜΠΕΝΑΚΕΙΟ ΦΥΤΟΠΑΘΟΛΟΓΙΚΟ ΙΝΣΤΙΤΟΥΤΟ</p>	<p>Benaki Phytopathological Institute (Coordinating Beneficiary)</p>
	<p>Agricultural University of Athens</p>
 <p>SERVIZIO SANITARIO REGIONALE EMILIA-ROMAGNA Azienda Unità Sanitaria Locale di Cesena</p>	<p>Azienda Sanitaria Locale Cesena</p>
 <p>SERVIZIO SANITARIO REGIONALE EMILIA-ROMAGNA Azienda Unità Sanitaria Locale di Ravenna</p>	<p>Azienda Unità Sanitaria Locale Ravenna</p>
 <p>CENTRO agricoltura ambiente 'Giorgio Nicoli'</p>	<p>Centro Agricoltura Ambiente “G.NICOLI” S.R.L.</p>
 <p>DEMOKRITOS NATIONAL CENTER FOR SCIENTIFIC RESEARCH</p>	<p>NCSR Demokritos</p>
 <p>ONEX</p>	<p>ONEX S.A.</p>
 <p>Regione Emilia-Romagna</p>  <p>SERVIZIO SANITARIO REGIONALE EMILIA-ROMAGNA Azienda Unità Sanitaria Locale di Ravenna</p>	<p>Regione Emilia-Romagna Public Health Service</p>
 <p>terra nova</p>	<p>TERRA NOVA Environmental Engineering Consultancy Ltd.</p>
	<p>Institute of Urban Environment and Human Resources (UEHR), Panteion University</p>

Table of Contents

1. The Socioeconomic Aspect of the Problem of Invasive Mosquito Species	8
2. Categorization of the Socioeconomic Costs	11
Table 2.1 Main Cost Categories related to the IMS problem	12
3. Estimation of Public Prevention costs in selected Greek Regions	15
3.1 Public Prevention Costs Implemented by Regions and Municipalities	15
Table 3.1 Budget of Mosquito Control Programs from Regions and Municipalities for 2011.	18
3.2 Prevention Costs implemented by the Hellenic Centre for Disease Prevention and Control (HCDCP)	28
3.3 Prevention Costs implemented by other organizations	30
4. Estimation of Public Prevention costs in the Region of Emilia Romagna	33
5. Estimation of the Cost of Illness of mosquito borne diseases of selected cases in Greece and Italy	38
5.1 Methodology for the estimation of the Cost of Illness for the recorded WNV cases in Central Macedonia and Malaria Cases in Lakonia	38
5.2 Estimation of Direct Medical Costs in Greece	39
5.3 Evaluation of Indirect Medical Costs: Productivity Losses	39
5.4 Results of Medical costs and Productivity losses for the recorded Malaria cases	39
5.5 Results of Medical costs and Productivity losses for the recorded WNV cases	40
5.6 Estimation of hospitalization costs associated with the outbreak of Chikungunya in Emilia Romagna, summer 2007, Italy	41
6. Cost Benefit and Cost Effectiveness Analysis of public prevention programs	42
6.1 Estimation of Cost Benefit and Cost Effectiveness Criteria	43
6.2 Results of a Cost Benefit Analysis of the WNV prevention strategy	44
6.3 Cost-Effectiveness Analysis (Test 1) of the WNV prevention strategy	45
6.4 Cost-Effectiveness Analysis (Test 2) of the WNV prevention strategy	46
6.5 Cost-Effectiveness Analysis (Test 1) of the Malaria prevention strategy	46
6.6 Cost-Effectiveness Analysis (Test 2) of the Malaria prevention strategy	47
7. Estimation of other cost categories	48
7.1 Valuation of Benefits of Mosquito Control Programs in the Prefecture of Eastern Macedonia and Thrace	49

7.2 Results of WTP and total Nuisance Costs	49
8. Conclusion	50
9. References	52
10. ANNEXES	55
ANNEX A. Division between Market and Non Market Costs	55
ANNEX B. Collaboration between HCDCP and Research Institute of Urban Environment and Human Resources- Panteion University for the assessment of Medical Costs brought by mosquito borne diseases in selected Greek Regions	56
ANNEX C. Collaboration between University of Bologna and Research Institute of Urban Environment and Human Resources- Panteion University for the assessment of Medical Costs brought by Chikungunya 2007 in the Region of Emilia Romagna	65
ANNEX D. Strategic Plan for the Estimation of Societal Welfare of the Management Plans proposed under the LIFE CONOPS Project	69
ANNEX E. ICD-9 codes of signs related to Chikungunya virus infection (in Italian)	70

SUMMARY

BACKGROUND: The ‘Invasive Mosquito Species problem’ generates variable socio-economic impacts. The “IMS problem” can affect the economy and society in various ways, through their impact on human and animal health and various services. These impacts generate certain economic costs related to prevention measures, control strategies, public health measures, health treatments, productivity losses, information and awareness campaigns etc. The objective of the present report is to evaluate the socio-economic cost imposed by the IMS problem in selected areas of Greece and Italy and to identify the crucial parameters of the economic burden associated with the problem of Invasive Mosquito species. It should be noted that beyond the initial planning of the present report an additional separate cost of illness approach was conducted for the estimation of medical costs and productivity losses and for the calculation of averted health impacts in relation to two other mosquito related diseases (West Nile Virus, Malaria). The averted mosquito nuisance costs to households were estimated on the basis of a contingent valuation study.

RESULTS: The total estimated cost of mosquito control programmes in Greece in the years 2011, 2012, and 2013 reaches 21.2 million €. The average annual cost for mosquito control and management programmes is estimated to be approximately 8 million €. The total expenditure for the implementation of the Regional Plan for Mosquito Control in the Region of Emilia Romagna varied between 7.6 million € in 2008 and 3.2 million € in 2013. The Regional contribution to this expenditure fell from about 2 million € in 2008 to approximately 1 million € in 2013. Based on these findings, as well as the figures of the Cost of Illness and averted mosquito nuisance costs, a Cost Benefit Analysis and a Cost Effectiveness Analysis were employed in order to evaluate the economic efficiency of these strategies in Greece for the years 2010-2013. Results indicate that nuisance costs capture the biggest percentage among all cost categories. A clear net socioeconomic benefit emerges when nuisance costs are included within the CBA and CEA tests, as nuisance costs appear four times higher than the average prevention costs, indicating a margin for increased benefit from implementation of enhanced mosquito control programmes.

CONCLUSION: The evaluation of the socioeconomic costs of the IMS problem consists of a highly challenging task. This report actually sets the basis for the categorization of the various socioeconomic implications of the IMS problem and the costs that they induce in the public and private level. Lastly, it should be mentioned that the difficulty of separation of costs incurred by invasive and other mosquito species requires the implementation of more specialized methodological tools. A magnitude of these costs is expected to be estimated in Action C.3, with the “elicitation” of the benefit levels that certain management plans may have on households, through the careful design of specialized questionnaires (based on the stated preferences method).