

## Work package 6 - Risk Assessment

The Irish partner in TRACE will develop a modeling approach to evaluate the human health risk from ARO in surface water. The model will focus on selected locations and selected ARO as identified during the project and estimate the probability of human exposure to ARO through recreational water and environmental exposure routes (e.g. irrigation).

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### Objective

The overall objective of this work package is to develop a risk assessment model for human exposure to selected Antimicrobial Resistant Organisms (ARO) from surface water use.

### Description of work

The risk assessment devised in this project will follow a standardised procedure of: Hazard identification; Exposure assessment; Hazard characterization and finally Risk characterisation

**Task 1:** Literature review - A literature review of current and past research in the area will be carried out.

**Task 2:** Hazard identification - The objective of this task is to identify the potential ARO present in surface water systems at selected sites which are capable of causing adverse human health effects through surface water. This task will develop a database where important hazard information (e.g. levels/ survival/growth/inactivation data) which may influence risk will be noted for use in subsequent tasks.

**Task 3:** Exposure assessment - This task will estimate the probability that selected ARO would be present in surface waters at selected sites based on the water characterisation stage (WP1). The exposure assessment will estimate the probability of human exposure to selected ARO through recreational and irrigation practices at selected sites, and will rely on data generated in Task 1 and 2 to characterise the levels and behaviour (survival/growth/inactivation) of the selected ARO.

**Task 4:** Hazard characterisation - The hazard characterisation stage describes the human health consequence of exposure to selected ARO based on the importance of the drug or related drugs to humans. A human health consequence is defined as a situation in which a doctor would have difficulty treating a person with an antimicrobial drug because the bacteria infecting the human had acquired resistance.

**Task 5:** Risk characterisation - This task will combine all the tasks described in this work package into one complete risk assessment model. The risk characterisation integrates the components of the risk assessment into an overall conclusion, providing a qualitative indication of the potential risk to human health from the ARO. The integration process results in an estimation of the risk that ARO

will adversely impact human health. This estimation may be qualitative/semi qualitative and provide estimates of high, medium or low risk which are then used to help identify steps necessary to manage the risks associated with the ARO. The model will be developed based on all available data and analysed using computerised packages dedicated to the process of risk assessment (e.g. @Risk software, Palisade corporation USA). Model input uncertainty and variability will be characterized using probability density distributions while Monte Carlo simulation techniques will be used to generate probability density distributions of relevant outputs (i.e. human exposure estimates).The model will be used to conduct sensitivity and scenario analysis to identify target areas for risk reduction activities along the continuum.

**Expected outcome**

A risk assessment model of human exposure to selected antimicrobial resistant organisms from surface water use.