



*CENTER FOR ECOLOGICAL-NOOSPHERE STUDIES,
NATIONAL ACADEMY OF SCIENCES, RA*

**ENVIRONMENTAL TOXICOLOGY
ENVIRONMENTAL RISK ASSESSMENT
FOOD SAFETY AND DEFENCE**



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Viterbo, 2019

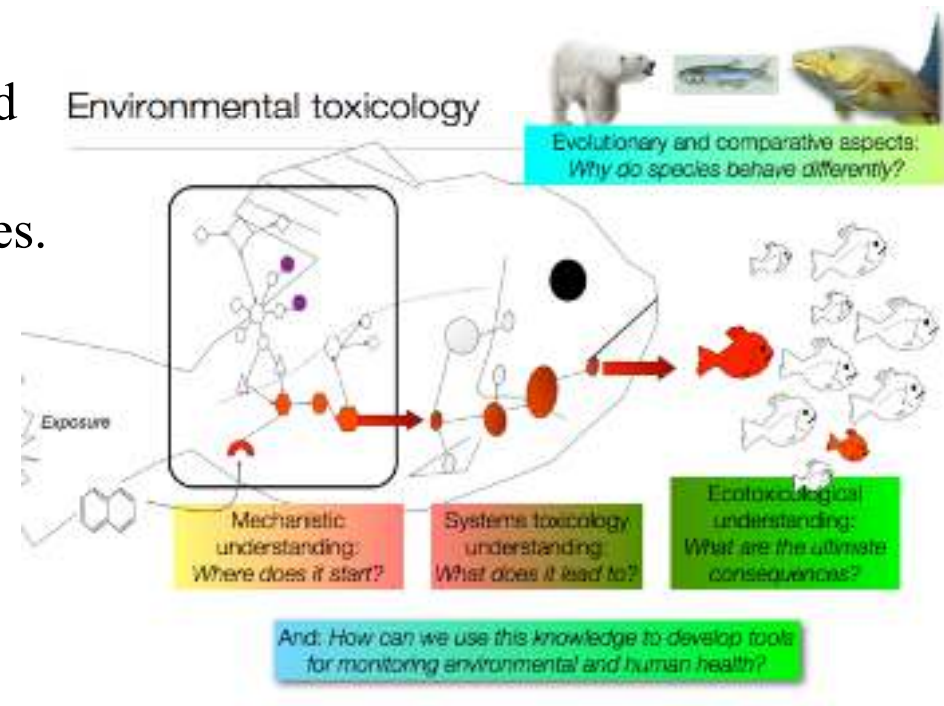


ENVIRONMENTAL TOXICOLOGY

Multi-disciplinary field of science concerned with the study of the harmful effects of various chemical, biological and physical agents on living organisms.

Learning objectives

- ☐ Understand toxicology and associated terminology.
- ☐ Learn about everyday toxic substances.
- ☐ Interpret a dose-response curve.
- ☐ Define exposure types and pathways.
- ☐ Understand and explain the toxicokinetic and toxicodynamic processes.



ENVIRONMENTAL TOXICOLOGY

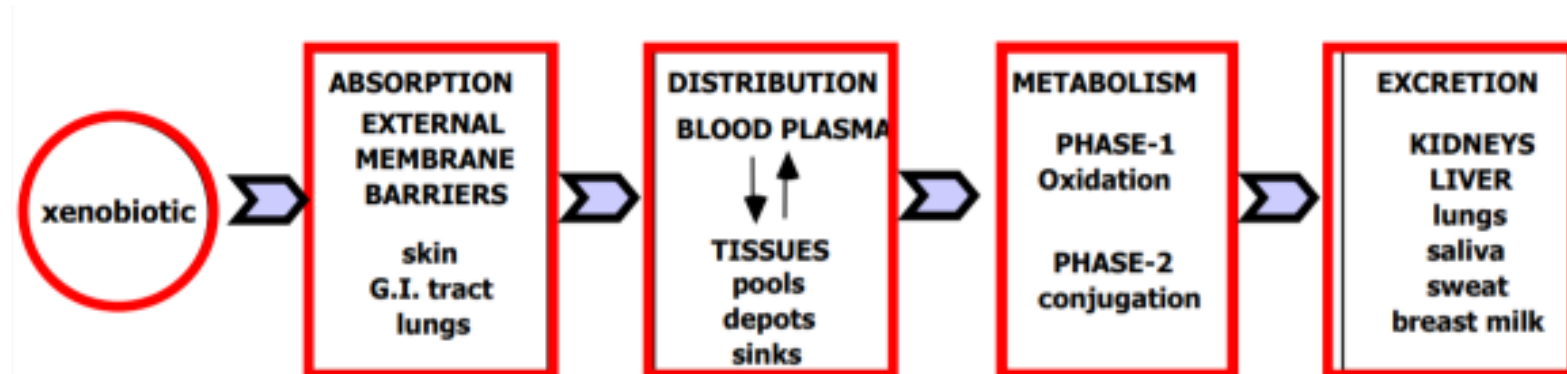
Toxicokinetics

Toxicodynamics

Characterization (Quantitation) of the time course of disposition (ADME) of xenobiotics in the whole organism

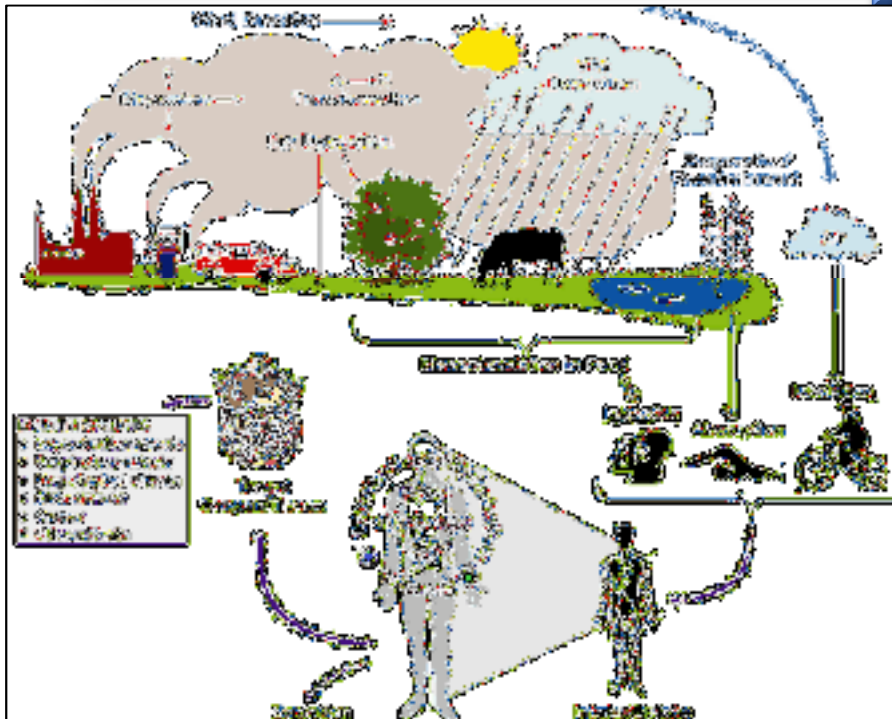
“a substance gets into the body and what happens to it in the body”.

- Toxicodynamics is the study of toxic actions of xenobiotic substances on living systems.
- Toxicodynamics is concerned with processes and changes that occur to the drug at the target tissue, including metabolism and binding that results in an adverse effect.
- Simply, TD is concerned with what the toxicant do to the body

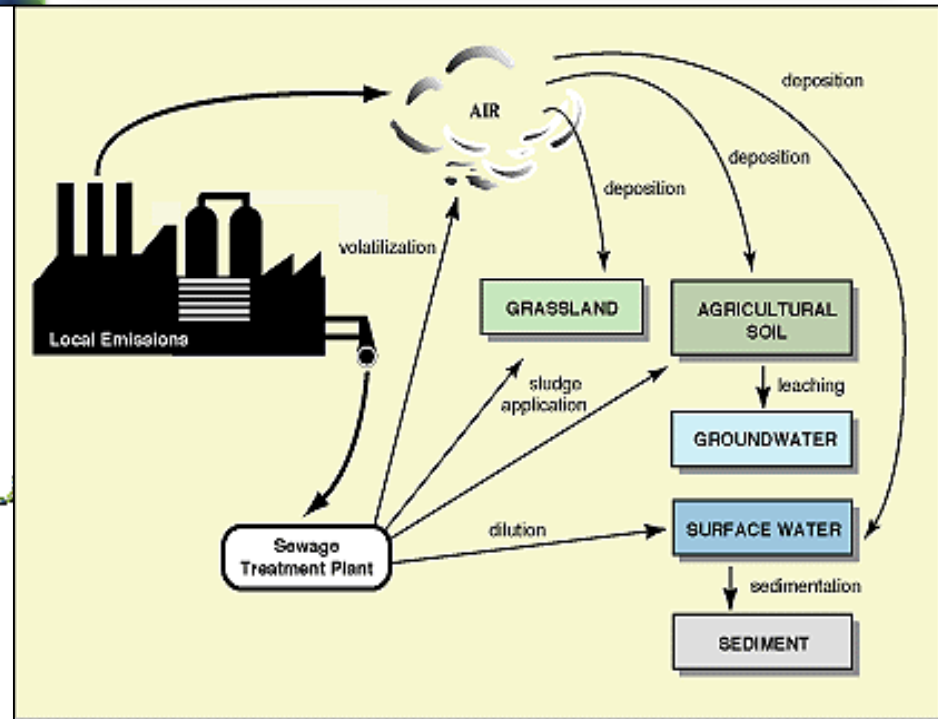


PILLARS OF ENVIRONMENTAL RISK ASSESSMENT (ERA)

Human health risk assessment

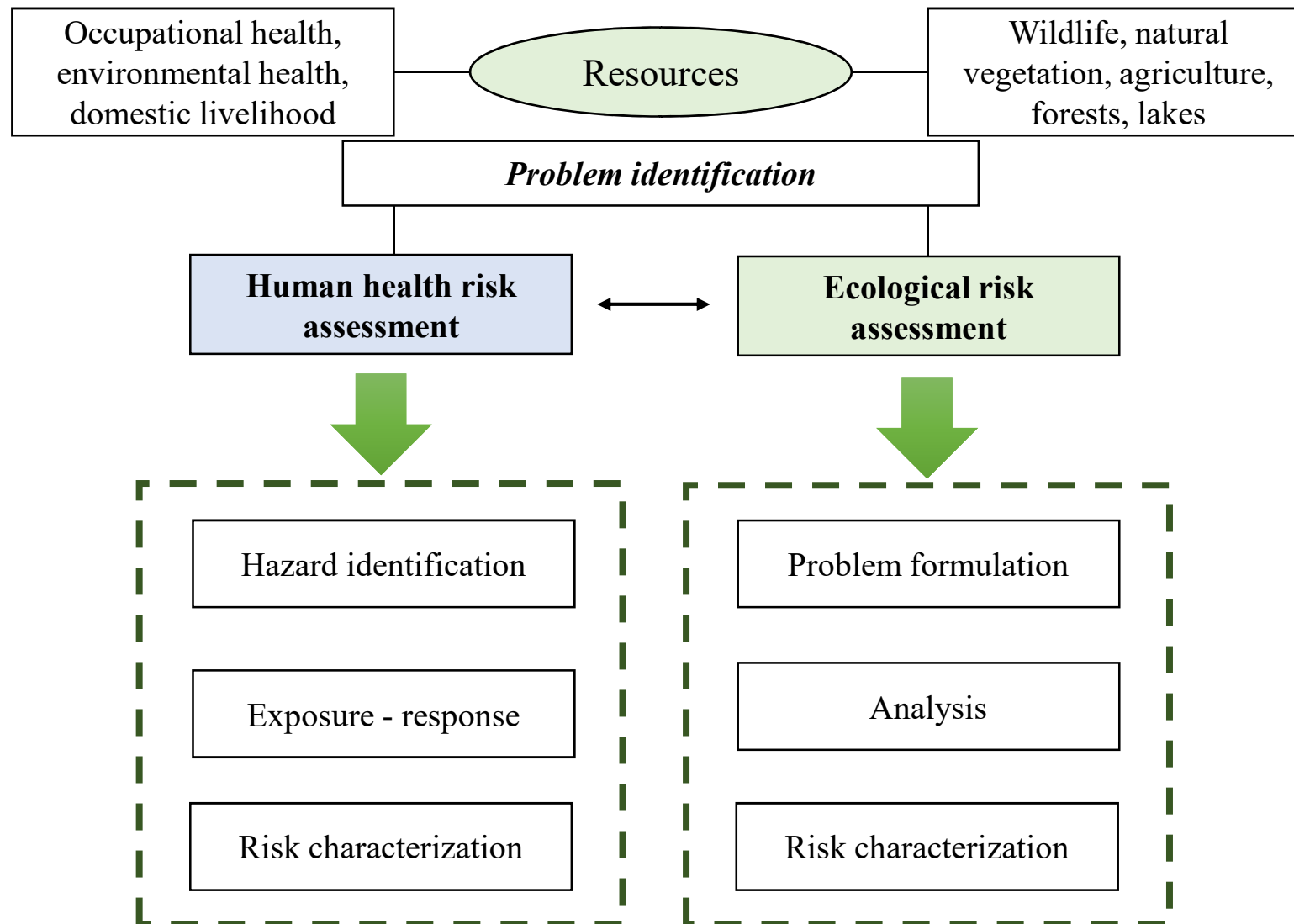


Ecological risk assessment

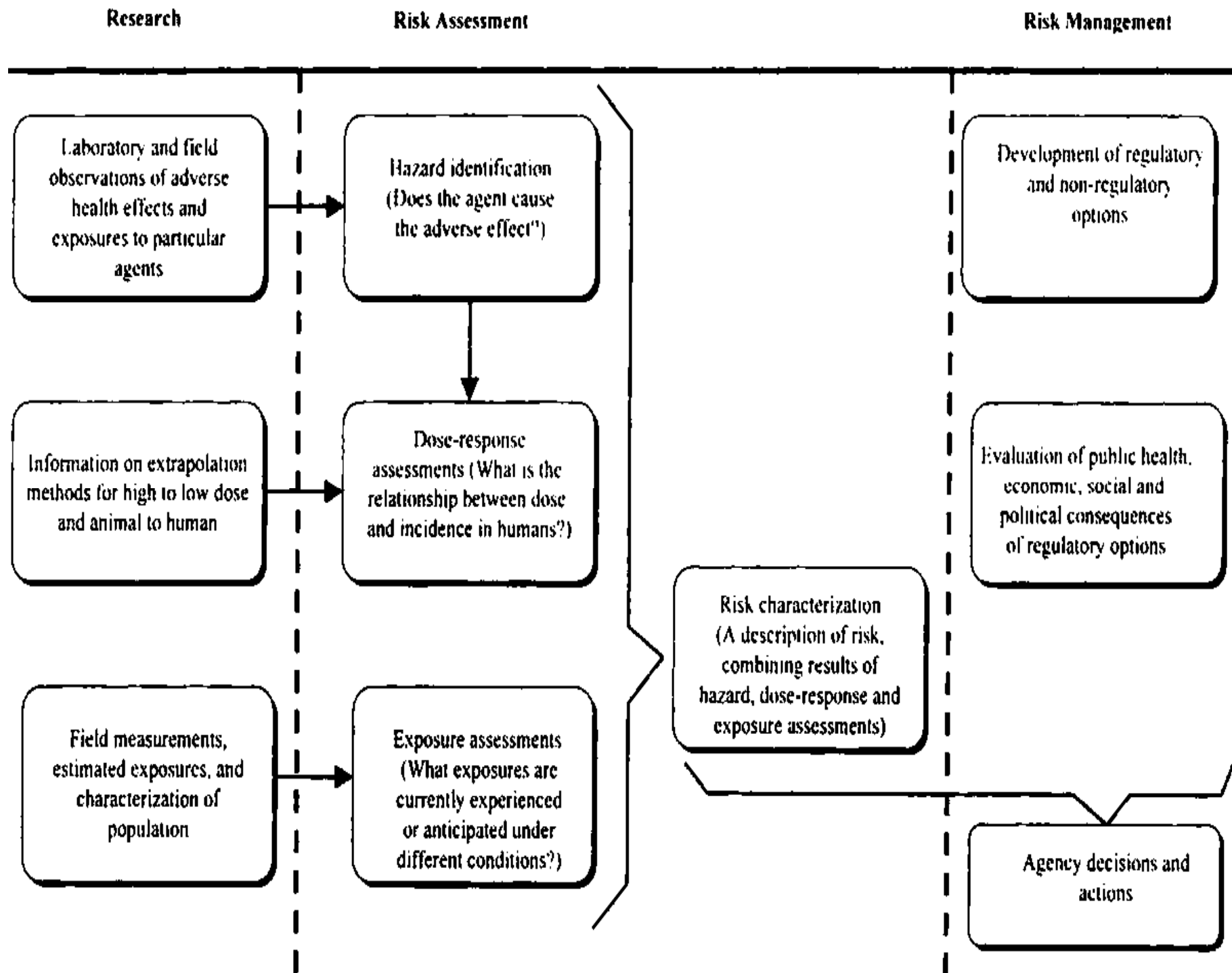


Qualitative and quantitative valuation of environmental status

ENVIRONMENTAL RISK ASSESSMENT (ERA)



It is determined the likelihood of the occurrence/non-occurrence of adverse ecological effects as a result of exposure to stressors.



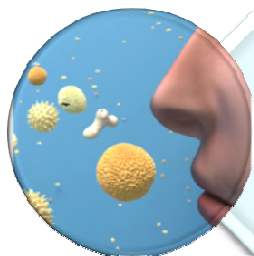
The separated topics in the frame of environmental risk assessment / joint lectures



Health risk through ingestion
of food



Health risk through dermal
pathway of exposure



Health risk through inhalation
pathway of exposure

FOOD SAFETY



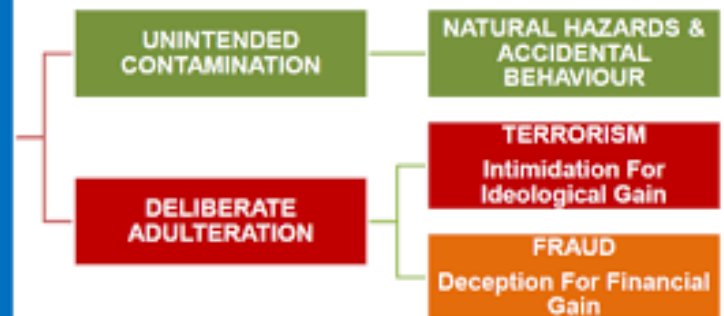
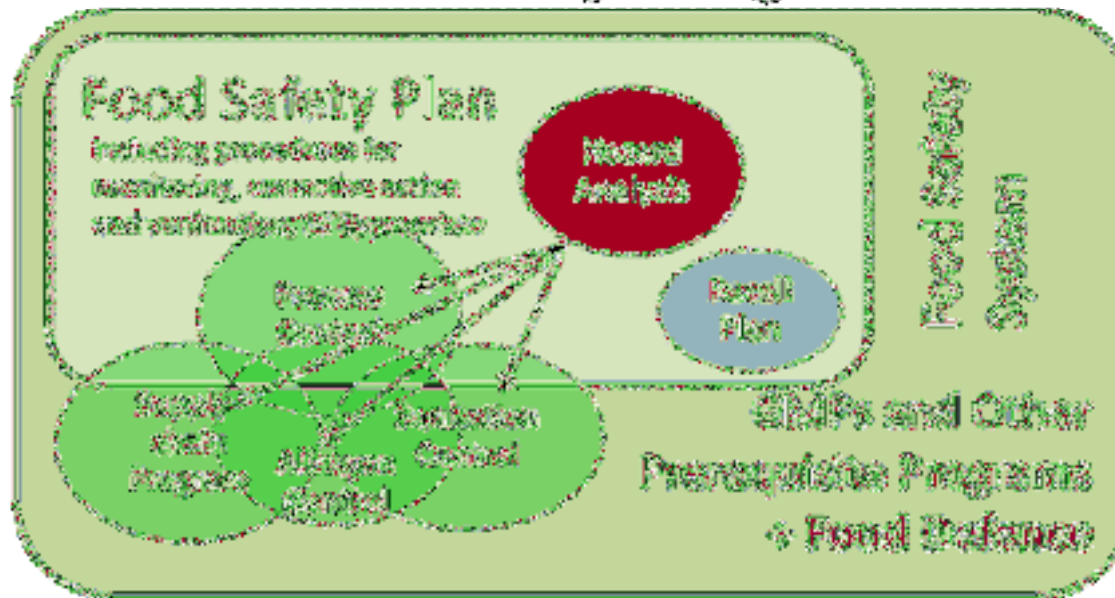
- ❑ Issues of **unintentional contamination** of food products.

FOOD DEFENSE



- ❑ Protecting from acts of **intentional adulteration** of foods.

Food Safety Program



Food safety from farm to fork



**Food chain
contaminant control**

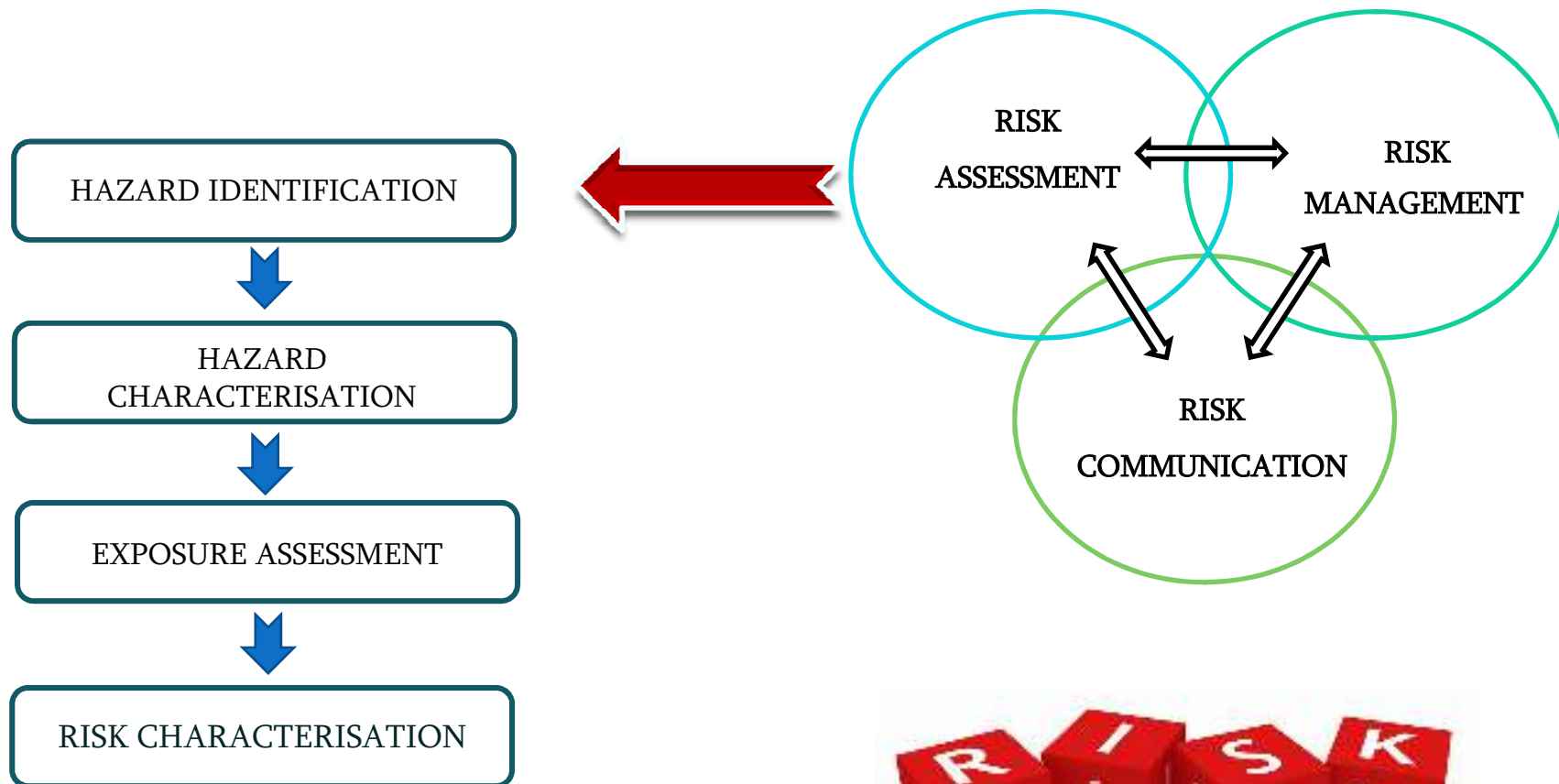
Plant protection

**Biological
food
chain hazards**

**Food additives
Flavourings and
Processing aids**

Food packaging

RISK ANALYSIS



Topics that can be included in food safety & defense course

- ☐ Basics of food safety
- ☐ National and international regulation
- ☐ Food contamination, types and sources
- ☐ Food preservation, food spoilage prevention
- ☐ Novel foods, GMOs
- ☐ Food safety management systems
- ☐ Food defense principles
- ☐ Food defense mitigation strategies
- ☐ Risk analysis
- ☐ Risk-based inspections.





Publications

Biological Trace Element Research
<https://doi.org/10.1007/s12011-018-1522-8>



Dietary Exposure Assessment of Potentially Toxic Trace Elements in Fruits and Vegetables Sold in Town of Kapan, Armenia

Davit Pipoyan¹ · Meline Baglaryan¹ · Soulla Sisipanyan¹ · Nicolò Merendino²

Received: 7 August 2018 / Accepted: 12 September 2018
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Abstract

Fruits and vegetables grown under the impact of Armenia's mining industry are widely sold in markets of adjacent towns. As the share of fruits and vegetables in Armenians' diet is significant, the present study aims to assess the dietary exposure of potentially toxic trace elements through the intake of fruits and vegetables sold in Kapan town, located in the biggest mining region of Armenia. The concentrations of Cu, Mn, Ni, Co, Pb, Zn, Hg, As, and Cd in 15 types of fruits and vegetables were determined. Non-carcinogenic and carcinogenic risks were assessed. Although the estimated daily intakes of trace elements for each studied food item did not exceed health-based guidelines values, in case of the combined consumption of fruits and vegetables estimated cumulative daily intakes exceeded reference doses for Cu and Mn. Moreover, carcinogenic risk for the majority of fruits and vegetables exceeded the IUPAC recommended risk level of 10^{-6} , indicating adverse health effect to local population. The outcomes of this study can serve as a basis for further research that will consider many other exposure pathways (i.e., inhalation or dermal pathways) in order to ensure the safety of the residents living under the impact of mining industry.

Springer



Biological Trace Element Research
 (2018) 241:1–12

Health Risk Assessment of Potentially Toxic Trace and Elements in Vegetables Grown Under the Impact of Kajaran Mining Complex

Davit Pipoyan¹ · Meline Baglaryan¹ · Liana Sireyan¹ · Nicolò Merendino²

Received: 10 August 2018 / Accepted: 12 September 2018 / Published online: 20 September 2018
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Abstract

Mining industry is one of the prominent sectors of Armenia's economy. However, mining companies without measures to reduce toxic substances in the environment, have caused environmental pollution. Moreover, environmental pollution is harmful to human health, primarily by, through the consumption of food crops. In this study, 14 soil and 14 vegetable composite sample were collected from the site of Kajaran where Armenia's biggest copper and



Human and Ecological Risk Assessment: An International Journal

ISSN 1080-7018 Print / 1570-7048 Online with online first page: <https://www.tandfonline.com/doi/full/10.1080/10807018.2018.1522288>

Risk Assessment of Population Exposure to Toxic Trace Elements via Consumption of Vegetables and Fruits Grown in Some Mining Areas of Armenia

Davit Pipoyan, Meline Baglaryan, Lara Costantini, Romina Molinari & Nicolò Merendino

To cite this article: Davit Pipoyan, Meline Baglaryan, Lara Costantini, Romina Molinari & Nicolò Merendino (2018) Risk Assessment of Population Exposure to Toxic Trace Elements via Consumption of Vegetables and Fruits Grown in Some Mining Areas of Armenia, Human and Ecological Risk Assessment: An International Journal, DOI: [10.1080/10807018.2018.1522288](https://doi.org/10.1080/10807018.2018.1522288)

To link to this article: <https://doi.org/10.1080/10807018.2018.1522288>



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ISSN: 1080-7018 Print / 1570-7048 Online Journal homepage: <https://www.tandfonline.com/doi/full/10.1080/10807018.2018.1522288>

Exposure assessment of potentially toxic trace elements via consumption of fruits and vegetables grown under the impact of Alaverdi's mining complex

Davit Pipoyan, Meline Baglaryan, Liana Sireyan & Nicolò Merendino

To cite this article: Davit Pipoyan, Meline Baglaryan, Liana Sireyan & Nicolò Merendino (2018) Exposure assessment of potentially toxic trace elements via consumption of fruits and vegetables grown under the impact of Alaverdi's mining complex, Human and Ecological Risk Assessment: An International Journal, DOI: [10.1080/10807018.2018.1522288](https://doi.org/10.1080/10807018.2018.1522288)

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Thank You