CENTER FOR ECOLOGICAL-NOOSPHERE STUDIES,

NATIONAL ACADEMY OF SCIENCES, RA

ENVIRONMENTAL TOXICOLOGY
ENVIRONMENTAL RISK ASSESSMENT
FOOD SAFETY AND DEFENCE

Dr. Davit Pipoyan

NAS RA
INTERNATIONAL SCIENTIFIC
EDUCATIONAL CENTER

Viterbo, 2 April 2019

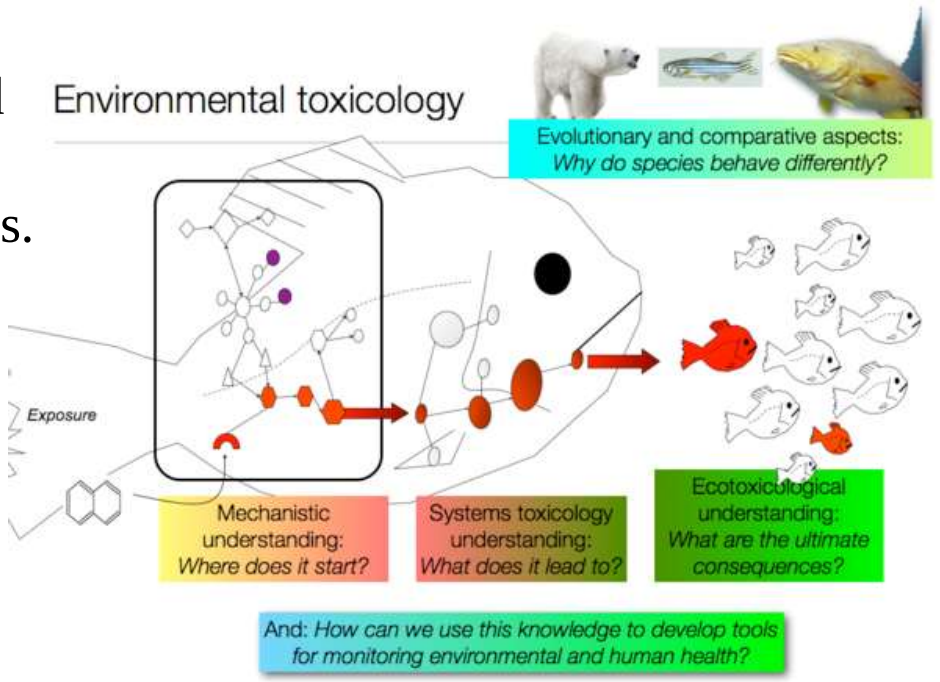
ENV PRO

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

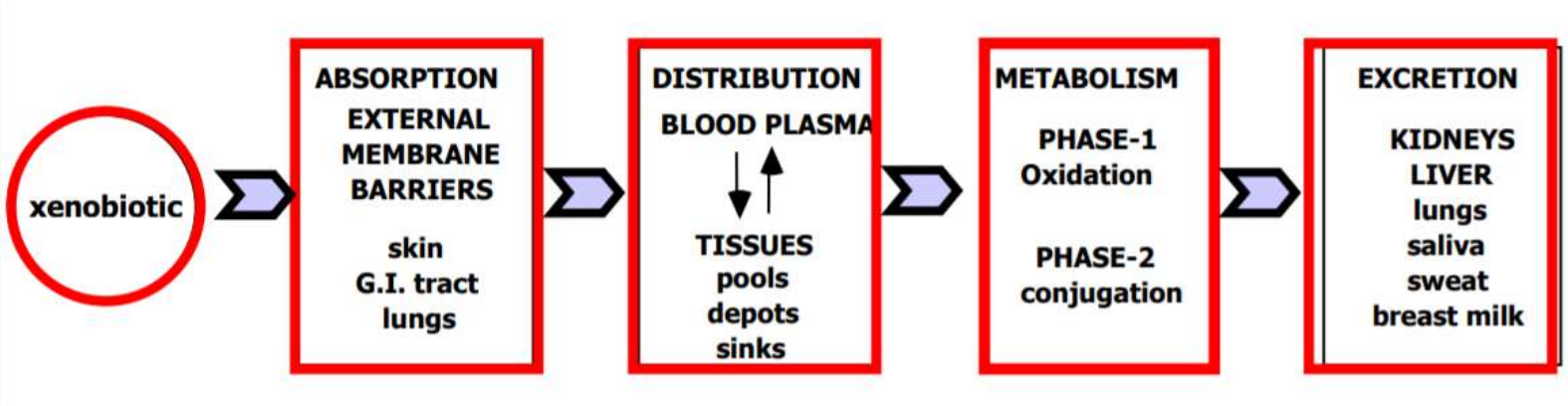
Toxicokinetics

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

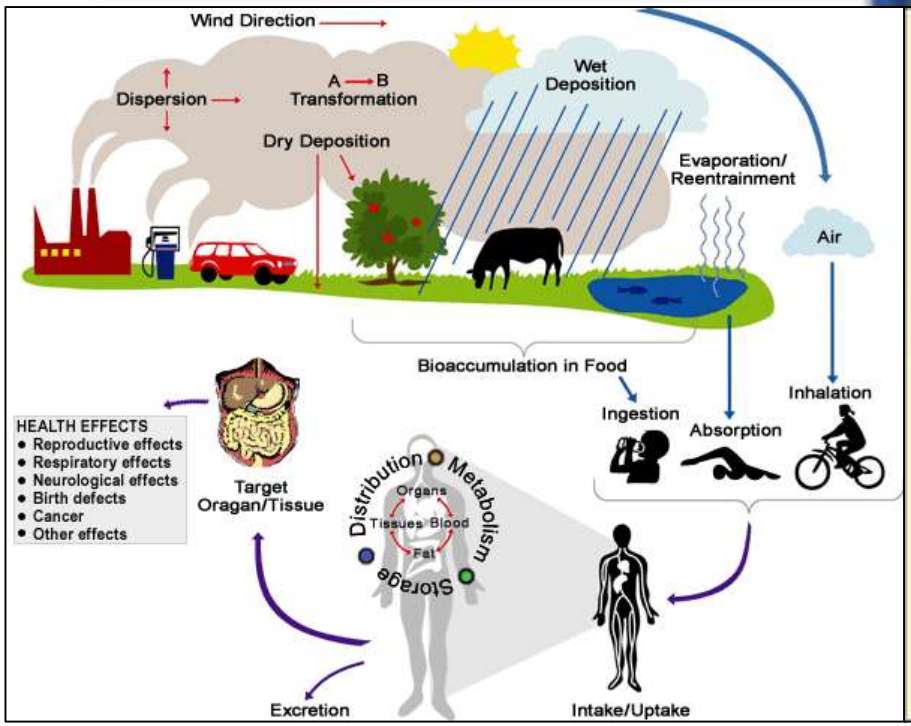
- Toxicodynamics is the study of toxic actions of xenobiotic substances on living systems.
- Toxicodynamics is concerned with processes and changes that occur to the drug at the target tissue, including metabolism and binding that results in an adverse effect.
- Simply, TD is concerned with what the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

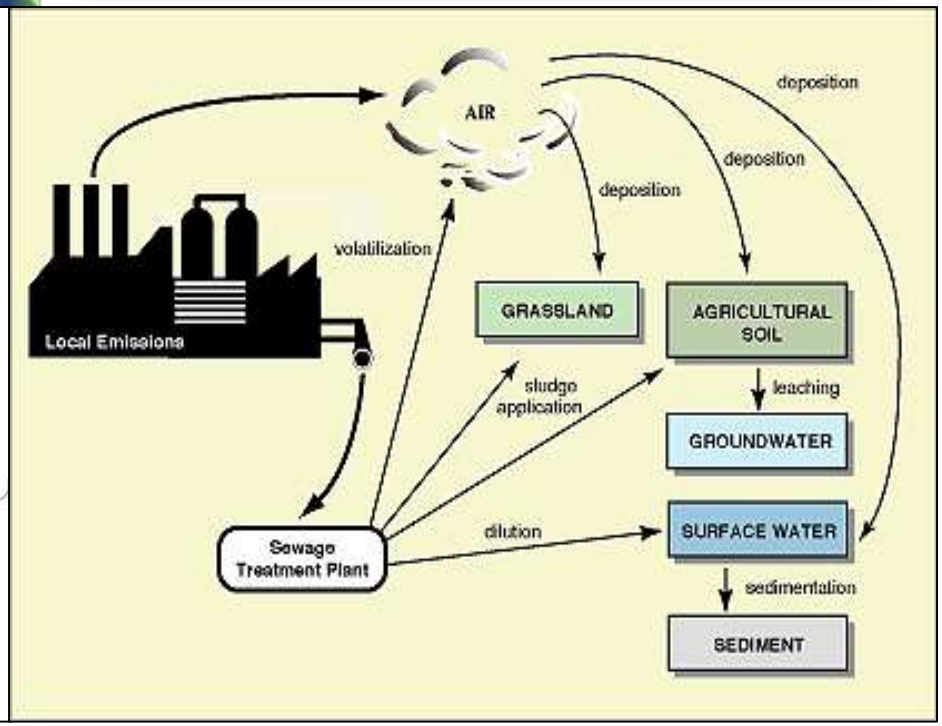


PILLARS OF ENVIRONMENTAL RISK ASSESSMENT (ERA)

Human health risk assessment

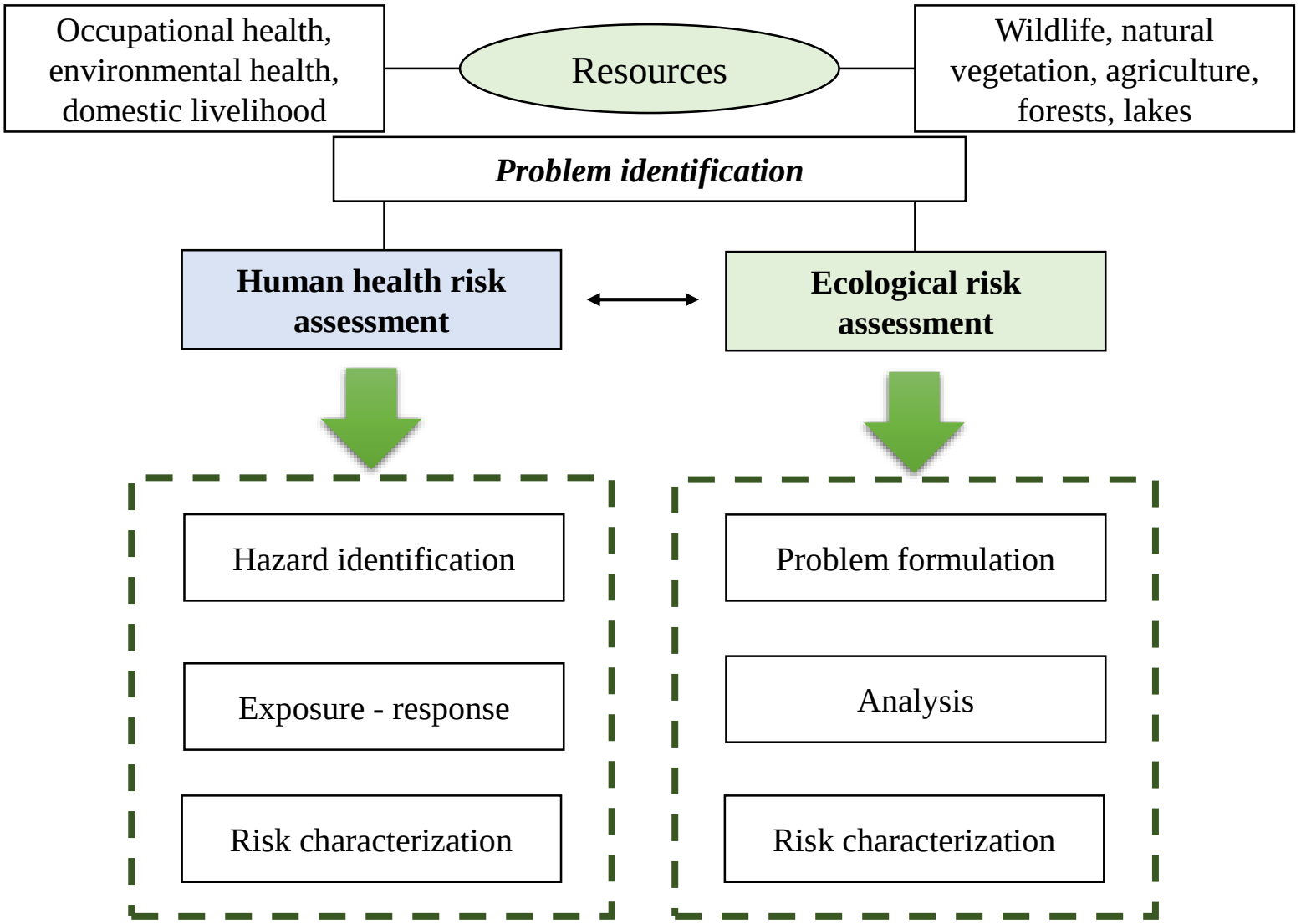
Ecological risk assessment



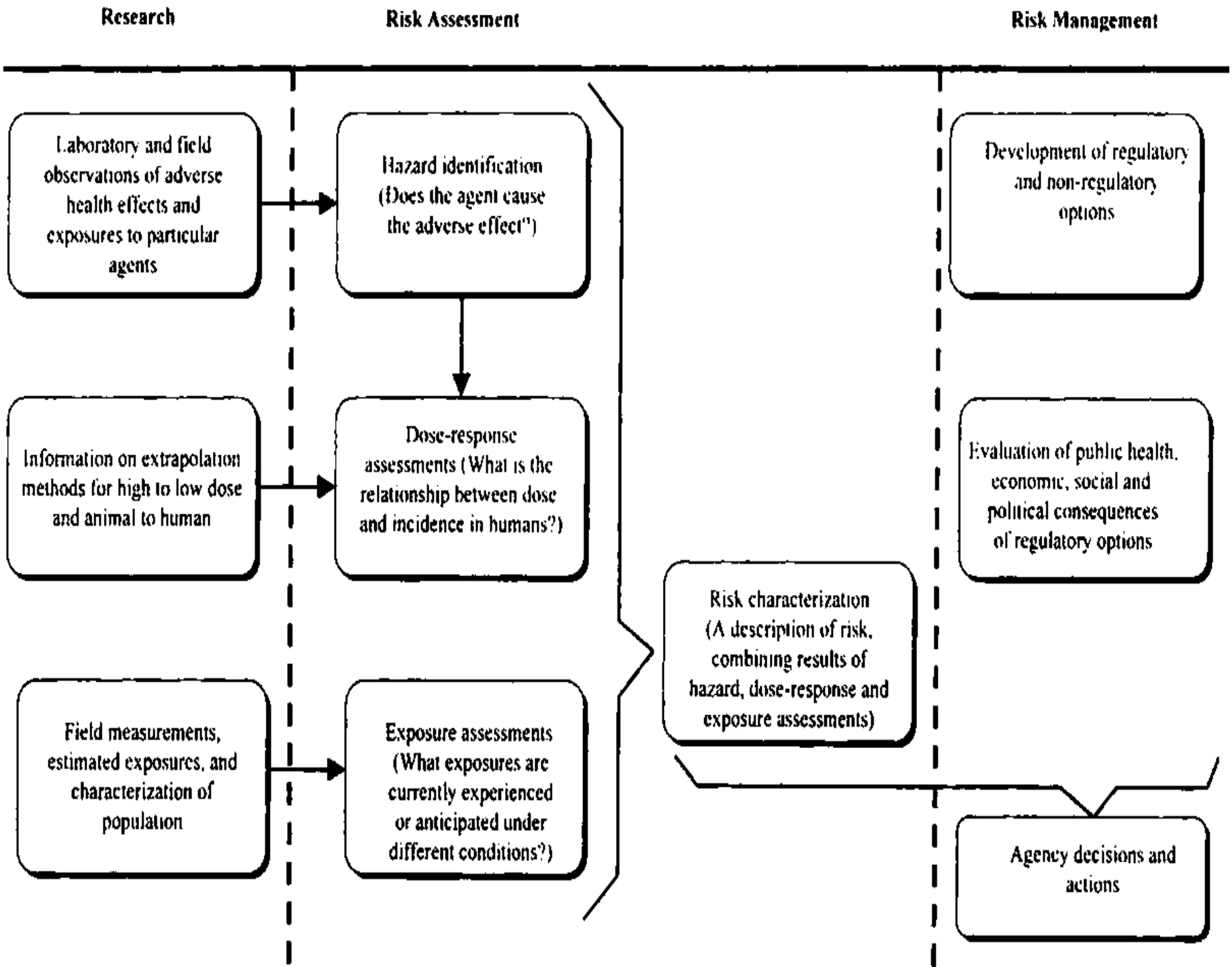


Qualitative and quantitative valuation of environmental status

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.


Research
Risk Assessment
Risk Management
Laboratory and field observations of adverse health effects and exposures to particular agents
Hazard identification (Does the agent cause the adverse effect?)
Development of regulatory and non-regulatory options
Information on extrapolation methods for high to low dose and animal to human
Dose-response assessments (What is the relationship between dose and incidence in humans?)
Evaluation of public health, economic, social and political consequences of regulatory options
Risk characterization (A description of risk, combining results of hazard, dose-response and exposure assessments)
Field measurements, estimated exposures, and characterization of population
Exposure assessments (What exposures are currently experienced or anticipated under different conditions?)
Agency decisions and actions

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

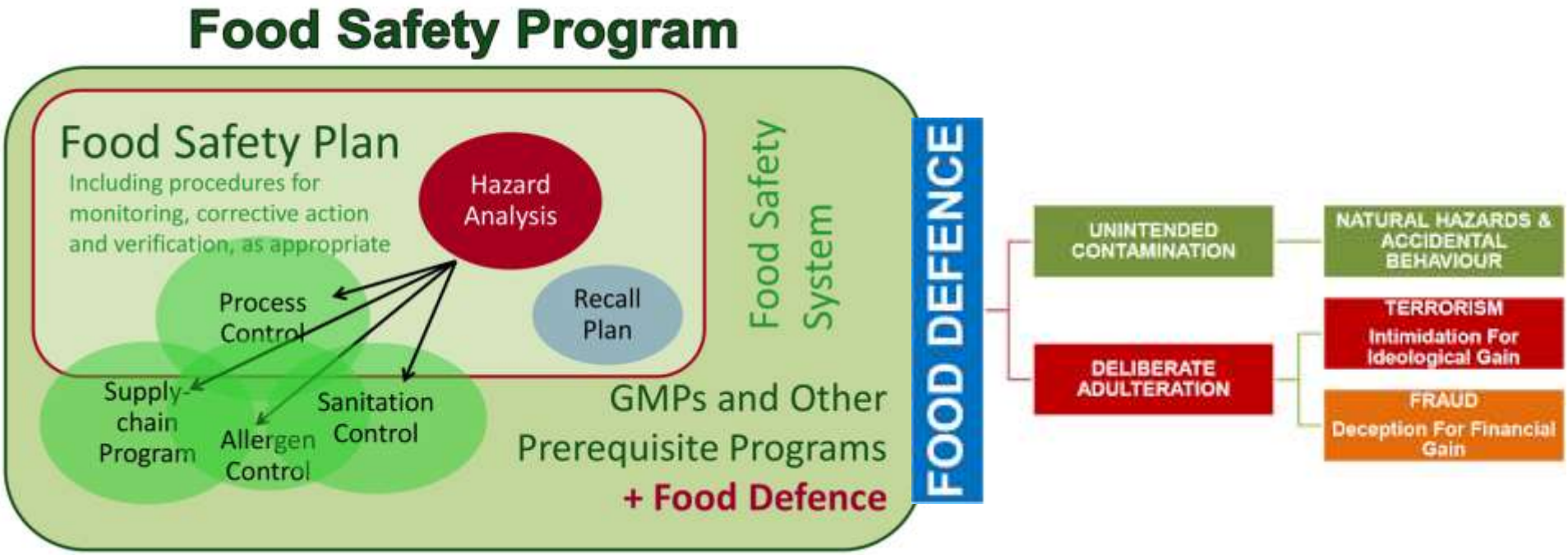
Health risk through inhalation pathway of exposure

FOOD SAFETY

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

FOOD DEFENSE

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



Food safety from farm to fork

Food chain contaminant control

Plant protection

Food packaging

Biological food chain hazards

Food additives Flavourings and Procesing aids

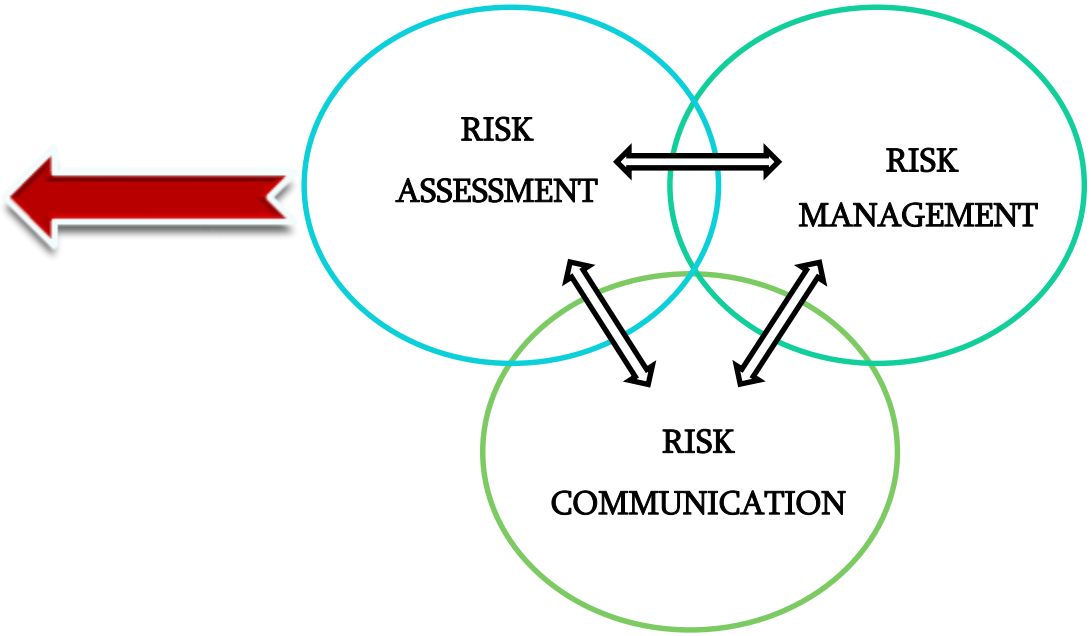
RISK ANALYSIS

HAZARD IDENTIFICATION

HAZARD CHARACTERISATION

EXPOSURE ASSESSMENT

RISK CHARACTERISATION



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 Pipoyan[1] · Meline Beglaryan[1] · Stella Stepanyan[1] · Nicolò Merendino[2]

Received: 7 August 2018 / Accepted: 12 September 2018

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, Mo, Ni, Cr, 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 Mo. Moreover, carcinogenic risk for the majority of fruits and vegetables exceeded the EPA 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.

SpringerLink

Biological Trace Element Research

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

Authors | Authors and affiliations

Davit Pipoyan, Seda Stepanyan, Stella Stepanyan, Meline Beglaryan, Nicolò Merendino

Article
First Online: 20 February 2019

Abstract

Mining industry is one of the priority sectors of Armenia's economy. However, mining complexes without treatment facilities, such as those in Armenia, have adverse environmental impact. Moreover, soil contamination can pose a potential risk to human health, particularly, through the consumption of food crops. In this study, 12 soil and 32 vegetable composite samples were collected from the city of Kajaran where Armenia's biggest copper and

Human and Ecological Risk Assessment: An International Journal

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 Beglaryan, Lara Costantini, Romina Molinari & Nicolò Merendino

To cite this article: Davit Pipoyan, Meline Beglaryan, Lara Costantini, Romina Molinari & Nicolò Merendino (2017): 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: 10.1080/10807039.2017.1381019

To link to this article: http://dx.doi.org/10.1080/10807039.2017.1381019

Human and Ecological Risk Assessment: An International Journal

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 Beglaryan, Liana Sireyan & Nicolò Merendino

To cite this article: Davit Pipoyan, Meline Beglaryan, 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: 10.1080/10807039.2018.1452604

To link to this article: https://doi.org/10.1080/10807039.2018.1452604


Thank You