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School on Modelling Tools and Capacity Building in Climate and Public Health

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Public Health and Climate

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Public Health and Climate

Spring School on Modelling tools and capacity building in climate and public health

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Outline

- Basic Concepts
  - Public Health
  - Epidemiology
  - Climatology
- Public Health Approach
- Time and Space Scales
- Climate Risk Management

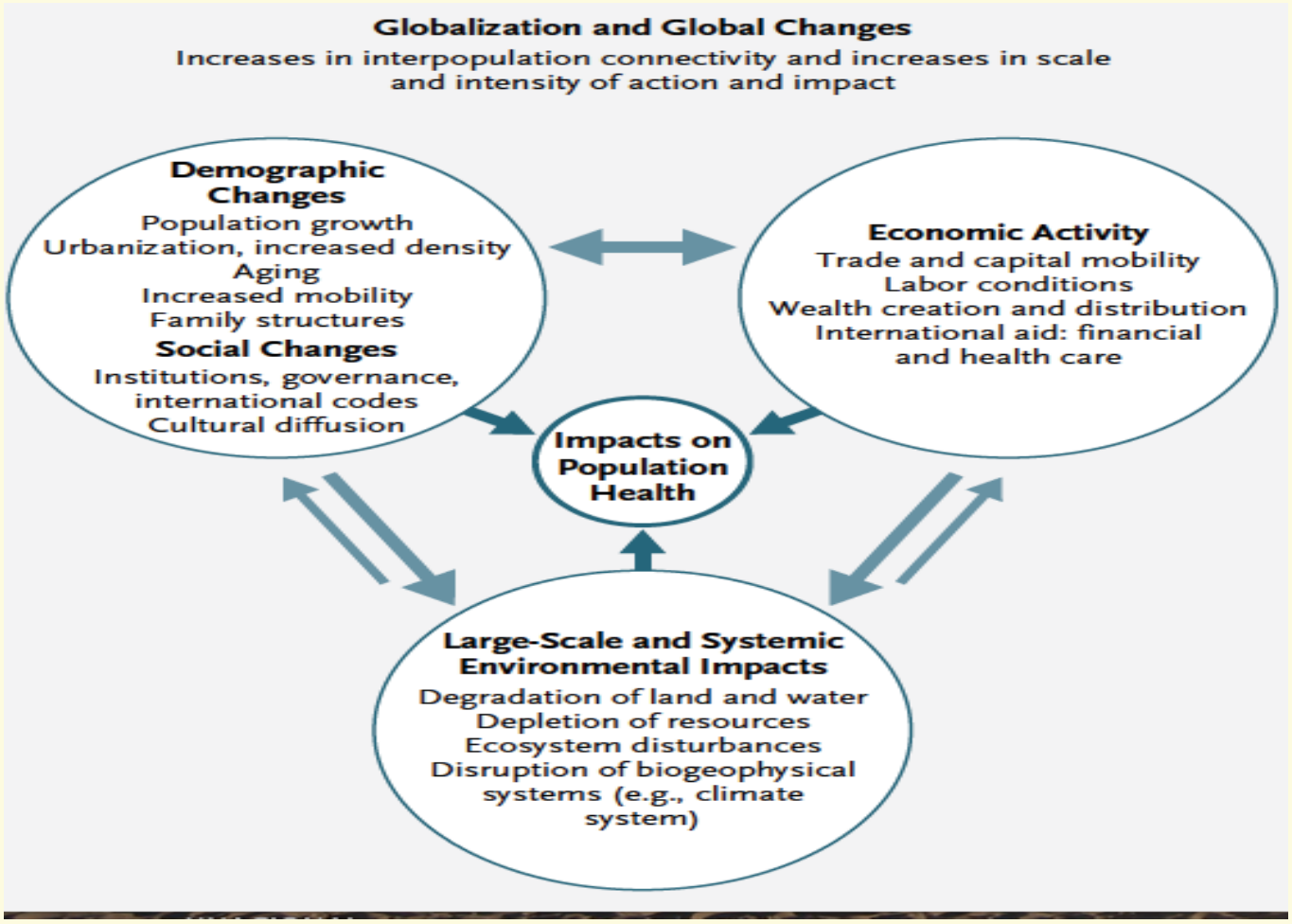
Public Health

Public Health is what we, as a society, do collectively to protect, promote and restore the people's health

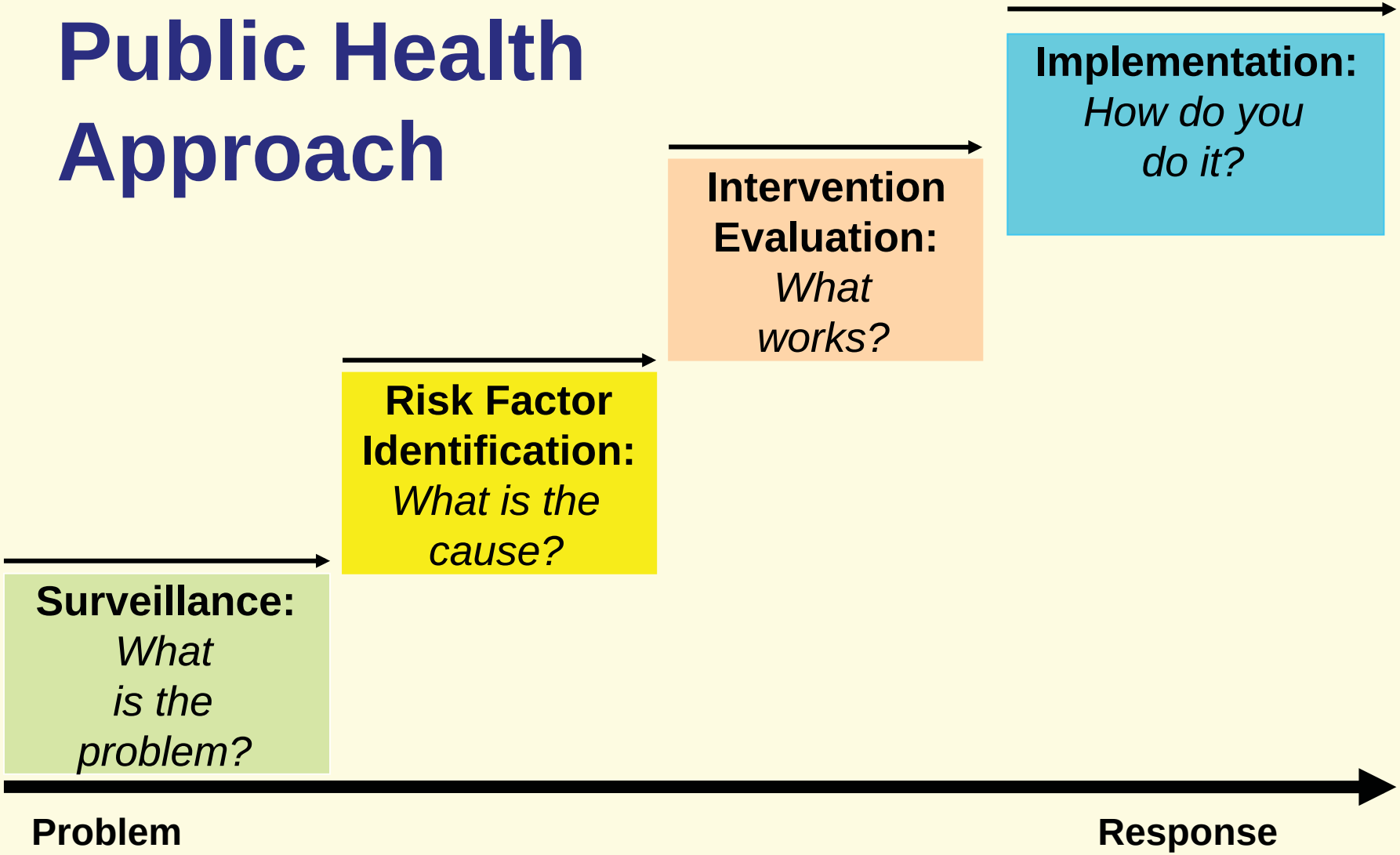
or

The science and art of preventing disease, prolonging life and promoting health through the organised efforts and informed choices of society, organisations, public and private, communities and individuals

Public Health as a final path…

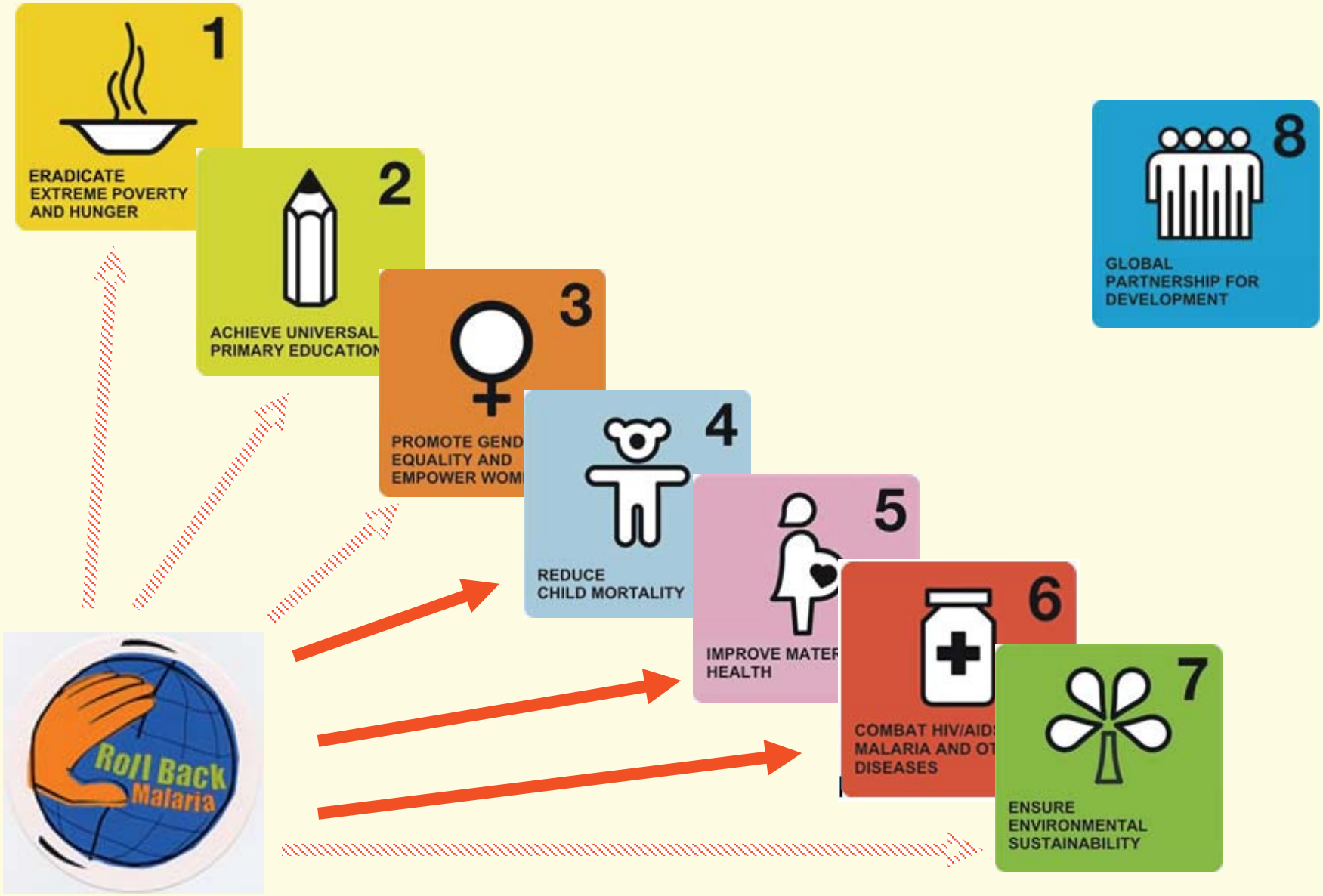


Public Health Approach



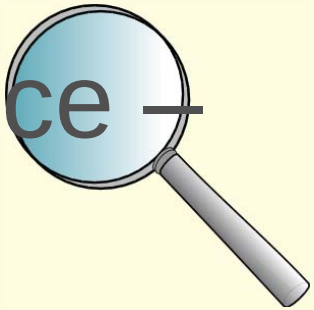
Public Health Priorities

The Millennium Development Goals



Epidemiology

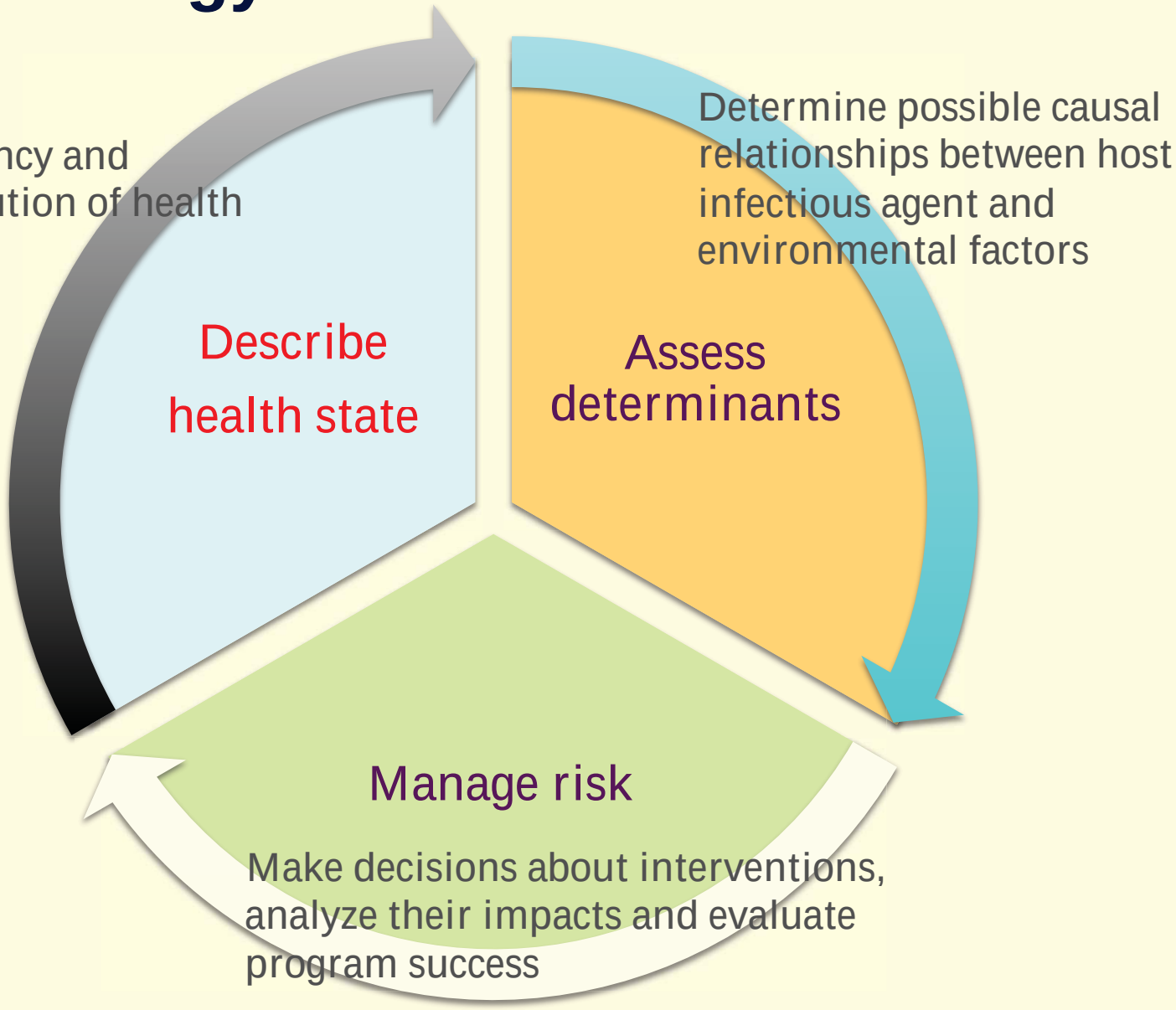
- The basic science of Public Health
  - – examining the evidence –



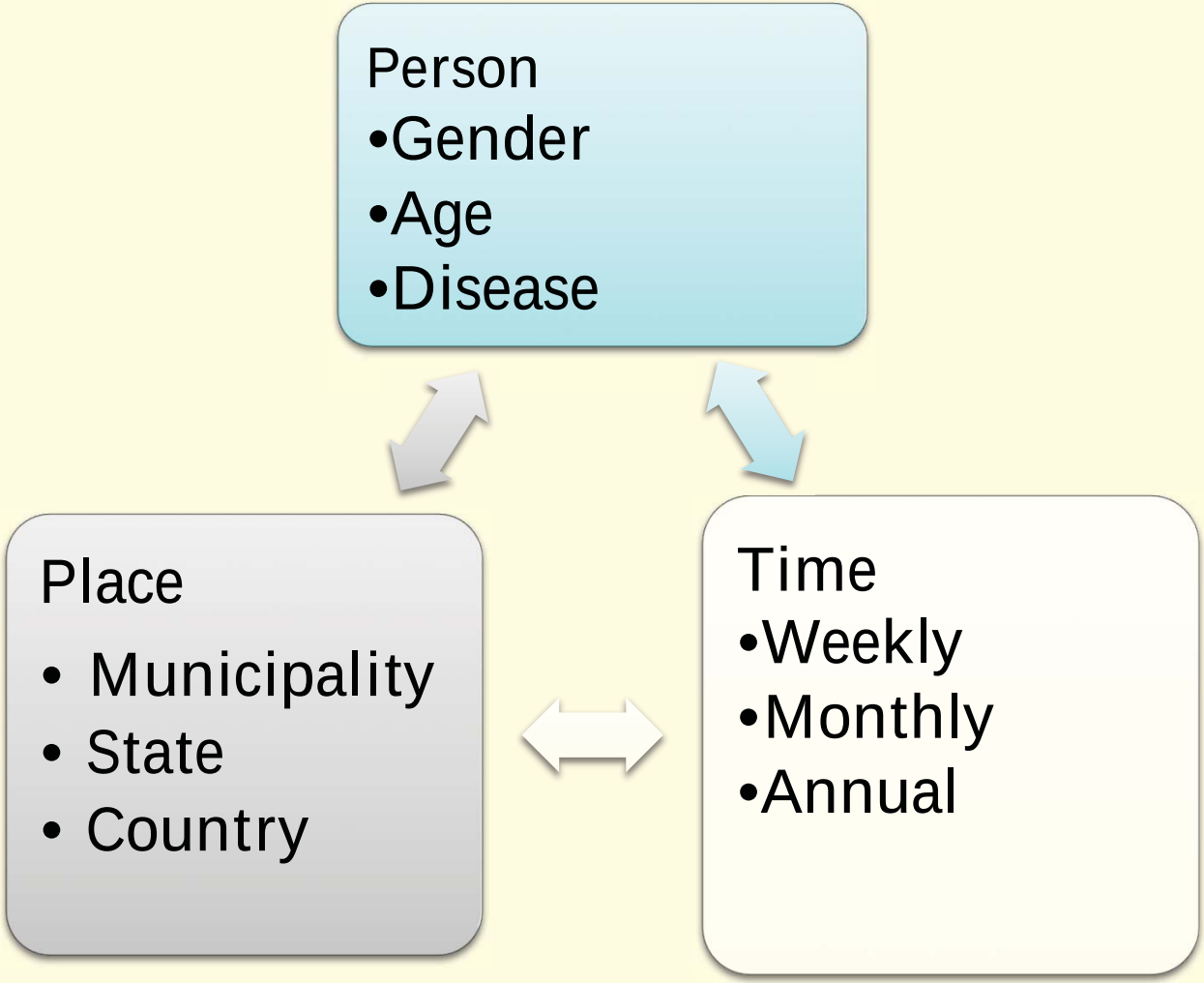
"The study of the distribution and determinants of health related states or events in specified populations and the application of this study to the control of health problems'

– *Dictionary of Epidemiology*

Epidemiology seeks to:



Person, place and time:
the framework for epidemiology



Assessing disease determinants

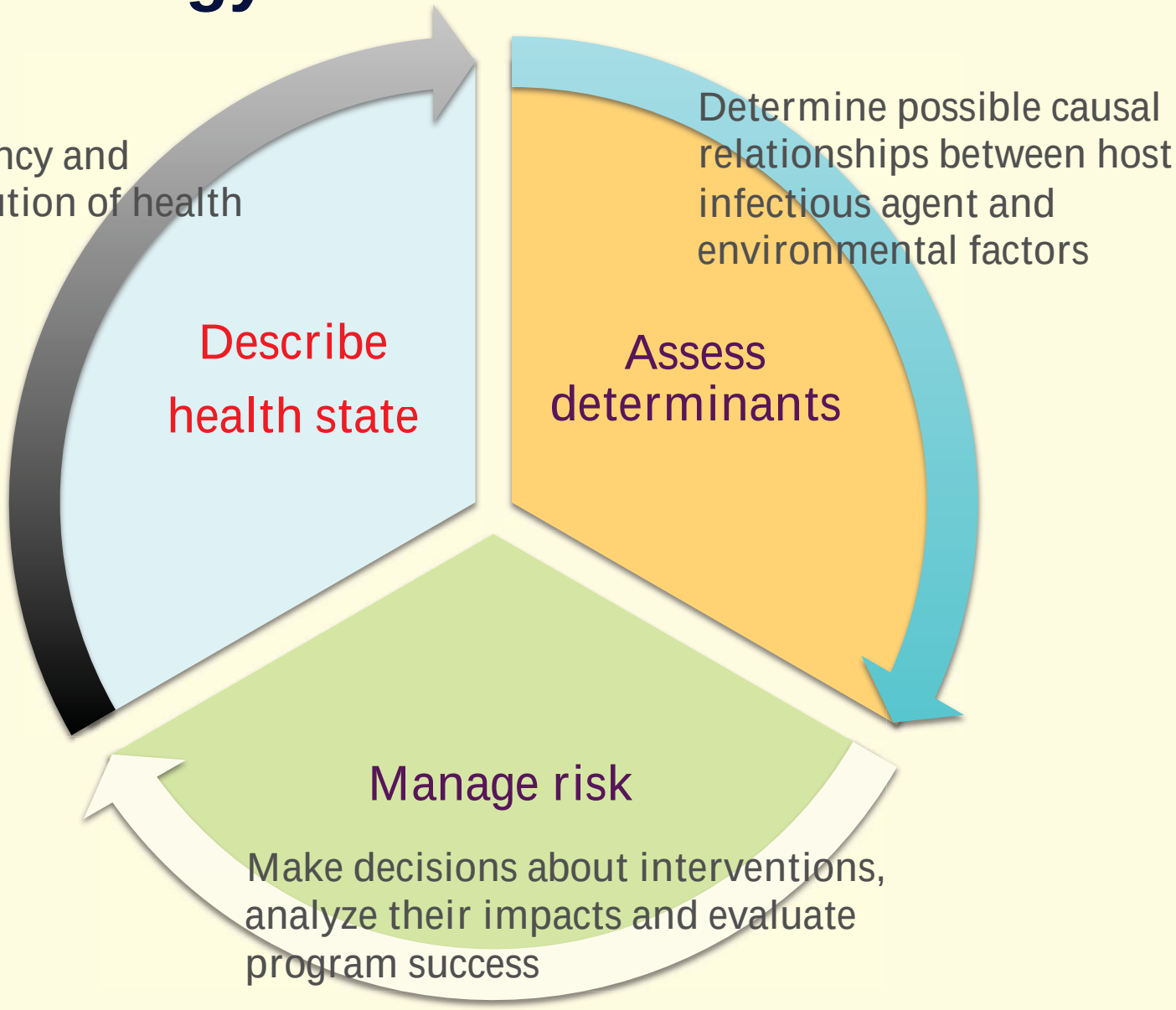
The web of causality

– the complex inter-relationship of numerous direct and indirect factors that interact to alter the risk of disease –

- What are the causal factors?
  - Disease agent?
  - Climate influences?
  - Human influences?

- Is it a real cause or could it be an artifact?

Epidemiology seeks to:



Risk, hazard and vulnerability

- **Hazards** are threats that have potential to harm people and places. They are usually caused by the interaction between society and natural systems (hurricanes) or between society and technology (chemical spills) or within society (civil conflicts)
- **Vulnerability** is the susceptibility of a given population, system , place to harm from exposure to the hazard and directly affects to prepare for, to respond to or recover from hazards and disasters
- **Risk** is the probability that some type of injury or loss would result from the hazard event

Risk Management in Public health

Risk = Hazard x Vulnerability

- Disease risk waxes and wanes between populations, geographical areas and in time.
- This variation is driven by environmental and social change. In the case of climate sensitive diseases, variations in disease risk are also driven by climate variability on a seasonal, annual, inter-annual or even decadal time scale.
- Management of risk involves understanding variation and exploiting this to increase society's resilience to impacts

Decision making for risk management

- Should we intervene?
- Where should we intervene?
- How much intervention is required?
- What are the costs? Can we afford it?
- How frequently?
- What tools should we use for monitoring progress?
- How will we measure the success of the program?

Measuring disease or public health outcome

Measures of occurrence:

- -Incidence measures
  - -Incidence rate
  - -Hazard rate
  - -Cumulative incidence
- -Prevalence measures
  - -Point prevalence
  - -Period prevalence

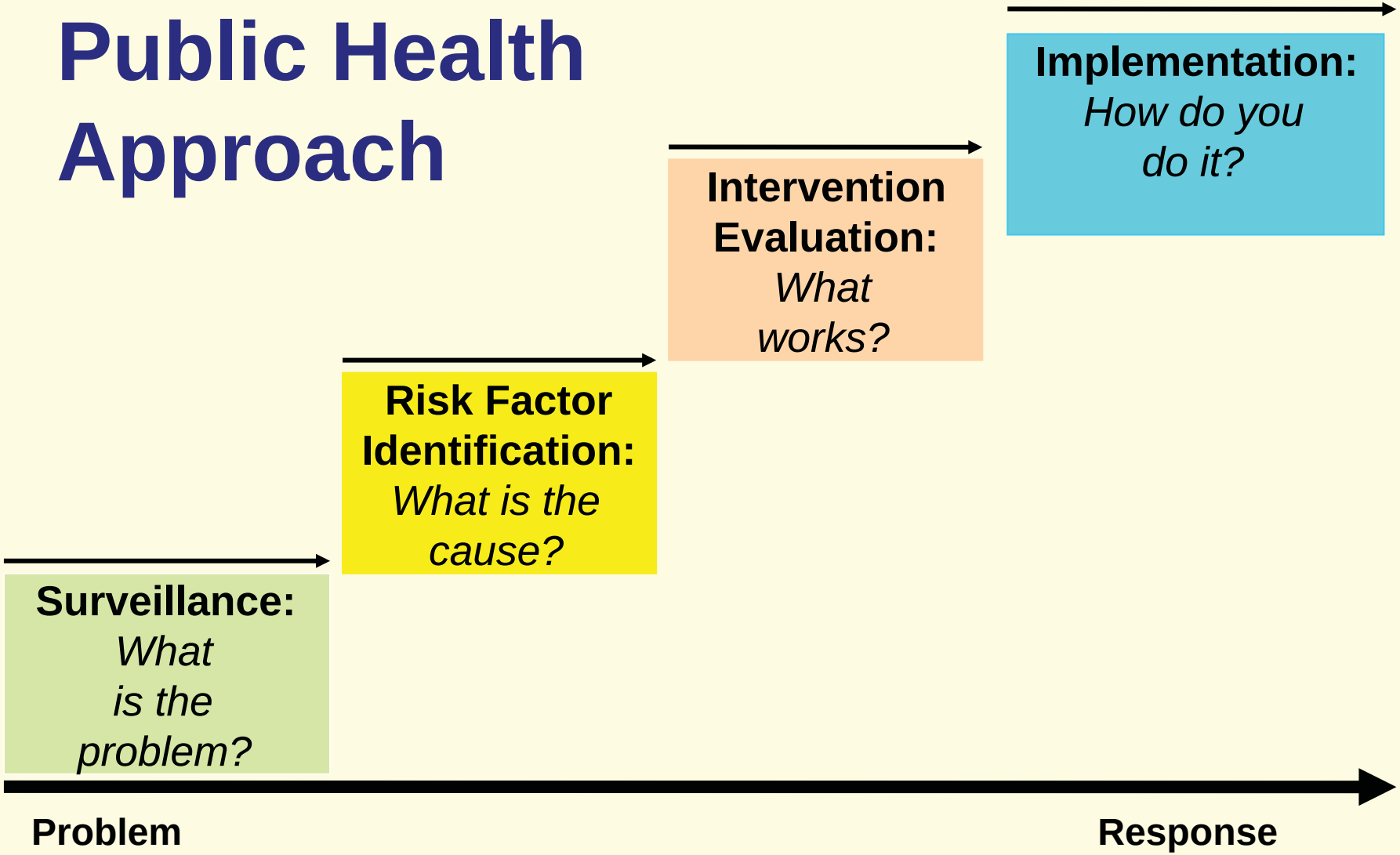
Measures of association:

- -Relative measures
  - -Risk Ratio
  - -Rate Ratio
  - -Odds ratio
  - -Hazard Ratio
- -Absolute measures
  - -Risk/Rate/Incidence Difference
  - -Attributable risk in exposed
  - -Percent attributable risk

Other measures:

- -Virulence and infectivity
- - Mortality & morbidity rates
- - Case fatality
- - Sensitivity and specificity tests

Public Health Approach

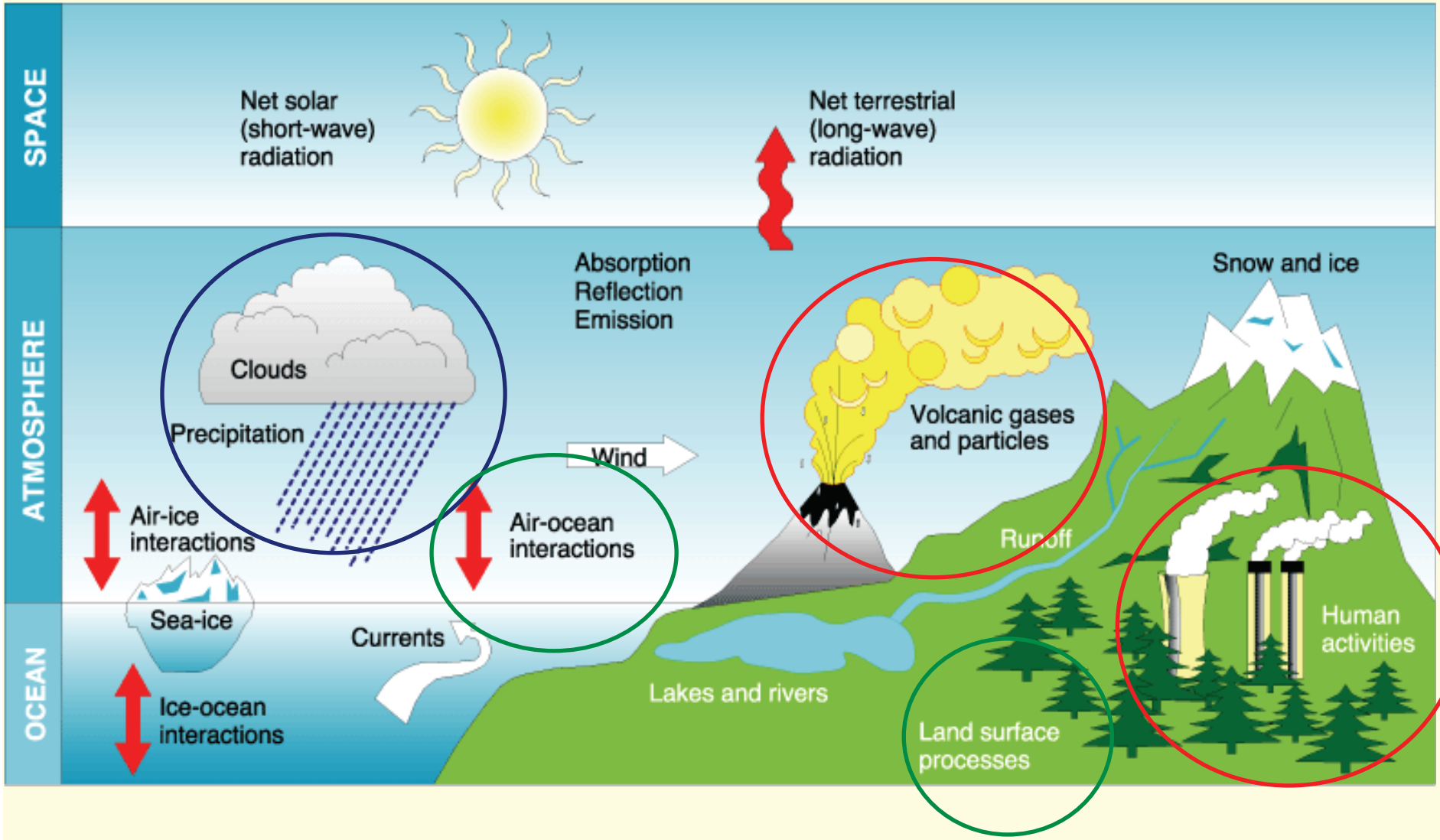


Climatology

- It is is a branch of atmospheric science that focuses on the study of climate over a period of time.

- Climatologists study climate patterns of many periods of time such as months, years, and centuries in certain regions and aim to predict changes and how the changes will affect the environment.

Climate System



Different processes, different scales (spatial and temporal)

Weather vs Climate

Weather

state of the atmosphere at a given time and place with regard to temperature, air pressure, wind, humidity, cloudiness, and precipitation. The term ***weather*** is restricted to conditions over short periods of time

☛conditions averaged over long periods are referred to as ***climate***

Time Scale

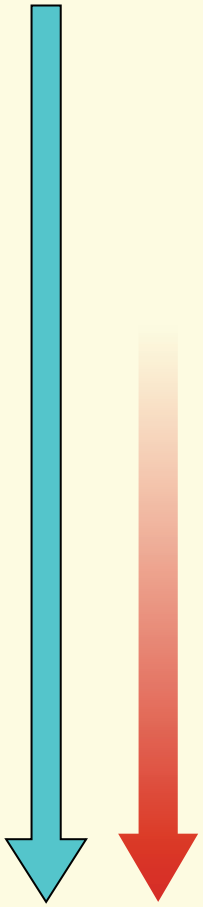
("Time" 1 – 10 días):

"Climate Variability"

- 2-3 months
- 6 months – 1 año
- Decades

"Climate Change"

- Several Decades
- Centuries



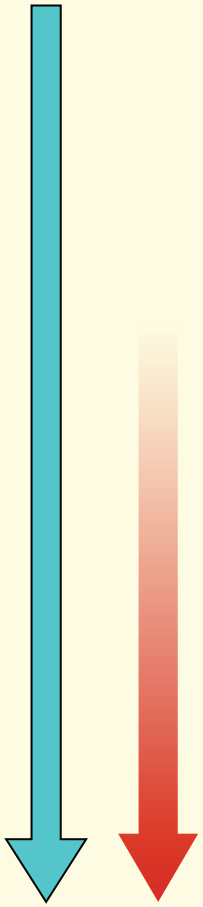
Time Scale

("Time" 1 – 10 días): Weather Forecast

"Climate Variability"

Adaptation

"Climate Change" Mitigation



- 2-3 months Seasonal Forecast
- 6 months – 1 año Seasonal F
- Decades Decadal Prediction
- Several Decades : Projections
- Centuries Projections

Climate Knowledge for Public Health

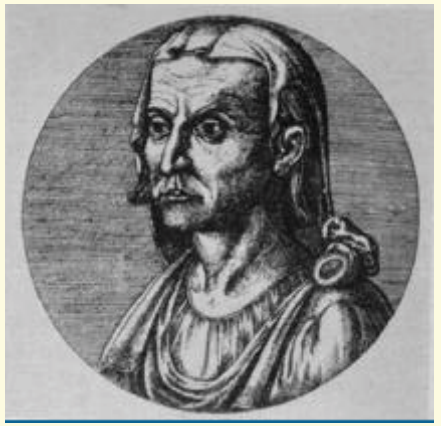
ΠΕΡΙ ΑΕΡΩΝ ΥΔΑΤΩΝ ΤΟΠΩΝ

Ἰητρικὴν ὅστις βούλεται ὀρθῶς ζητεῖν, τάδε χρὴ ποιεῖν· πρῶτον μὲν ἐνθυμεῖσθαι τὰς ὥρας τοῦ ἔτεος, ὅ τι δύναται ἀπεργάζεσθαι ἑκάστη· οὐ γὰρ ἐοίκασιν ἀλλήλοισιν οὐδέν, ἀλλὰ πολὺ διαφέρουσιν αὐταί τε ἐφ' ἑωυτέων καὶ ἐν τῇσι μεταβολῇσιν· ἔπειτα δὲ τὰ πνεύματα τὰ θερμά τε καὶ τὰ ψυχρά, μάλιστα μὲν τὰ κοινὰ πᾶσιν ἀνθρώποισιν, ἔπειτα δὲ καὶ τὰ ἐν ἑκάστη χώρῃ ἐπιχώρια ἐόντα. δεῖ δὲ καὶ τῶν ὑδάτων ἐνθυμεῖσθαι τὰς δυνάμιας …

Hippocrates, c. 400 BC

Whoever wishes to pursue properly the science of medicine must proceed thus: first he ought to consider what effects each season of the year can produce – for the seasons are not all alike, but differ widely both in themselves and at their transitions; the next point is the hot winds and the cold, especially those that are universal, but also those that are peculiar to each particular region; and he must also consider the properties of the water …

Hippocrates
Father of Medicine
Born in 460 B.C. - Died in 377 B.C.
Airs, Waters Places".



Climate Change and Health

"Climate change will affect, in profoundly adverse ways, some of the most fundamental determinants of health: food, air, water".

Dr Margaret Chan
Director-General of the World Health Organization (2007)

David E. Barmes Global Health Lecture on Monday, Dec. 10 2007 NIH Bathesda

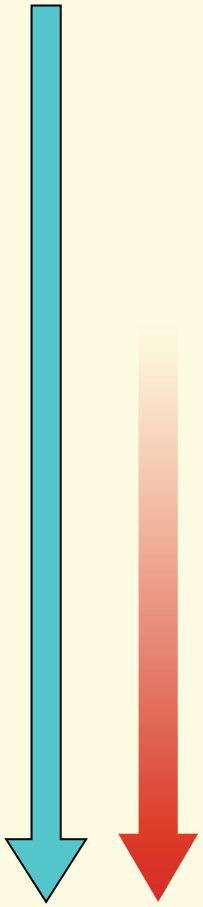
Time Scale (Climate&Health)

("Time" 1 – 10 días): **weekly**

"Climate Variability"

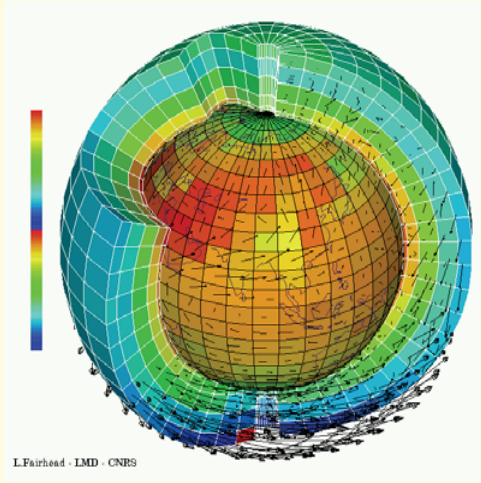
Adaptation vs Prevention

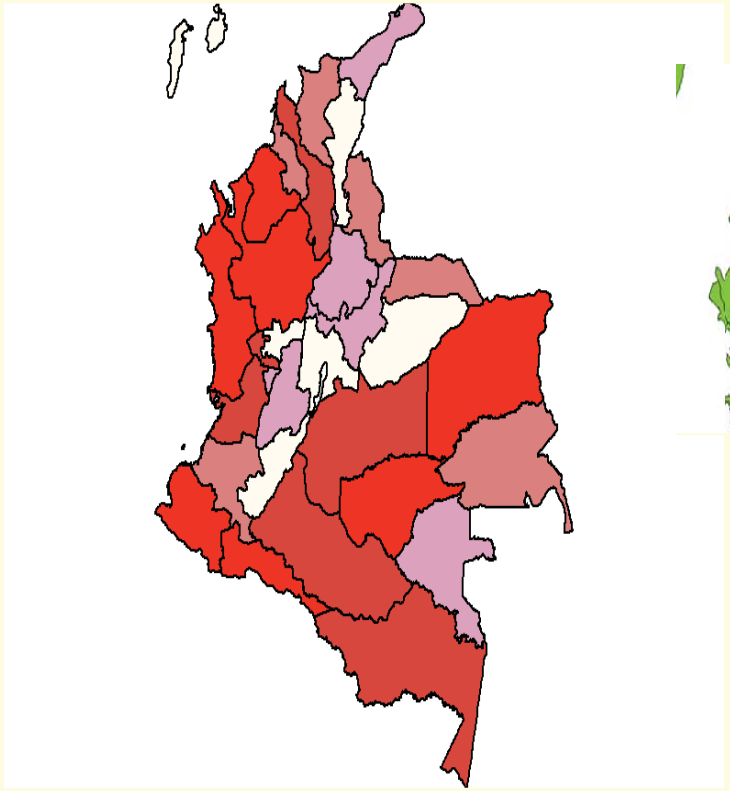
"Climate Change" Mitigation – Treatment - Rehabilitation

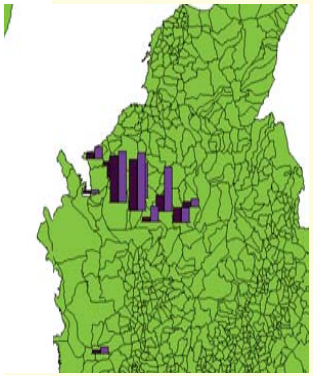


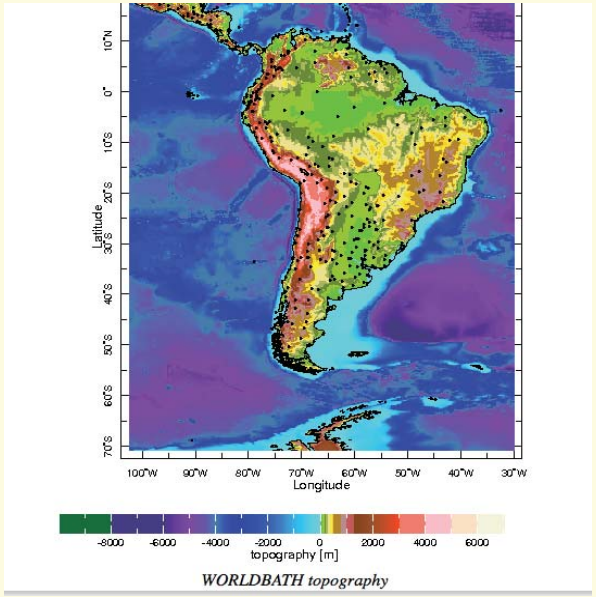
- 2-3 months **monthly**
- 6 months – 1 año **annual**
- Decades **five years period**
- Several Decades
- Centuries

Space Scale (Climate& Health)









What is climate risk management?

"Climate Risk Management" or "CRM" is a generic term to refer to an approach to climate-sensitive decision making that is increasingly seen as the way forward in dealing with **climate variability and change**. The approach seeks to promote sustainable development by reducing the vulnerability associated with climate risk.

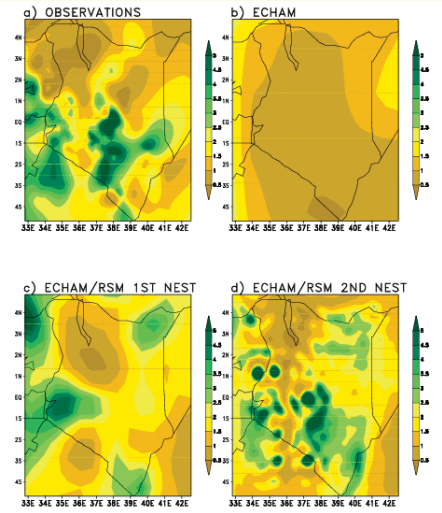
(IRI: Climate Risk Management in Africa: Learning from Practice, 2007; pg. 8).

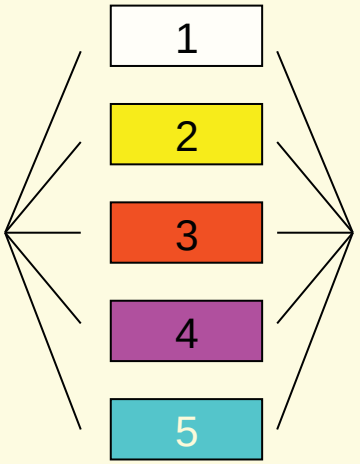
Climate Risk Management

Climate Scenarios
(downscaled)

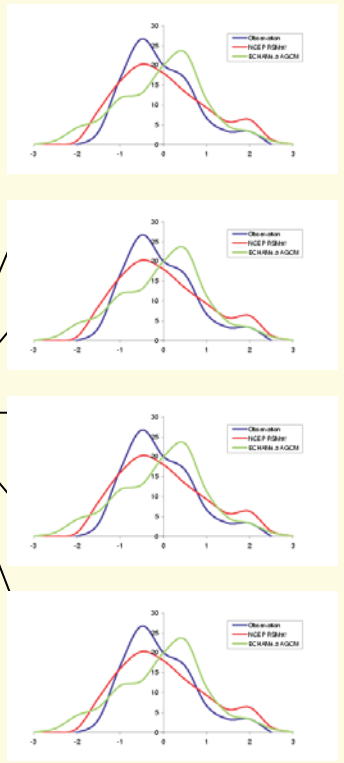
- *Interventions*
- *Technologies*
- *Management*
- *Policies*

Possible
Outcomes





Simmulations Models
(Agro, Water, Health



Inform,Planification, Decisions

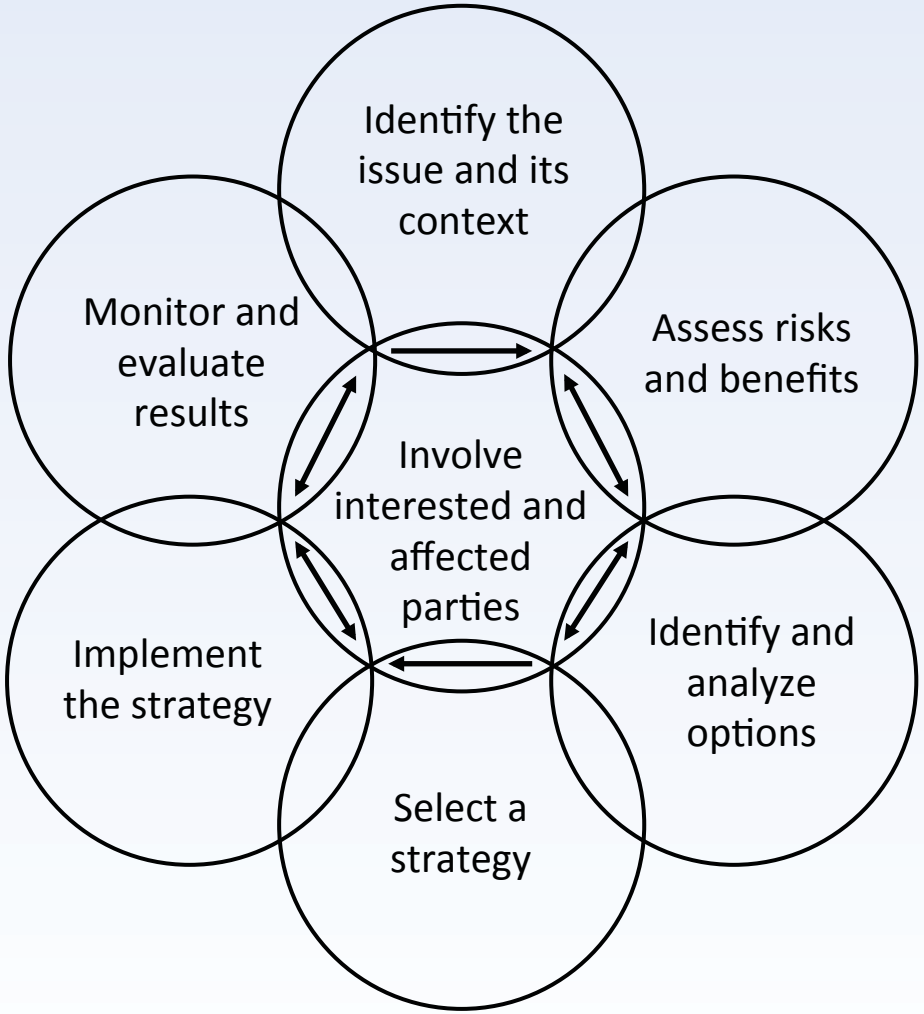
CRM: Where should we start in public health?

1. Define the problem : **Users needs – local context -KAP**
2. **Define the framework in time and space scale**
3. Identify the partnerships needed for solution
4. Identify the sources of data
5. Identify, create, tools, methodologies
6. Create, manage, share data
7. Identify risk management opportunities
8. Implement risk management activities
9. Evaluate impact on health outcomes

= dynamic process for building a ‘community of practice’.

Framework for risk management

Risk management



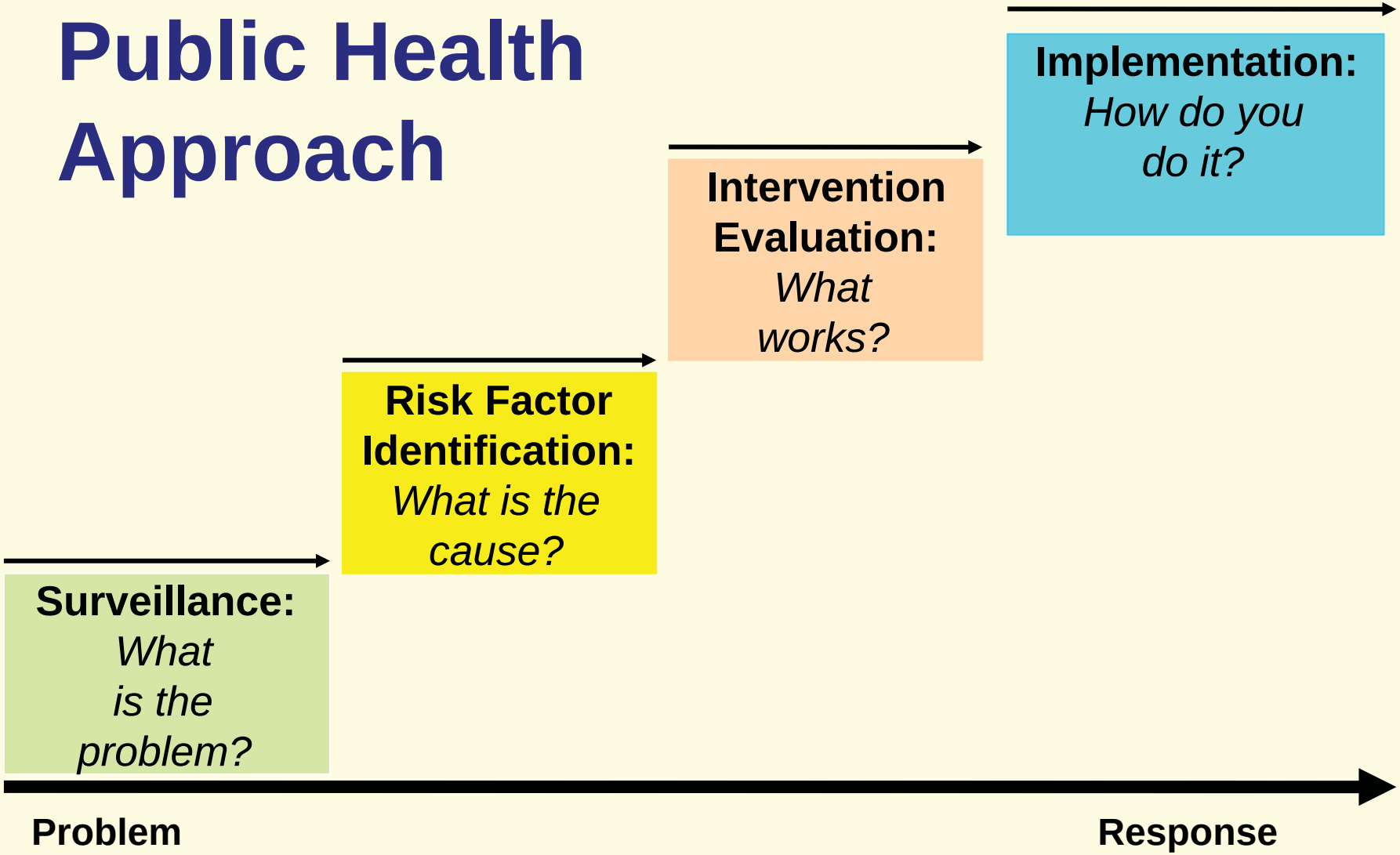
Epidemiological investigation

Define the problem : **Users needs**

- Is this disease increasing/decreasing in incidence?
- Does its incidence correlate with some suspected cause or a defined population sub-group?
- Does incidence vary during the year or season?
- Have things changed since control measures were introduced?

- Is an association between climate and dengue? At what temporal and space scale?
- What is the attributable climate risk for dengue?
- Is rainfall a good predictor of dengue outbreaks?
- What other factors are important in the dengue transmission?
- What is the perception of climate and dengue in the population ?

Public Health Approach



Thank you !

Q&A