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Investigating the environmental damage: a detailed study about the main reference methods for economic and social aspects integration

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Academic Work

Agenda

- Background
- Methodological framework
- Results
- Implications and future outlooks

Background

- In 2013, ISPRA (Italian National Institute for Environmental Protection and Research*)* and the Department of Business Studies of Roma Tre University signed a cooperative agreement to launch a joint research program

- M.I.D.A. Research Program:

  Methodologies for identification of Environmental Damage and tools able to accurately quantifying and assessing economic values

- Life Cycle Impact Assessment (LCIA)

- Corporate Social Responsibility (CSR) Strategy in a managerial perspective.

Scheme of environmental damage assessment identification

Risk assessment site-specific

Risk assessment is a process for health impact estimates that serves primarily to policy makers to make decisions under uncertainty.

US-EPA method:

1. Hazards identification;
2. Exposure assessment;
3. Dose-response evaluation;
4. Risk characterization.

Risk assessment is characterized by the uncertainty associated with each stage that can not be eliminated.

Methodological Framework

to analyze the different methods for providing the value of the **environmental damage**

To Facilitate the implementation of **CSR** stategy and introduce economic and social aspects.

Materials and methods

The authors conducted a **systematic literature review** and analysed the publications by **querying databases** with different **keywords**:

ENVIRONMENTAL DAMAGE

ENVIRONMENTAL RISK ASSESSMENT

ECONOMIC VALUE OF ENVIRONMENTAL DAMAGE

Main results

Authors	Title	1. Item	2. Objectives	3. Methodological features
Amann et al, 1998	The revision of the air quality legislation in the European Union related to ground level ozone.	SJ	Incidence rate of benefits on human health in the implementation of environmental policies	WTP
Atkinson et al,2006	Cost benefits analysis and the environment: recent development	B	Incidence rate of benefits on human health	Cost-effectiveness analysis integrating information on economic, technical, physical and biological aspects of ozone pollution and abatement
Bickel et al. 2013	Environmental external costs of transport	B	Impact pathway for estimating marginal environmental cost of transport	WTP, Bottom-up approach
Borruso et al 2001	Methodology for the estimation of the cost of air pollution and noise	B	Demonstration of the reasons why quantifying the effects of pollution in terms of life years lost rather than the number of deaths is better if we consider life expectancy	DALY
Desaigueset al, 2007	Final Report on the monetary valuation of mortality and morbidity risks from air pollution	R	Demonstration of the appropriate metric to assess the impact of atmospheric pollution on human health, life expectancy.	Life expectancy
ExternE, 1995-2005	External cost of Energy http://www.externe.info/externe_d7/?q=node/4	R	Impact Pathway for the assessment of external impacts and associated costs resulting from the supply and use of energy	Impact pathways approach methodology
Hainoun et al., 2010	Estimating the health damage costs of syrian electricity generation system using impact pathway approach	SJ	The impact pathways approach methodology for the economic quantification of damage	Impact pathways approach methodology
Holland and Krewitt, 1996	Benefits of an Acidification strategy for the European Union reductions of SOx,NOx, NH3 in the European Union.	R	The concept of 'total economic value' and evaluation techniques could to be use.	VOLY and VSL
Kahn J. Et al, 2007	As China Roars, Pollution Reaches Deadly Extremes	B	Environmental damage definition for China	No Methods
Krewitt et al, 1998	Application of the impact pathway analysis in the context of LCA	SJ	The impact pathways approach methodology for the economic quantification of damage	Impact pathways approach methodology
Rabl et al.,2003	Interpretation of air pollution mortality: number of deaths or years of life lost?	SJ	Criterion the years of life lost rather than the number of deaths. Explanation and demonstration of this statement.	DALY

Main results obtained: an example

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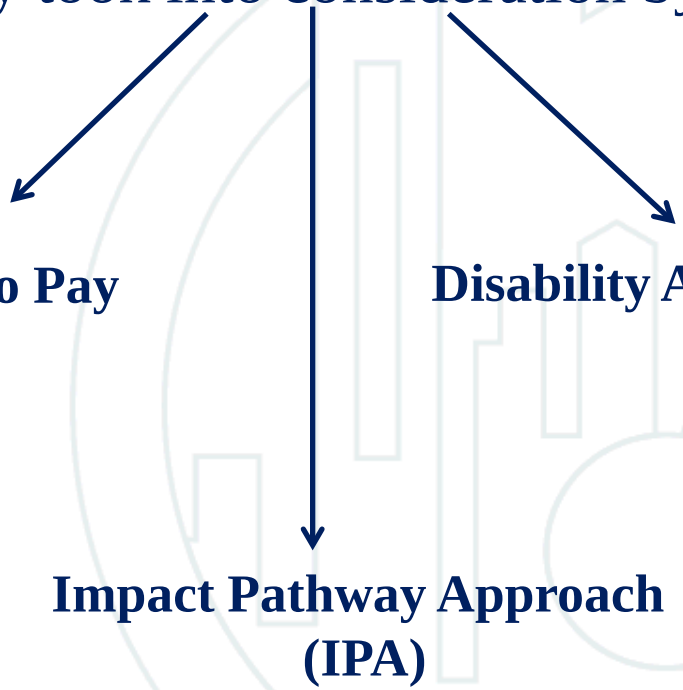
Item: **(R)** Report; **(SJ)** Scientific Journal; **(B)** Book.

Methodological features

The **tools** mainly took into consideration by literature are:



Willing to pay

- Willingness to pay (WTP) is the maximum price at or below which a consumer will definitely buy one unit of the product (Varian, 1992)

↓

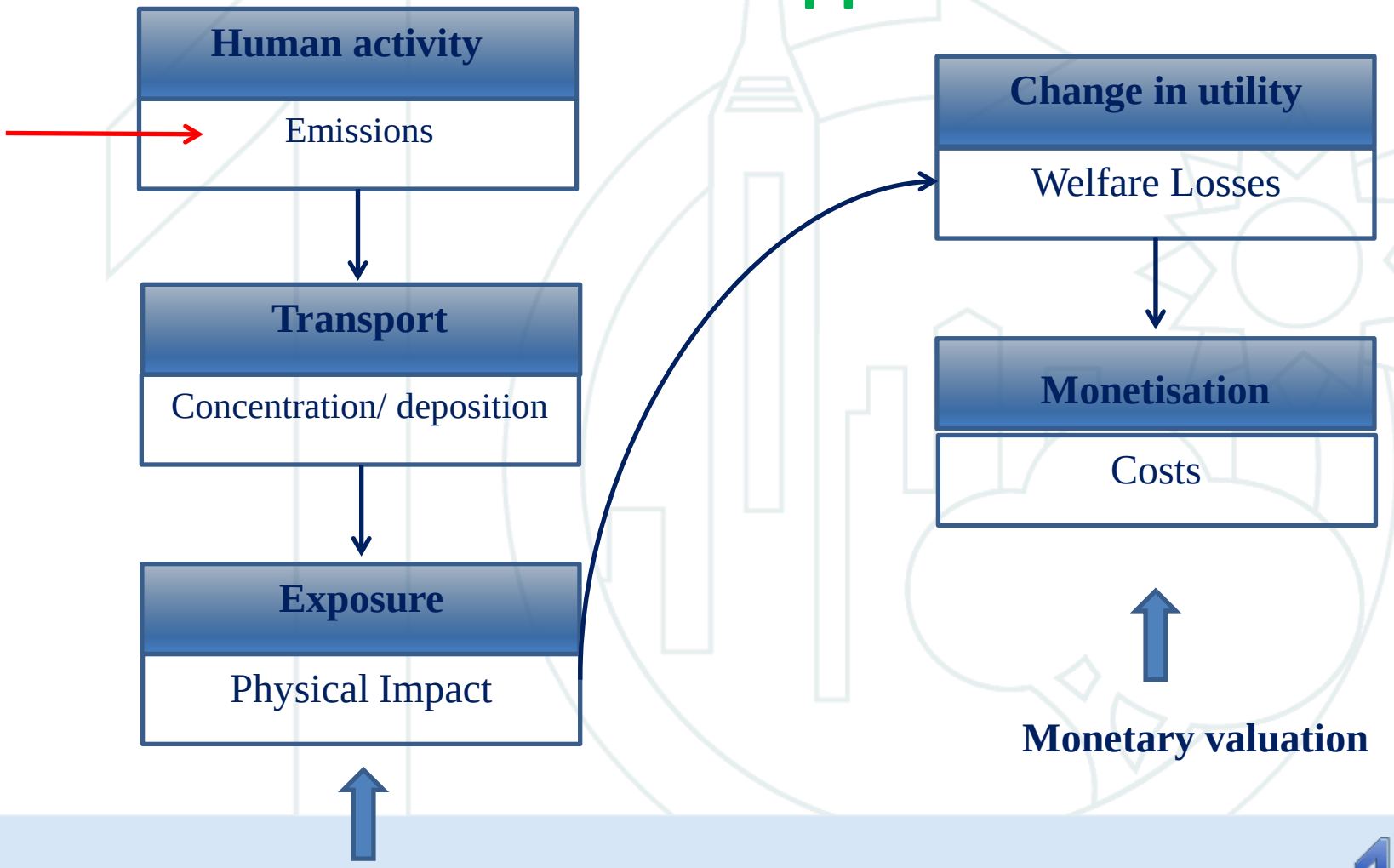
measuring the economic value attributed to the «human health».

Disability Adjusted of Life Year

- Measuring disease and injury burden in populations requires a composite metric that captures both premature mortality and the prevalence and severity of ill-health

- DALY= years of life lost (YLLs) +
  years lived with disability (YLDs)

IPA approach structure



Economic aspects of environmental damage

- Total Economic Value (TEV):

  sum of individual value components that can assign an economic value to environmental goods, which have no market

$$\Delta R = \beta * \Delta D$$

Where:

β = coefficient of the dose-response function

ΔD = change in dose

ΔR = change in response

Total Economic Value (TEV)

Two types of estimates:

The Mortality costs and the morbidity costs.

not only to the direct losses associated but also:

- The moral damage
- Affective costs
- Loss of future production, which constitutes a cost not only for loss of individual income, but for the entire community.

First consideration

Today there isn't a model to quantify the economic value of environmental damage universally adopted

If Companies want to implement good practices and relations with stakeholders in a **complete way**
have to consider the environmental damage in the
CSR strategy

Summarize the results

Methods	Environment	Economy	Society
LCA – LCI databases	✓		
DALY	✓	✓	
WTP		✓	
VET		✓	
IPA	✓	✓	
CSR		✓	✓

Conclusions

- The interaction between a product or a process activity and the environment is a **very complex issue to analyze in order to define all the variables to include in the general model**

- LCIA databases are still necessary to enhance the appropriate applicability of LCA methodology for the assessment of environmental damages.

- TEV method application is only a part of the real economic incidence of the environmental damage.

- Corporate Social Responsibility (CSR) represents the industrial point of view of global sustainability strategy implementation

Future outlooks

- A new framework could be created and implemented starting from the existing ones
- Stakeholder's categories could be developed
- CSR policy development have to include environmental damage issue

Thanks
for your attention

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10 Years
2007 - 2017