The DPSIR approach applied to marine eutrophication in LCIA as a learning tool

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INTRODUCTION

- Human activities are driven by social and economic development
- Human systems put an important pressure on the environment making its state to change and impacts to arise.
- Indicators are used to assess the sustainability of such interventions.

Environmental indicators became an important tool in decision-making.

Benefitting from conceptual frameworks based on the causality chain framework, the Drivers-Pressure-State-Impact-Response (DPSIR) is formally an adaptive environmental management approach that integrates the environmental and human systems into a common conceptual framework [1,2].

It deals with the Drivers that generate the Pressures to the environment, that modify its State, causing the Impacts, and then helps to identify Responses.

Life Cycle Impact Assessment (LCIA) indicators aim at modelling the P-S-I and provide a good background for understanding D and R.

DPSIR provides a good conceptual understanding that is well suited for sustainability teaching and communication purposes.

OBJECTIVE

Educational example of environmental assessment that supports the learning of complex sustainability issues, through:

- Science-based tools to quantify impacts (LCIA)
- Communicate knowledge (DPSIR)
- Support decisions (DPSIR and LCIA)

METHODOLOGY

Active learning stimulates deep learning and increases its outcomes [3].

Case-based learning - students carry out their own case (active process)

A good educational example should enable students to:

- View the problem in a larger context
- Define their own problem
- Apply theory
- Solve problems
- Suggest solutions

Cases within the DPSIR framework can include all of the above and is exemplified here by the impacts to marine eutrophication:

THE EDUCATIONAL INTEGRATION

- Develop a case study taking a specific point in the DPSIR framework, like impact based on incidences of eutrophication (e.g. severe oxygen depletion) or pressure based on knowledge of an activity with a significant N-emission.
- Add a theoretical introduction to the eutrophication model.
- The student works with the case study as an assignment or a project and go through all the DPSIR steps.
- Wrap-up with presentation and discussion.

Works as an introduction to environmental sustainability and the student learns about the complexity of sustainability problems, causality and societal responses.

CONCLUSIONS

- DPSIR integrated into assessment of environmental impacts is effective in the definition of solutions to real problems [4].
- Introduces knowledge supported on evidences of causality and alternatives for management — relevant for informed decisions.
- The marine eutrophication indicator embedded in DPSIR seems a useful tool to improve communication and learning — It bridges science and management while providing an overview of the basic elements of sustainability in a practical educational application.

Other LCIA indicators can be adapted to fit different audiences.

References