

A Global Tourist Information System to avoid marine litter in Coastal Areas

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Abstract

Marine pollution is an issue that threatens not only the health of our ocean but can also lead to socio-economic effects such as a decrease in sea-related tourism due to loss of potential for recreational use of marine environments due to contamination with Marine Litter. The resulting Action Plan gives advice for actions and collaboration opportunities connecting different stakeholders: Governments, Local Governments, Travel Agencies, Airlines, Hotels & Accommodation, Companies & Industries and local NGOs to prevent Marine Litter in coastal areas. The *Sustain Travel Program* is based on the Honolulu strategy and includes a DPSIR, a causal model for describing the interactions between society and the environment regarding Marine Litter. The huge amounts of litter produced in marine environments are also due to tourism and the hospitality industry, which make them major targets for awareness and education campaigns to reduce marine litter originating from these sources. The Plan offers ideas to positively inform and educate tourists and gives advice how to encourage them to participate in sustainable programs to reduce marine litter. Tools in this program include 1) an Application for mobile devices, 2) a universally recognizable logo connecting tourists with all participating stakeholders and 3) a Volunteering Program in which students or travelers who visit coastal areas help in projects associated with the *Sustain Travel Program*.

This Action Plan proposes ways how Marine Litter could be seen not as a problem, but rather as an opportunity for collaboration and partnership between different entities to work towards more sustainable tourism.

Keywords:

Marine Litter, Tourism Sustainability, Coastal Areas, Network.

1. Introduction

The purpose of this study is to propose an information system/plan for tourists who are visiting coastal areas. While marine litter has become an increasingly important issue in policy discussions, there is only a very sketchy (although growing) body of knowledge on the costs of the impacts. It is necessary and important that tourists get the right information to avoid marine litter but also they must be motivated to take part in the cleaning actions.

Marine litter is defined as solid material of human origin such as disposable lighters, plastic containers and plastic bottles that are discarded on the sea or reach the sea through waterways or

domestic and industrial outfalls (Yoon, Kawano and Igawa, 2010). In addition to the environmental and health issues discussed in previous book sections (Galloway 2015; Kühn et al. 2015), marine litter can cause a range of economic impacts that both increase the costs associated with marine and coastal activities, and reduce the economic benefits derived from them.

Measuring the full economic cost of marine litter is complex due to the wide range of economic, social and environmental impacts, the range of sectors impacted by marine litter and the geographic spread of those affected. Some of the impacts are easier to evaluate in economic terms because they are more direct, such as increased marine litter cleaning costs. Others are more complex, for example, the less direct and/or more intangible values such as the impacts of ecosystem deterioration or reductions in quality of life.

Many countries or coastal areas are dependent on tourism. When tourism is discussed in relation to marine debris, there is a preponderance to examine the impacts that this pollutant has on the tourism industry (Wilson and Verlis, 2017). Both aesthetic and economic impacts can result from high marine debris loads, primarily through decreases in visitation and shoreline and water-based recreational activities.

If the beaches are full of marine litter, the tourists will stay away or move to other coastal areas or countries. It is also important that people who are not living in coastal areas but often visit them, get motivated to take part in this process. In this process, we will connect tourists with local people, hotels, travel agencies, airlines, (local) businesses, (local) governments and other stakeholders. It is proposed to create a network between all the stakeholders, local people can learn from tourist, but also tourist can learn from local people. Many European citizens visit the coastal areas from Croatia, Spain, The Netherlands, Turkey, Italy, and Portugal but also on other continents. This project is a framework that can be used globally:

- What is the best way to inform and motivate tourist? (leadership, developing solutions)
- What kind of marine litter can we bring in connection with the tourist industry at the coastal areas? (modelling)
- How to avoid that this information about marine litter will lead to a negative image of a coastal area?
- What kind of stakeholders can take part?
- How to motivate the stakeholders?

The connecting and recognizable tools of this program will be the Sustain-Travel logo, the Sustain-Travel Exchange Program and an application for mobile devices.

The Sustain-Travel logo consists of a blue banner and the words “Sustain-Travel-Program”. An application for tourists will be designed as connecting tool, which helps them to find out helpful informations about their travel destination like maps, educational material like environmental & ecosystem facts & activities related to the Sustain-Travel-Program. A feature of this app could be tourists picking up (marine) trash, photographing and uploading it. As rewards refunds, discounts in restaurants, shops or hotels or other prizes might be given. These prizes might be sponsored by (local) companies/industries. This app would get tourists involved in the Sustain-Travel-Plan via mobile media devices and also provide scientific important data about distribution & accumulation of (marine) litter and actions of participants of this program. The development of the app might be financially supported by the EU or other higher governmental forces.

The promotion of it will take part in the media, travel agencies & hotels, on airports & planes, locally in towns and cities and globally. The scientific community will provide a report on the data/results and the report will be distributed to governmental authorities to help them to produce relevant policies and take actions further action to manage marine litter and participation by society/tourists in the area.

2. The DPSIR Framework

One framework supporting a systems approach is the Driving Forces – Pressures – State – Impacts – Responses (DPSIR) framework, which has been a valuable tool for organizing and

communicating complex environmental issues. The DPSIR framework was developed by the European Environmental Agency (EEA, 1999) has been used by the United Nations (UNEP, 2007).

The DPSIR framework is a systems-thinking framework that assumes cause-effect relationships between interacting components of social, economic, and environmental systems. The DPSIR framework has been used for many environmental resource applications, including management of agricultural systems (Kuldna et al. 2009), water resources (Borja et al. 2006), biodiversity (Maxim et al. 2009), marine resources (Nuttall and Fletcher, 2013; Yee et al. 2015), coastal tourism (Lozoya et al, 2011; Jurado et al, 2012). The DPSIR framework also can be used to integrate social, cultural, and economic aspects of environmental and human health into a single framework (Yee et al. 2012). DPSIR has most commonly been used in the context of environmental management to link ecological and socioeconomic factors (Fig. 1).

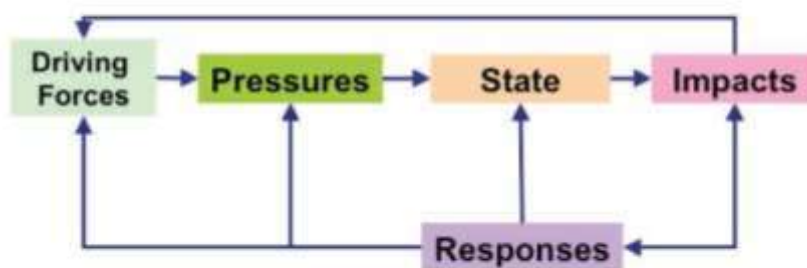


Figure 1. The DPSIR framework and conceptual relationships among categories (EPA, 2015)

According to the DPSIR framework there is a chain of causal links starting with ‘driving forces’ (economic sectors, human activities) through ‘pressures’ (emissions, waste) to ‘states’ (physical, chemical and biological) and ‘impacts’ on ecosystems, human health and functions, eventually leading to political ‘responses’ (prioritization, target setting, indicators). Describing the causal chain from driving forces to impacts and responses is a complex task, and tends to be broken down into sub-tasks, e.g. by considering the pressure-state relationship.

Driving Forces are the factors that motivate human activities and fulfill basic human needs, which have been consistently identified as the necessary conditions and materials for a good life, good health, good social relations, security, and freedom (Maxim et al. 2009). The spatial distribution and intensity of Driving Forces varies - they can originate and act globally, regionally or locally.

Pressures are defined as human activities, derived from the functioning of Social and Economic Driving Forces that induce changes in the environment (EEA 2005; Maxim et al. 2009), or human behaviors that can influence human health. Pressures are not stressors. Stressors are the components of state that are changed by pressures (e.g., land development [the pressure] - increases sediment [the stressor] in the coastal zone, which then may stress the ecological components of the reef). Pressures fall into two classes – Environmental Pressures and Human Behavior Pressures.

State refers to the state of the natural and built environment (e.g., the quantity and quality of physical, chemical, and biological components), and human systems, e.g., population level and individual attributes (Yee et al. 2012). Chemical, physical and biological processes interact to affect different ecosystem components (e.g. chemicals, biological species) that can be measured by their attributes (metrics of quantity or quality). All biota incorporate community and population attributes, but human condition also incorporates individual-level and subpopulation-level attributes.

Changes in the quality and functioning of the ecosystem have an Impact on the welfare of humans, including the production of ecosystem goods and services and ultimately, human well-being.

A key benefit in using the DPSIR framework is that it explicitly includes an Action or Response component that can be taken at any level of the causal network (Yee et al. 2012). In the DPSIR framework, Responses are actions taken by groups or individuals in society and government to prevent, compensate, ameliorate or adapt to changes in the state of the environment; and to modify human behaviors that contribute to health risks, to directly modify health through medical treatments, or to compensate for social or economic impacts of human condition on human well-being.

3. DPSIR, the connection to tourist information system to avoid marine litter

In the following the DPSIR framework is illustrated by more specific conceptual frameworks in relation to tourist information system to avoid marine litter (Fig. 2):

Driving forces

In the driving forces are described the factors that motivate human activities, which fulfill human needs. The growing desire for more causes an easy live attitude and a throw away generation, our examples; need for plastic packaged food and a need for clean portable drinking water in plastic bottles. The flourishing economy in many different countries generates that many people have enough time and money to spend their holidays in coastal areas. Coastal areas are developing fast and it is very important that these areas are free from marine litter. Not only for the tourist but also the local society, because they are economical dependent from tourism. That means; there is a need for clean beaches and a need for tourists to visit coastal areas.

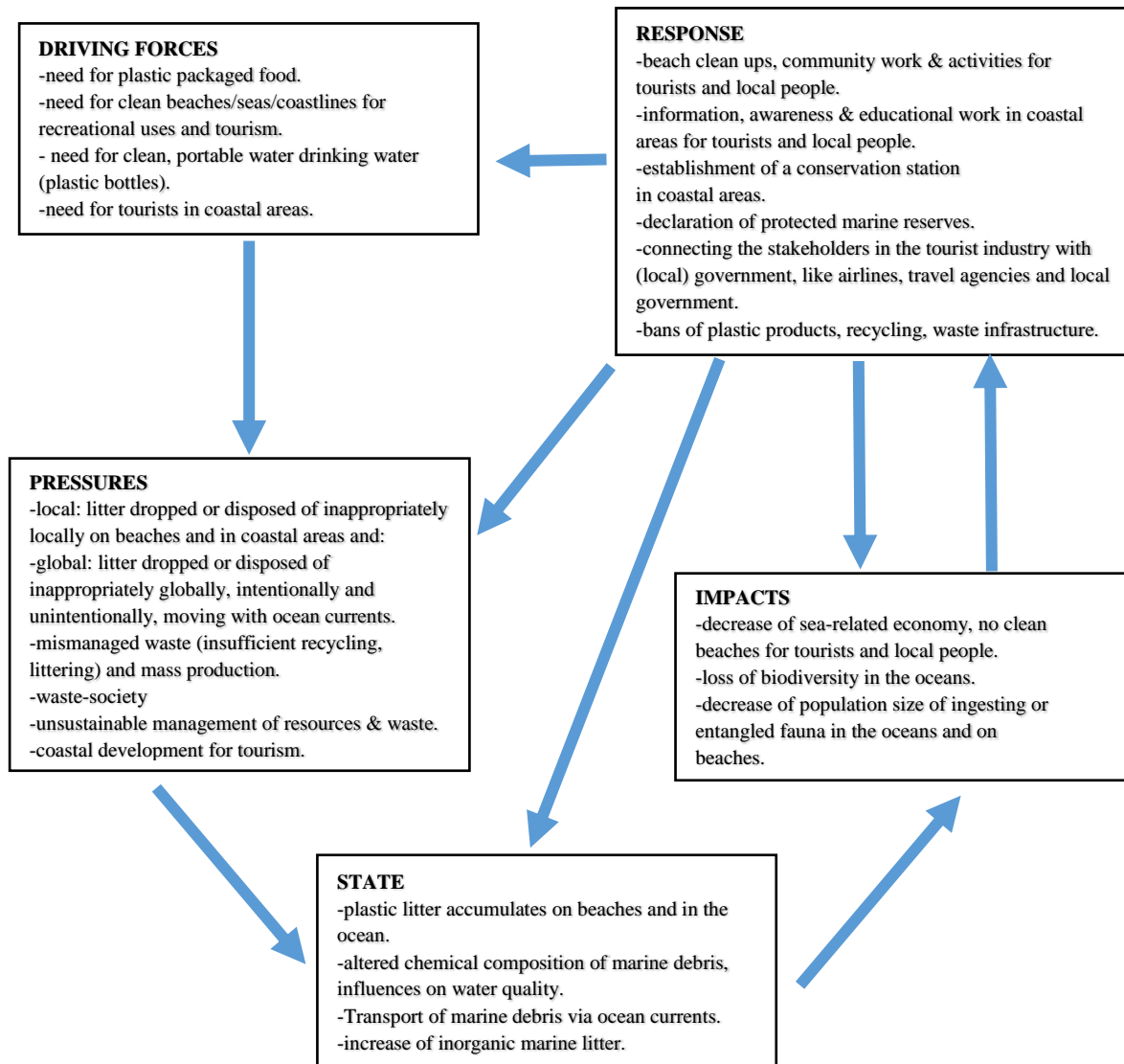


Figure 2. DPSIR, the connection to tourist information system to avoid marine litter

Pressures:

Are defined as human activities, derived from the functioning of social and economic driving forces that induce changes in the environment. We divide the marine litter into local and global littering. Litter dropped or disposed of inappropriately, locally (on purpose or by accident) on beaches and in coastal areas (in tourism destination). And also, litter dropped or disposed of inappropriately globally, intentionally or unintentionally, moving with oceans currents. They cause marine litter pollution on beaches that are located somewhere else.

State:

State refers to the state of the natural and built environment. Through the pressures as written above, a lot of litter is ending up on beaches and in coastal areas, polluting the environment. If beaches are full of rubbish, tourists will avoid these areas and spend their holidays somewhere else. Marine litter also has a big impact on the biotic state like water quality, microorganisms and marine life.

Impacts:

Changes in the quality and functioning of the ecosystem as written in the pressures and state have an impact on ecosystem services. In our DPSIR framework, we describe the decrease of sea-related economy and no clean beaches for tourists and local people for human well-being. The impacts of marine litter in our oceans have an influence on biodiversity in the oceans, through pollution etc. That means a decrease of population size in the oceans and on beaches.

Responses:

The following responses or actions are needed to avoid marine litter in touristic coastal areas: it can be organized beach clean ups, community work & activities for tourists and local people. An important part is to inform the tourist in a positive way about marine litter through awareness & educational work in coastal areas. A further good example is to establish a conservation station in coastal areas and declaration of protected marine reserves. With our responses, it is wanted to connect the problems to all stakeholders in the tourist industry, like airlines, travel agencies with the (local) government and local tourist industry to create a tourist information system to avoid marine litter.

With this DPSIR framework, it is wanted to connect the problems with the stakeholders, and give a general overview about the problems along the coastal areas visited by tourists and local people. This framework can also make a connection between the stakeholders, project management and decision makers, who can use this DPSIR framework. Notice that the above responses are especially for the following target group: the tourist industry. Together with the stakeholders it will be created solutions to avoid marine litter. The responses are corresponding to all other framework parts, the driver, pressures, state and impacts.

4. Conclusions: Managing measures

Since the publication of the first report about marine litter in the 1960's, a large number of instruments on local, regional, national and international have been adopted to tackle marine litter. These are not only projects, but also agreements, conventions, action plans, strategies and many more. It will be important to find the right instruments and make a connection to our Sustain- Travel-Program and the stakeholders. Those instruments can also be a part of the stakeholders, playing an important role in financing the project and also the success of the project itself. If we are working together with organisations, that have more experience and a lot of connections to other stakeholders, we can develop a better project and it will get more attention

Sustainable development correlates directly with community knowledge and empowerment. Participation of all stakeholders in the strategic planning process, interdisciplinary approach, empowerment and capacity building of all individuals and community organizations, and sustainable management of natural resources and environment are the key principles for sustainable development.

International instruments:

-United Nations Convention on the Law of the Sea (UNCLOS), an agreement about the use of the oceans, It exist out of 320 articles and nine annexes. Specially the economic and commercial relating to ocean matters will be interesting for our Sustain Travel Program.

-UNEP Regional Sea Programme, an international instrument developed for regional projects all around the world. Very important for our Sustain Travel Program are the following main activities from UNEP; review and assessment of the status of marine litter in the region, organization of a regional meeting of national authorities and experts on marine litter, preparation of a regional action plan for the management of marine litter, and participation in a regional clean-up day. Also the establishment of partnerships, cooperation and coordination of activities. UNEP will be a perfect partner to create our Sustain Travel Program. Specially for connecting our stakeholders we need the right contact persons and organisations, like government representatives, UN agencies, donor agencies and NGOs.

-UNEP Guidelines on the Use of Market-Based and Economic Instruments, this guideline will be very helpful for our Sustain Travel program. It tells us how select and to use economic tools. It describe many different economic relates tools for marine litter plastic programs, but also plastic bags tax or other economic related possibilities that we can use. We can use this for different stakeholders and economic based parts of our plan like; travel agencies, (plastic bag fee, or cotton reusable bags), companies local companies, and other parts of our plan that are based on economic solutions for the marine litter problem.

Regional Instruments:

-EU Marine Strategy Framework Directive, is a policy instrument for the European countries for the protection of the marine environment. It is the first EU legislative instrument related to the protection of marine biodiversity. It's a framework the ecosystem approach to the management of human activities having an impact on the marine environment, integrating the concepts of environmental protection and sustainable use. For our European Sustain Travel Program Partners this instrument will play an important role, because we are using concepts like; environmental protection, (see stakeholder program A) sustainable use (see stakeholder program B, D and E). The EU Strategy Framework can also be used as an example for other countries or continents.

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