



# INSPIR/ actions

SEPTEMBER 2021

# SUNSCREENS, HUMAN AND ENVIRONMENTAL HEALTH

Human and environmental health

A comprehensive approach to sun protection

Towards a holistic approach of health

Changes in consumer behaviour

The conversation between science, the public and decision-makers

A label for not environmentally harmful sunscreens

AND  
7 proposals for action





# introduction

## What was this booklet made of?

The activities which inspired this publication brought sunscreens formulae to the foreground. Indeed, it became obvious during our seminars that end-consumers are waiting for data and information regarding sunscreens as full products (taking into account the entire lifecycle and components of the products). Still, we chose to focus our attention upon one tangible starting point in order to initiate the debate: this infographic therefore focuses on sunscreens formulae as our main issue and not on sunscreens as full products.

In order to contribute to the build-up of momentum between science and society on issues relating to the environment and health, Green Cross held a stakeholder forum in February and March 2021 regarding scientific assessments of the benefits, hazards and risks related to the use of sunscreens, more specifically UV filters, on both environmental and human health. This stakeholder forum resulted in a series of 3 webinars undertaken in order to provide a comprehensive assessment of the current situation, including indications on where the points of convergence and controversies are, as well as pointers for reasonable action dedicated to decision-makers. This publication condenses key messages learnt from the preparation and workshops held as part of the stakeholder forum, and has been further enriched with knowledge garnered from Green Cross interviews.

The benefits, hazards and risks of UV filters use on both environmental and human health have been widely discussed in more general fora, with positions often being very definitive and polarised. However, surprisingly, the scientific literature available on this topic is very limited, most of the time either scattered or focused on a very specific subject matter. As such, the information currently available is not necessarily ready to be used for the purpose of raising decision-making awareness, or to enable much-needed arbitrations in the matter.

Our rationale for action in this booklet is firstly to review the state of research, considering both availability and robustness of the information - focussing on the interactions between science, business, government and civil society. Secondly, our goal is to make proposals for a common advancement, stating what can be achieved in terms of consumer behaviour, evolution of regulations and value-chain transparency.

Our scope for action was to balance environmental and human health topics in every workshop, interview or discussion, taking controversies into account, while simultaneously focussing on scientific communication. In this way, our goal was to build consolidated science-based fuelling the development of parameters for action.

As for almost every subject matter in present times, the effects of global warming revealed themselves as a major topic to be encompassed in our work. This was particularly highlighted by the complexity involved in balancing the possible effects of sunscreens on the environment - with other sources of pollution which use similar substances in their formulation.

An element which became clear during this project is the extent to which the diverse array of scientific disciplines involved in this matter of sunscreens, environmental and human health, are lacking in interrelated communication. The importance of sharing a common vocabulary and of making a preliminary global picture assessment became, thus, all the clearer as a starting point.

We are very thankful to all the contributors to our workshops and interviews for their time, insights and dedication. We encourage every feedback or remark you might have to be reported to [contact@gcft.fr](mailto:contact@gcft.fr) – Although we paid high attention to our reviewing process, we also welcome you to transmit any error or imperfection you may find.

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Green Cross International, is a network of civil society organisations founded by Mikhail Gorbachev in 1993, dedicated to the environment and humankind. Green Cross France & Territories, the French branch, is presided by Jean-Michel Cousteau and directed by Nicolas Imbert. Its primary mission is to respond to the combined challenges of security, poverty and environmental degradation to ensure a sustainable and secure future.

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A PUBLICATION FROM GREEN CROSS  
FRANCE ET TERRITOIRES

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THANKS TO ALL VOLUNTEERS, CONTRIBUTORS AND  
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PROJECT TEAM GREEN CROSS:  
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PHOTO CREDITS EXCEPT MENTIONED OTHERWISE:  
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### Terminology used in this publication:

**Sunscreens:** UV filters, other ingredients and packaging

**UV filters:** organic and mineral ultra-violet filters used in the composition of sunscreens to prevent UV radiations from impacting human skin

**UVR:** Ultra Violet Radiations

**Sun protection:** includes all forms of protections against the effects of ultra-violet radiations on skin, such as sunscreens, but also clothing (hats, shirts...) and practices such as seeking shade in the warmest hours of the day.

THIS PUBLICATION WAS MADE POSSIBLE  
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# HUMAN & ENVIRONMENTAL HEALTH

## Why are sunscreens beneficial to human health?

In terms of facts and numbers, today, according to the World Health Organisation<sup>1</sup> and the World Cancer Institute<sup>2</sup>, one out of three cancers diagnosed worldwide is a skin cancer. Two to three million non-melanoma skin cancers and 132,000 melanoma skin cancers are diagnosed every year on a global scale.

**Each third cancer diagnosed worldwide is a skin cancer**

- Yolanda Gilaberte

Given this high incidence, the use of a protective element is clearly of paramount importance. Sunscreen products help to protect from skin cancer, as well as from skin burns and skin aging, thanks to the UV filters in their composition, which turn aggressive UV-rays into har-

mless heat. As such, one may consider that they are essential for human health and skin protection.

We are not equal with respect to sun hazard. More specifically, children's skin<sup>3</sup> is much more sensitive to UV radiation damage than adult skin is. Additionally, children experience higher exposure to the sun than adults, making it very important to adjust their sun protection to their exposure and skin type.

**Between 25 and 50 percent of the total erythema (or sunburn) dose that a person receives before the age of 60 years old is received during childhood**

- Sun Protection in Children: Realities and Challenges, Yolanda Gilaberte

### Why do we not simply avoid sun exposure?

Sunlight is known to have a wide array of positive effects on human health, such as mood improvement, immune system boosting, including enhanced vitamin D processing. It has also been demonstrated that sun exposure reduces the risk of heart disease<sup>4</sup>. This highlights the importance of exposing ourselves safely, in order to obtain all of these benefits, without risking sun-related skin damage.



**YOLANDA GILABERTE**

Head of the Dermatology Department at the Miguel Servet University Hospital

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<sup>1</sup>World Health Organization / [https://www.who.int/news-room/q-a-detail/radiation-ultraviolet-\(uv\)-radiation-and-skin-cancer](https://www.who.int/news-room/q-a-detail/radiation-ultraviolet-(uv)-radiation-and-skin-cancer)

<sup>2</sup>World Cancer Institute / <https://www.wcf.org/dietandcancer/cancer-trends/skin-cancer-statistics>

<sup>3</sup>Sun Protection in Children: Realities and Challenges, Yolanda Gilaberte

<sup>4</sup>Sunlight Has Cardiovascular Benefits Independently of Vitamin D, Richard Weller, © 2016 S. Karger AG, Basel 0253-5068/16/0413-0130\$39.50/0

## What are scientists and consumers reporting in terms of the potential hazards and risks of sunscreens?

The composition of the formula, as well as their impacts on human and ecosystem health, is increasingly scrutinised by consumers, especially with regard to the potential occurrence of endocrine disruptors. Some consumers are also more sensitive to the use of substances such as parabens, phthalates or silicon.

An article on the Measurement of Urinary Biomarkers of Parabens, Benzophenone-3 (UV filter) and Phthalates identified "a higher risk exposure in women and younger age groups on the disruption of hormonal balance that might have long-term consequences on their health".

Another exposure study<sup>5</sup> considered the chemical mixture of UV filters with other compounds; it evaluated associations between repeated measures of bisphenol A, chlorophenols, benzophenones, and parabens with female reproductive hormone levels. The study concluded "that low level exposure to mixtures of ubiquitous endocrine disrupting chemicals may play a role in altering reproductive hormone levels, with potential subsequent implications for hormonally-mediated diseases across the life course". The authors warned, however, that these findings must be interpreted with caution, and still await corroboration.

So far, only twelve studies<sup>6</sup> have worked on the impact of sunscreens on the marine environment; most of them focusing

solely on impacts on coral reefs. Nine of these studies report toxicological findings from 'no response' to a variety of biological effects on marine ecosystems.

A proper understanding of the fate of the components once in the environment is required for further impact studies and improved risk assessment models, but there is, as yet, no standard methodology, nor even efficient communication between scientific disciplines on the topic.

There is a difference between end-consumers, professionals and regulators regarding sun products.

Professionals and regulators focus on the impact of sunscreen formulae on the environment. As reported in the foreword, and although we have made it clear that sunscreens formulae are the core of this work, it has to be pointed out that there is a growing end-consumer interest for the full product – including packaging – as well as for usage and product life-cycle, in order to enable comparability with other daily-use products.

Our workshops identified that there would be a large added-value for all stakeholders if the information available on this issue was to be pooled. This entails establishing a common platform for the many, and diverse scientific studies performed on UV filters and ingredients, spanning both geographies and disciplines.

### PROPOSITION 1

**Setup a platform to regroup scientific studies and sunscreen-related content, including impacts on human & environmental health.**

<sup>5</sup>Exposure to bisphenol A, chlorophenols, benzophenones and parabens in relation to reproductive hormones in healthy women: a chemical mixture approach, EnvironInt. 2018 November; 120: 137-144. doi: 10.1016/j.envint.2018.07.028

<sup>6</sup>A Critical Review of Organic Ultraviolet Filter Exposure, Hazard, and Risk to Corals, 2021, Carys L. Mitchelmore et al.



# A COMPREHENSIVE APPROACH TO SUN PROTECTION

## Human and environmental health involve diverse disciplines and methodologies – further cooperation between them is desirable

Knowledge regarding human health is extensive, with a tremendous amount of scientific literature amassed, all of which benefits from regular updates. The importance of sun exposure in skin cancer rates, and the positive role played by UV filters in reducing them – specifically for children – has been largely documented. The risk / benefit ratio, when taking a broad angle approach, clearly leans in favour of sun protection, via the use of sunscreens, appropriate clothes, and moderating exposure levels. Even if historically, studies have been performed on white skins, recent studies and models include in their scope people of different skin pigmentation. Similarly, new studies take into account different levels of exposure as well as a wider age range.

Knowledge regarding **environmental health** is clearly more elusive. The number of studies is limited, most of them are relatively recent, and the possible areas of study are incredibly diverse, ranging from physico-chemical assessment, to impact on seagrass; from corals, to tropical seashore eco-systems to in-vitro proofing or life models.

Regarding both dimensions, human and environmental health, we have noted the wide variety of scientific disciplines impacted, the diversity of approaches, but also the communication barriers between them, and the need for holistic knowledge-sharing between studies and areas of expertise. An element which equally arose was the strong interest not to focus solely on sunscreens, but to anticipate or to envision the additional (or specific) impacts of UV as

compared with the variety of ingredients in our day-to-day life, which end in our skins, bodies, watercourses and seashores, and ecosystems. This diversity is perfectly illustrated by the study directed by Professor Carys Mitchelmore, from the University of Maryland Center for Environmental Science Chesapeake Biological Laboratory, which consolidated from an extensive and intensive literature review the current key findings, scientific data gaps and recommendations for future studies to assess the environmental risk of organic UV filters to coral reef ecosystems.

**According to our analysis, there is limited evidence to suggest that their (organic UV filters) presence is causing significant harm to coral reefs.**

– Carys Mitchelmore

The study further concludes that from a toxicological point of view, “it would be premature to conclude that environmental concentrations of UV filters do not adversely impact coral reefs”. The many data gaps currently existing in terms of reliable and relevant environmental exposure and toxicity, do not yet allow for final secure conclusions, nor recommendations. Still, the study highlights the urgent need for additional research, publication and coordination on environmental exposure and fate, toxicity testing and risk assessment.

Possible usage of safe UV-filters for personal care products in both Europe and the United States originates from a short-list provided by the regulators.

In addition to existing cross-industry regulations, which impact UV-filters and personal care product ingredients at different levels, some territories (on the national or federal state level) decided to take additional measures as per the precautionary principle, thus banning cer-

tain UV-filters. The regulatory impulse is welcome, however some measures can be redundant or even contradictory with superseding regulations, while others are additional. The knowledge on both the rationale for acting and the return on experience regarding the impact of the decision is still scattered, elusive and difficult to collect.

A side-effect of the substances ban reported by some manufacturers and scientists is also worth highlighting. Most of the time, the impact of substances (and notably of UV-filters) on the environment and on specific living organisms, is directly linked to a given concentration. In reducing the number of permitted UV-filters – and thus the diversity of UV-filters available at a local shop – we may act counterproductively, and in fact achieve a higher concentration of a specific sequence of UV-filter in the same environment. This might become a concern since some components currently labelled as “safe” might alter biodiversity differently if used in higher concentrations. This possible side-effect is yet another illustration of the need for a holistic approach encompassing not only the UV-filters, but also the full products and their usage, and anticipating the mutual effects of change in regulation, usage, product formulae and conditions of exposure.



**CARYS MITCHELMORE**

Professor, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, Maryland

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<sup>1</sup>A critical Review of Organic Ultraviolet Filter Exposure, Hazard, and Risk to Corals, Feb 2021, DOI: 10.1002/etc.4948

## Sunscreens are one of many potential stressors impacting marine ecosystems

All water returns to the ocean. And the ocean is subject to the combined effects of climate change, human activities and development, either direct or induced.

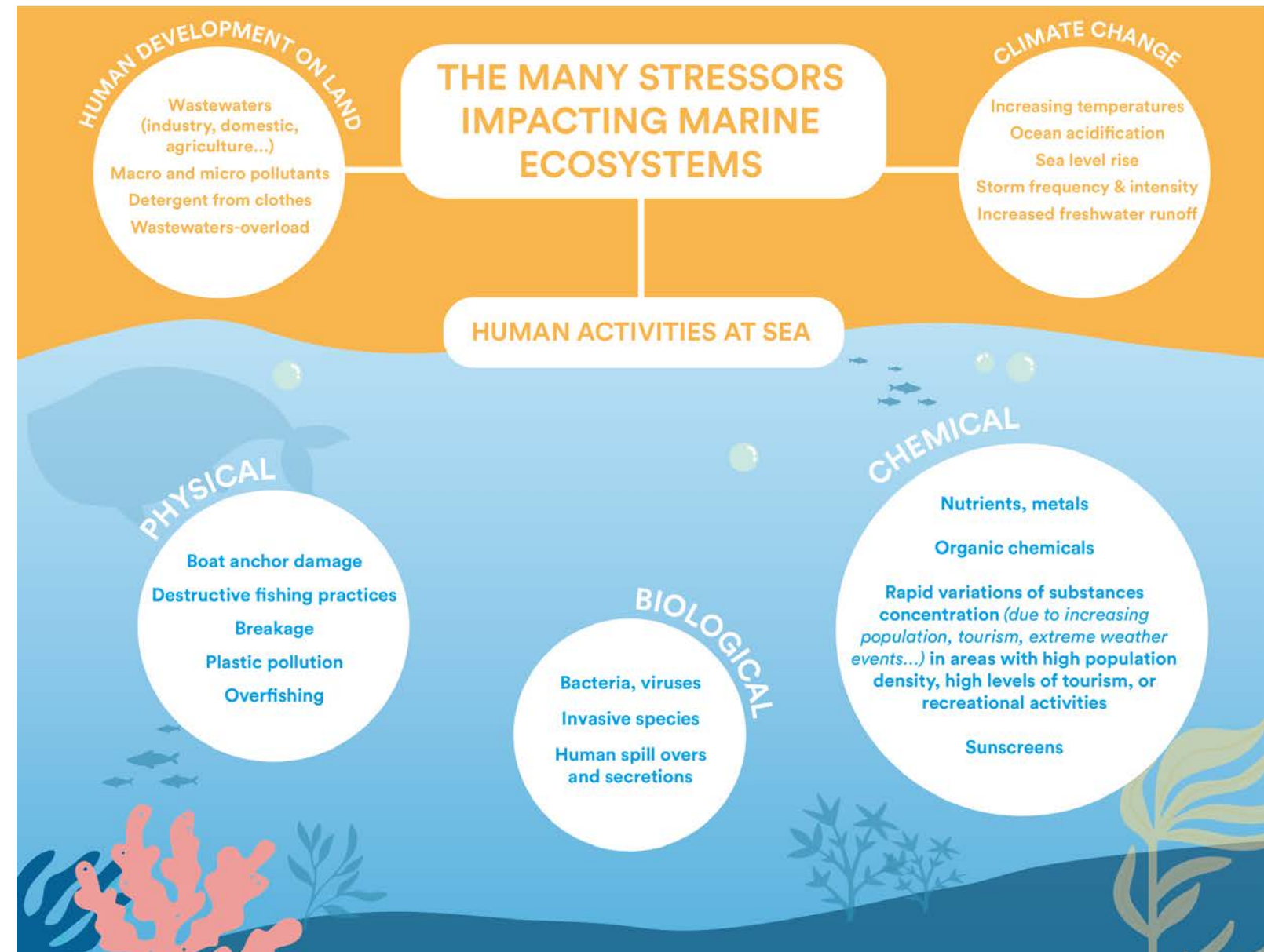
*This infographics outline some of the many stressors impacting the marine environment, and illustrate the imperative for an inclusive perspective when dealing with Ocean Health.*

For such reasons, the impact of UV filters on marine ecosystems has to be studied alongside other possible stressors. Hence, our workshop outlined the respective role of UV filters and other possible sources of impact. In this way, the aim was not only to establish the missing link on the provenance of UV filters (which are not only to be found in sunscreens, but also in other personal care products, clothes, plastics, coating...), but also to enable comparison with other stressors. The final goal being to combine response modes in order to end in sound priorities in terms of effective marine ecosystem conservation, while protecting human health.

## PROPOSITION 2

### Create a **cartography** of the different areas of study on UV filters:

- **Environmental health:** impact on seashore, freshwater, coastal ecosystems and biodiversity
- **Human health:** exposure, application of sunscreens and behaviours when using sunscreens.





# TOWARDS A HOLISTIC APPROACH OF HEALTH

## Humans, animals and ecosystems live on the same planet – *they share ONE health system*

Many systemic health approaches are currently gaining in popularity, bridging the gaps between human, animal and ecosystem lives. The recent propagation of zoonosis (including SRAS, MERS and Covid-19...) has illustrated the interconnections and common destiny between the health of humans, animals and ecosystems. In view of this, our workshops investigated the conceptualisation of systemic health approaches, and specifically the “One Health” approach, as presented by Professor Jakob Zinsstag.

**Cooperation leads to benefit, there is an incremental benefit of working at both human and environmental levels**

- Jakob Zinsstag



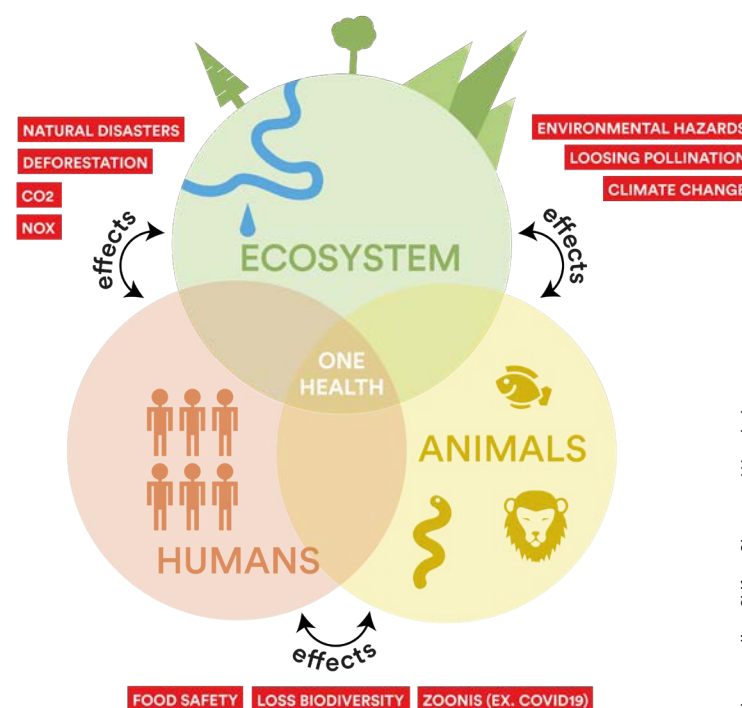
JAKOB ZINSSTAG

Professor of Epidemiology and Deputy Head of the Department of Epidemiology and Public Health at University of Basel, Switzerland

### PROPOSITION 3

**Interactions between sunscreens, human, animal and ecosystems health to be modelled through a holistic approach.**

### Holistic approach of health



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## How can a global health approach support or streamline comprehensive assessments on how sunscreens affect human, animal and ecosystem health?

### PRESENTATION OF THE “ONE HEALTH” APPROACH & ITS APPLICATION BY JAKOB ZINSSTAG

**One Health is a global strategy to develop the interdisciplinary collaborations for human, animal, and environmental health. It promotes an integrated, systemic and unified healthcare at the local, national and global scales, in order to better deal with emerging diseases of pandemic risk, but also adapt to present and future environmental impacts.**

The **theoretical foundations of One Health**, are built upon necessary and sufficient requirements:

- Recognition of the inextricable linkage of human, livestock, companion animal and wildlife health with the environment
- Added value of closer cooperation of human and animal health:
  - Social resilience and environmental sustainability,
  - Better anticipation of risks,
  - Economic benefits.

### One Health as it may applies to sunscreens

UV filters contained in sunscreens are substances which have effects on both humans, animals, and ecosystems. Therefore, they form an optimal test case for a switch from a human-centric perspective (anthropomorphism) to a more holistic approach (biocentrism).

The *One Health* concept closely links these two approaches in every interaction loop, and encourages its users to:

- Coordinate research and operations towards products (understood as full formulae with packaging and common-sense use cases) leveraging biocompatibility and minimising their impact all along the usage chain,
- Encourage systemic design involving scientists from a diverse range of disciplines, and develop bridges with comparable industries and use cases,
- Consolidate a standard way of exchanging with consumers and

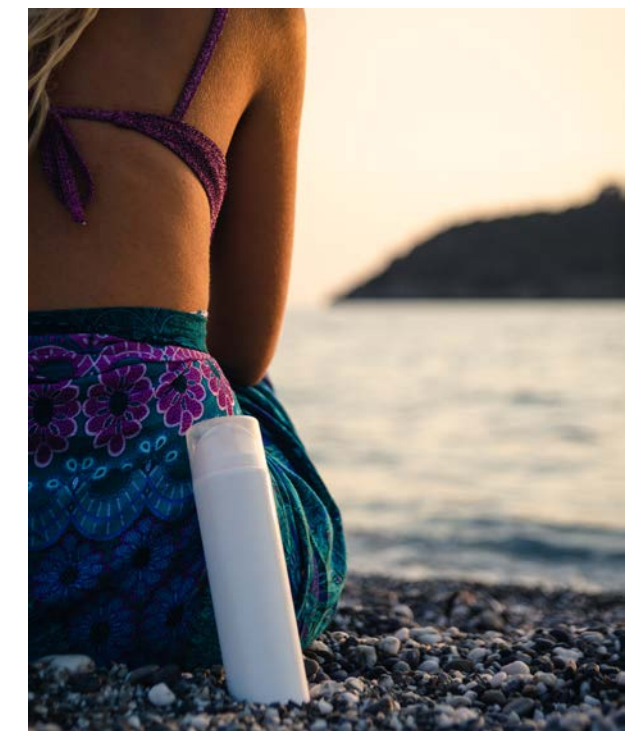
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stakeholders on the benefits and risks.

**Which are currently the different holistic approaches being developed?**

The need for a multidisciplinary analysis of health has led to the development of many innovative approaches with different maturity levels. In addition to the One Health approach here depicted, there are also other noticeable approaches:

- **Global Health**, analyses human-health on both an individual and a community-scale basis, including physical and mental health, economic disparities, and individual and community well-being. It is a human-centric holistic approach, open to ecosystems.
- **EcoHealth** analyses environmental risk factors and their impact on human health. The risk model is built inside the approach, and models the environment as per what it means to humankind.





# OUR PROPOSITIONS FOR ACTION

## PROPOSITION 1

Setup a **platform** to regroup **scientific studies** and sunscreen-related content, including impacts on human & environmental health.

## PROPOSITION 2

Create a **cartography** of the different areas of study on UV filters:

- **Environmental health:** impact on seashore, freshwater, coastal ecosystems and biodiversity
- **Human health:** exposure, application of sunscreens and behaviours when using sunscreens.

## PROPOSITION 3

Interactions between **sunscreens, human, animal and ecosystems health** to be modelled through a **holistic approach**.

## PROPOSITION 4

Create a cause-and-effect diagram of impacts **upon the water cycle**, putting the various stressors into perspective so as to establish a holistic overview of the situation:

- Sunscreens and UV-filters (including UV filters present in other products)
- Water treatment, sewage and plastic pollution
- Tourism and overfishing
- Global warming: ocean level rise, acidification and impact on biodiversity.

## PROPOSITION 5

Develop the **conversation about human and environmental health between science, the public and decision-makers** through the consolidation of an **information guide on sunscreens** and a complementary **social network or a Wiki page**, including to share new research and identify gaps in current research.

## PROPOSITION 6

Create a **cartography of UV filters** & substances in sunscreens, with a focus on EU / US regulations, including information about:

- Authorised and banned substances
- Individual ingredient testing vs complete formulae testing
- Geographical area
- Projection of change within a 5 year range.

## PROPOSITION 7

Draft a “**Not environmentally harmful**” label, backed with studies and science, in a way that adds information incrementally, and consistently, in a system-wide approach.



# CHANGES IN CONSUMER BEHAVIOUR

**There is momentum to move forward on science-based principles. Consumers are willing to protect both their health & the environment, seeking for information and transparency so that they can make their own choices in full awareness.**

Consumers have a growing interest for the products they are choosing and using. They are desirous of information, either via online literature or apps, but this information is frequently scattered, difficult to access, and potentially biased, which a non-expert consumer risks being unable to detect. Consumers also call out for tangible action regarding ocean and water preservation, including getting rid of plastics and single-use components.

**An interesting point is the difference between compliance and confidence, we are hearing people from the industry telling us their products are safe, and, other side, we are seeing consumers looking out for regulatory guides to learn: how can we use sunscreens? What are the impacts on human and environmental health?**

– Nicolas Imbert

Environmental health in general is becoming a rising concern for all stakeholders: citizens, governments, industry professionals, and the scientific community. This growing concern may be seen as fortuitous, but it implies a need to fuel this interest with science-based education, so that research, data, and facts may be explained in their integrity to the consumer. A holistic and multidisciplinary approach to science-based communication is essential to avoid the spreading of either fake news or non-verified data that may lead to non-productive or even counterproductive actions.

Companies are evolving quickly to respond to this shift in consumer demand. More and more brands take a stand for the planet, making long term plans to reduce their impact and develop eco-friendlier products for their

customers. Companies are also self-controlling in their communication to establish a transparent conversation with their customers, in terms of product benefits and risks. The enthusiastic greenwashing – and even “blue washing” – of products was reported early-on by whistleblowers, having thus had a counterproductive effect to the one originally intended.

**The public debate and decision-making process should be driven only by science, fear should not lead the debate. We need to focus on science in the decision making process in order to deal with uncertainties**

– Gerald Renner

However, there are currently mainly non-standardised, difficult to assess, self-claimed “ocean safe” labels, bringing more confusion than clarification to the conscientious consumer.

In order to avoid the multiplication of more or less scientifically validated labels that may lead to consumer confusion, it would be valuable to develop a worldwide label for environmental security on sunscreens, which would be updated every year with the new results from international research upon the subject and thus fortified with time.

**We shouldn't set human and environmental health in opposition. The industry's responsibility is precisely to communicate on this issue to explain how the risks are assessed in order to ensure that our products are safe both for our consumers and the environment, and to give consumers clear ad-**

**vice for proper usage and improved skin protection. We should be clear in our messaging, but also didactic in order to avoid misinterpretation overly complex messages**

– Veronique Poulsen, Head of Environmental Safety at L'Oréal

## Consumer protection dilemma: protecting yourself or the environment?

Often described as harmful for the environment, some consumers find themselves facing the sunscreen dilemma: divided between the need for skin protection and their will not to harm the environment. As Franz Trautinger said in our first webinar “Protecting your health should come first when exposed to the sun, as skin cancer is one of the most common cancers worldwide”. Dermatologists also warn against the development of «recipes» for personal manufacture, following the «do it yourself» trend. Indeed, the protection offered by «homemade» creams is often insufficient.

**Humans are a part of the environment. I think the concept could be excellent to talk with people about sunscreens' consequences. The concept would be to educate people about sunburns and premature ageing. But, the most important issue is that people don't understand how to use sunscreens.**

– Joe DiNardo,

**Most people don't know how much sunscreen is good for them. But the objective isn't to stop using sunscreens, but instead to find the correct dose.**

– Maja Brozovic

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## Science-based principles is the repository to build this momentum upon

In order to move forward and build momentum on science-based principles, we have highlighted the need to see things from a holistic angle. This concept also applies when considering the impact of UV filters on both human and environmental health, and we have seen with ‘One Health’ that human, animal and ecosystem health are closely linked.

To realise how impactful UV filters are on the health of ecosystems, we need to be able to put their effects into perspective with all the other stressors impacting the marine environment through the water cycle. Proposition 4, below, focusses on this point:

### PROPOSITION 4

**Create a cause-and-effect diagram of impacts upon the water cycle, putting the various stressors into perspective so as to establish a holistic overview of the situation:**

- Sunscreens and UV-filters (including UV filters present in other products)
- Water treatment, sewage and plastic pollution
- Tourism and overfishing
- Global warming: ocean level rise, acidification and impact on biodiversity.

**We need to put the sunscreen stressor in perspective with the other stressors impacting the marine environment (climate change, plastic pollution, overfishing, and pollution from human activities...)**

– Serge Planes



# THE CONVERSATION BETWEEN SCIENCE, THE PUBLIC AND DECISION-MAKERS

**Towards an “agora” for science and decision-makers to exchange their information and return on experience, for whistle-blowers to interact with, and for consumers to be aware of and relay concerns to.**

Scattered information, scientists' difficulties to share transversally, lack of reliable data sets for decision-makers to build regulations upon, are currently reporting as the main difficulties to organise successful conversations, in every part of the world.

Levels of maturity can be different between the subject matters of human and environmental health. Regarding human health, many sectoral insights, content and data exist, and the main challenge is consolidation and consistency.

Regarding environmental health, the level of available data is much lower, the respective role of UV-filters as compared to other possible ocean stressors is not necessarily characterised, and the in-vivo and in-vitro models are not yet stabilised. For such reasons, we deliberately decided in this section to focus on what we consider as the most urgent need for a consistent science-based conversation,

i.e. to leverage information available and knowledge sharing with an emphasis upon environmental health.

For Scott Dyer, Chair of the Department of Biology at Le Tourneau University, it is critical to understand UV filter exposure and its sources. According to him, for most people, the thought of UV filters is equivalent to sunscreens. However, UV filters are used to protect inanimate objects as well as other product attributes, such as cosmetics and hair dyes. What this means is that UV filters can enter aquatic systems through means other than through sunbathing and beach activities. Thus, understanding exposure and its sources is critical. If we decide to contain the discussion to the beach, then we must understand the relative sensitivities to UV filters of diverse aquatic organisms. Compared to what is understood regarding the hazard of chemicals to freshwater organisms, the marine system is in need of a lot of inves-

tigation. Unfortunately, this is not just with regard to UV filters, but nearly all chemicals.

Related to the previous point, most water quality criteria are based on an extrapolation of toxicity data from toxicity studies conducted in a lab environment. What is needed is a complementary dataset related to the ecological status of aquatic organisms in areas of potential risk, such as beaches and locations near wastewater outfalls. Such data would provide the “so what” test since it enables an eco-epidemiological assessment integrating toxicity, exposure and ecological monitoring data.

Maja Brozovic proposed to create two different booklets, one intended for the general public, highlighting best practices to protect ourselves and the environment. The other for a scientific audience, focussing on shared knowledge and on questions to investigate in order to support new ideas and future studies. She also suggested the idea of creating a third booklet in the future directed towards children.

Todd Gouin, considers that if the information guide is to be used by decision makers in relation to environmental health, it would require an improved understanding of the environmental release, mobility and fate of UV filters. He also reminds us that due to the hydrophobic nature of the majority of UV filters used in sunscreen products, the environmental fate and mobility in the aqueous phase is likely to be strongly influenced by interactions with organic matter in the marine environment.

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**From our sequence of stakeholder meetings, it became clear that most practitioners desire, in priority, to have unambiguous science-based answers to the following questions:**

- How do UV-filters work?
- What is the seashore ecosystem?
- What are the consequences of global warming on exposition levels / sun protection?
- What is the framework for certified products and safe usage?
- How can we make it happen now?

On top of this relatively generic requirement, being able to more precisely sort out the respective role of UV-filters as compared to other ocean stressors is a key priority. Similarly urgent is the requirement to put local, national and supra-national regulations in relation with science outcomes. This is important so that we may have use of a common, up-to-date repository; so as to be able to better identify the connection between the regulation and the science rationale behind it; and so as to verify the effectivity of such measures in terms of return on experience.

## PROPOSITION 5

**Develop the conversation about human and environmental health between science, the public and decision-makers through the consolidation of an information guide on sunscreens and a complementary social network or a Wiki page, including to share new research and identify gaps in current research.**

## PROPOSITION 6

**Create a cartography of UV filters & substances in sunscreens, with a focus on EU / US regulations, including information about:**

- Authorised and banned substances
- Individual ingredient testing vs complete formulae testing
- Geographical area
- Projection of change within a 5 year range.

Using this information and cartography, it would be possible not only to share the status of knowledge on a given issue, but to initiate debates, and to foster a social network or Wiki page. This medium would mobilise and animate a community of practice. The point being not only to outline priorities and opportunities for further collaborative research, but also to enable the identification of gaps in the current research, as well as to further develop the conversation between science and decision-makers

## How to ensure a platform leads to a stakeholders' conversation?

For Scott Dyer, the success of such a platform will depend on who contributes to it, even if in concept, creating a social network to share a community of practices has a great appeal. For him, this platform could be credible if NGOs and a community of experts were involved, as it could greatly expand datasets and perhaps speed up a more appropriate decision-making process.

A concern he has with this approach is how political such a Wiki could become, as we are living in an era of polarisation where certain views are not given credence, whether rational or not. Hence, if there were a body of experts that oversaw the Wiki – coming from diverse interest groups – the probability of its being used appropriately would largely increase.

Getting new ideas or observations out into accepted science typically follows the peer-review system, which Dyer naturally subscribes to as an editor for an environmental journal. However, if a well-run Wiki enables new ideas to gain attention more swiftly, then this could serve as a complement. For example, regarding eco-epidemiology – a Wiki could enable ecological status observations from trained amateurs to be included without delay into research. For Maja Brozovic, adding a grading tool on the Wiki could be interesting in order for experts to review the veracity of the information shared. It could also be useful to set up a vote system to put on top of the Wiki page, where the gaps in current research could be identified so that they could be focussed upon next.

**Creating a social network would definitely be interesting for consumers, but would also be valuable for policy-makers to have an overview of current questions and discussions. Some educational pages are already available, supported by digital tools, such as the EcoSunPass and the Sunscreen Simulator, which analyse each UV filter for certain properties as a help for sunscreen formulators. Open access publications could also be linked for deeper information on new scientific results.**

– Mechtild Petersen-Thiery



**MECHTILD PETERSEN-THIERY**

Product Stewardship Personal Care, UV Filters BASF

## THE MORE WE KNOW, THE LESS WE ARE SURE OF OUR CONVICTIONS THE DUNNING-KRUGER OR OVER-CONFIDENCE EFFECT

Psychology research demonstrates that individuals who know a small amount about a topic can have very strong convictions; the more they learn about the topic, the less affirmative they are in promoting one single way forward.

The Dunning-Kruger effect also explains the fact that many on- and offline press, as well as social media relay and spread fake news, making it very complicated to distinguish between a genuine alert and a rumour. The individuals – or groups – having recently discovered a given topic can be very convinced and vocal in propagating their arguments, thus making it difficult to access the more structured and subtler knowledge of expert communities.

A key means of overcoming this very common psychologic bias is to engage in subject-matter conversation making sure everybody is sharing the same words and grammar, but also the same set of basic concepts. This is particularly key when dealing with a holistic topic regarding which every specialist will be a partial expert in, but to understand the whole will need to interact with disparate areas of expertise.



# A LABEL FOR NOT ENVIRONMENTALLY HARMFUL SUNSCREENS

## What could such a label contain?

What would be the main criteria that have to be fulfilled in order to gain the label? To start answering this question, it is interesting to examine existing labels used by cosmetic products, such as Nordic Swan or the European Eco Label.

Before introducing these two models, our readers have to take into account the fact that the latter consider cosmetic products as full products. This statement highlights the need for a specific label regarding cosmetic compositions as an issue in its own right, a label that has yet to be developed – the whole point of this section.

Nordic Swan Ecolabel, used in the Nordic countries, creates “sustainable solutions based on a life cycle assessment and an overall goal to reduce the environmental impact from production and consumption of goods.” It is a very highly recognised

label in Nordic countries, with nine out of ten Nordic consumers knowing the Nordic Swan Ecolabel – and half of these looking for it when they are shopping.<sup>1</sup>

The EU Eco label is “a label of environmental excellence that is awarded to products and services meeting high environmental standards throughout their life-cycle: from raw material extraction, to production, distribution and disposal. The EU Ecolabel promotes the circular economy by encouraging producers to generate less waste and CO2 during the manufacturing process.” Today, 77,000 products and services hold the EU Ecolabel.

As we see from these two examples, the Life Cycle Analysis is probably the starting point from which to develop products, and should be included in any process of new labelling on sun-care products. Differences between tools used in assessing environmental risk relative to those used to assess life-cycle impact may be a good starting point. ISO (International Organisation for Standardisation) standards could also be a way forward, and worth including in the development of an environmental safety product label.

## What do we mean by “not environmentally harmful”?

Everything is harmful at some concentration. So when we state “not harmful”, we mean it within a set of standardised exposures that correspond to a specific environment in which we are testing a substance. The main goal with this label would be to define which harm is caused, and on which environment.

Such a label would need protocols relative to exposure, toxicity and eco-epidemiology in order to provide a thorough risk assessment. Each component should be tested according to these protocols, and analysed within the overall life-cycle of the full product, i.e. sunscreens.

Specifically looking at UV filters, we would need eco-toxicity assessments on species-sensitivity distribution and bioaccumulation, coupled with eco-epidemiology and exposure assessments of each filter. The latter being where we are missing models that incorporate the complexity of the diverse aquatic ecosystems.

The development of a label identifying UV filters as “not environmentally harmful” could represent a goal for an additional stakeholder discussion.

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<sup>1</sup> <https://www.nordic-ecolabel.org/why-choose-ecolabelling/>

## PROPOSITION 7

**Draft a “Not environmentally harmful” label, backed with studies and science, in a way that adds information incrementally, and consistently, in a system-wide approach.**

## Should we start labelling sunscreens with respect to coral or reef safety?

Most of the experimental studies have been lab studies only, which may not accurately represent what happens when sunscreens are actually in the water at a beach near a reef. Most field studies of UV filters contained in sunscreens look at environmental concentrations in water, sediment and organism tissues.

In order to work on a label for environmental safety, when looking specifically at corals, we are missing science on two types of study: larval exposure in lab and in the field, and field studies of UV filters effects on corals in their environment.

**Create best practice is my recommendation to industry: innovate so as to have full products you can prove to the end consumer as being perfectly safe for ecosystems and human health. Being first could be good for your business and for everybody. Don't assume consumers are uninformed, and be ready to change quickly. If you don't want to shut shop in a few years, you have to go for it!**

- Jakob Zinsstag

**Science directly feeds marketing. Marketers need to use education and transparency in order to reach their customers. Scientific knowledge and product limitations can only be clearly expressed to a wider public in a more simplified manner.**

- Emmanuelle Roturier



EMMANUELLE ROTURIER

Researcher on sunscreen usage



# SPECIAL THANKS

## to our contributors and partners



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Member and Adviser at the European Economic and Social Council. He co-authored a public report on the role of advertising and its consideration of ecological transition. He is also a scientific collaborator at the Earth and Life Institute in Belgium, and was commissioned by the Belgian government for a report on product sustainability.



**CARYS MITCHELMORE**

Expert in environmental health and aquatic toxicology, her research focusses on understanding the exposure to, fate and effects of pollutants. Her research is directed towards the detection of chemical contaminants and understanding their routes of exposure, uptake and bioaccumulation, metabolism, mechanisms of toxicity and implications to organism and ecosystem health.



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A 25-year experienced ecotoxicologist, she joined L'Oréal in November 2017, as Head of Environmental Safety where she ensures the environmental safety of the compounds used in L'Oréal's formulated products according to worldwide regulations. She also works with environmental advocacy within and for L'Oréal.



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Following business school, and complementary training at the French school of perfume and cosmetics ISIPCA, she joined L'Occitane Group as product development manager, and developed in parallel a strong interest for sun protection.



**RICHARD WELLER**

An academic dermatologist at the University of Edinburgh. His major research interest is on the effects of UV radiation on systemic health. His research, by identifying vitamin D independent benefits from sunshine has brought about a reconsideration of the risks and benefits of UV exposure.





A PUBLICATION FROM  
GREEN CROSS FRANCE  
ET TERRITORIES

NUMBER 04

# INSPIR/ actions

SEPTEMBER 2021

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