

Welcome to the first newsletter of the ECsafeSEAFOOD project. In this issue:

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Introduction to ECsafeSEAFOOD:

The overall objective of ECsafeSEAFOOD is to assess safety issues mainly relating to non-regulated priority contaminants present in seafood as a result of environmental contamination (including those associated with marine litter). The project will evaluate the impact of these contaminants on public health, in order to increase seafood safety and reduce human health risks.

The fourth coordination meeting took place in Hirtshals, in Denmark (19 and 20 of June 2014). Here, project partners presented the progress which has been made in monitoring selected priority contaminants in seafood species, and in developing reliable and cost-effective detection tools for those contaminants. Recent work carried out as part of ECsafeSEAFOOD includes a consumer survey, designed to help the partnership to understand consumer preferences and concerns with regard to seafood safety, which collected nearly 3,000 survey responses from Ireland, Belgium, Italy, Portugal and Spain.



Interview with Dr António Marques (IPMA), ECsafeSEAFOOD coordinator



Can you explain to a wider audience, whose knowledge on environmental contamination may be limited, why a project like ECsafeSEAFOOD is important?

Although seafood is recognized as a high quality, healthy and safe food, some can accumulate environmental contaminants with potential impact on human health. Seafood is currently controlled by efficient monitoring programmes for certain environmental contaminants (e.g. Pb, Hg, Cd, toxins) that provide crucial information for management and risk assessment purposes. However, little information is available for contaminants without maximum limits set by authorities, such as toxins from harmful algal blooms, marine litter, endocrine disruptors, pharmaceutical and personal care products, inorganic As, organic Hg, and brominated flame retardants.

Therefore, in order to increase safety of seafood for consumers and reduce human health risks, ECsafeSEAFOOD aims to assess safety issues mainly related to non-regulated priority contaminants present in seafood as a result of environmental contamination and evaluate their impact on public health. The project aims to implement monitoring, detection, mitigation, toxicological and risk assessment tools to accurately quantify and minimize human health risks, increase consumer confidence in seafood and promote seafood consumption in Europe in a conscientious way.

What types of seafood species consumed in Europe will you focus on?

Explain the reasons behind this selection. In the initial phase, case study species were collected in European areas subjected to strong anthropogenic pressure and expected to have higher levels of contamination. These species include clams, mussels, mullet, flounder and macroalgae. Concerning toxins, other species will be sampled, such as microalgae (*Gambierdiscus* spp and *Ostreopsis* spp), fish (*Seriola*, *Lutjanus*, Grouper, *Caranx*), echinoderms (sea urchins) and Several bivalve species (mussels, oysters and clams). The criteria used for selecting target species were the following: a) may potentially accumulate high concentrations of chemicals; b) have a wide geographic distribution; c) are easy to identify; d) are abundant; e) are easy to capture; and f) are large enough to provide adequate tissue for analysis. This initial approach enabled the identification of non-regulated priority contaminants that should be selected for further screening.

In the second phase, commercially available seafood species were sampled in different seasons and geographic locations. These include mussels, plaice, sole, tuna (fresh and canned), hake (Atlantic and Pacific), monkfish, Nile perch, pangasius (farmed), cod (Atlantic and Pacific), mackerel (fresh and canned), brown crab, shrimp (*Penaeus vannamei*; farmed), octopus, salmon (Scottish and Norwegian; farmed), seabream (farmed), macroalgae (*S. latissima* and *Ulva lactuca*). These seafood species were collected in order to cover the European coast from Mediterranean to North Atlantic (including Macaronesia), according to the consumption relevance in Europe, origin (wild, farmed and imported), trophic level, habitats and ability to biomagnify/bio-accumulate contaminants. To assure that specimens are from at least two different batches, the commercial sampling activities were performed in different seasons.

In terms of the project itself, can you outline how the collaborative element between the partners will work?

The ECsafeSEAFOOD project is constituted of 18 well-known institutions with different areas of expertise. To make optimal use of the skills of all partners, the project

was divided into 8 work packages. For each WP a leader was appointed to coordinate and supervise the WP tasks, ensuring strong links and constant contact with the task leaders. The task leaders manage all details of the different tasks daily and send the information to the WP leader. Three decision-making committees were also created: Governing Board, Project Coordinator and Management Team with the responsibility of formulating, deciding/choosing, prioritizing and evaluating cross functional decisions/strategies, and correcting any deviation from planned actions. To interact and help the Governing Board in the decision making process, 7 advisory committees were created, covering the different areas: scientific, industrial, sampling, intellectual property, communication, ethical advisory and marine toxins. These advisory committees are composed of experts who assist, advise and establish close links in specific issues of their area within the project. The collaborative research amongst the consortium partners is strongly promoted in order to accelerate accomplishment of objectives. The ultimate decision-making responsibility within the project lies with the Governing Board, which represents the interest of all partners. The Governing Board meets every 6 months, to monitor the results obtained and decide upon activities for the following period.

What do you perceive will be the most challenging aspects both to this project as a whole and to your role within this project?

The most challenging aspects to the ECsafeSEAFOOD are its very ambitious objectives, the diversity of partners' backgrounds and the large number of participants in the consortium. Overcoming this will require a highly structured and excellence-oriented management system to guarantee that the risks will be continually monitored and minimized. The most challenging aspect of the coordinator role will be to guarantee full participation and involvement of all partners in order to ensure that the objectives are met in a timely and efficient way. Another challenge will be maintaining high levels of motivation in partners and efficient/effective communication and collaborations between the partners.

What will your priorities be for the upcoming months of the project?

My priorities for the upcoming months of the project will be: a) to ensure that the deliverables, milestones and periodic reports are prepared within the deadlines set in the DoW with the contribution of all partners; b) motivate partners

to ensure that the resources are adequately managed in a cost-effective way; and c) ensure close and effective collaboration between the partners.

What are the potential implications of this project, both in terms of societal implications and future research potential?

ECsafeSEAFOOD will have several tangible societal and economical impacts. It will present scientific breakthroughs through monitoring of non-regulated chemical contaminants, risk assessment, toxicity, links between contaminants in the environment and that in seafood and effects of climate change.

Probabilistic exposure assessment and risk characterisation for priority contaminants in seafood will not only help to identify the contaminants which accumulate in seafood at dangerous levels, but will also allow regulatory authorities to implement more realistic risk characterisation of the toxicology of contaminant exposure and effects to human health.

The development of fast screening detection systems for target contaminants in seafood will bring technological innovation not only to scientific community, but also to food safety authorities, food producers and processors, since it will improve the analytical performance and reduce costs. The development of these detection tools will help to ensure safe, high quality seafood to consumers and will enhance European competitiveness and innovation of food-producing and processor SMEs.

The project will have positive economic effects as a result of its promotion of seafood consumption throughout Europe in a conscientious way. ECsafeSEAFOOD aims to increase consumer awareness and confidence about the safety of seafood and its importance for human health as well as improving education, increasing employment, improving nutrition and increasing the sustainability of an important food sector. This awareness will be promoted through the project's online information tool. The project's EU funding ensures that capabilities are pooled and results are validated and disseminated throughout Europe and beyond.

Work Package 8 Highlights

Management is a crucial and challenging task in a large project such as ECsafeSEAFOOD, which comprises 18 partners from 10 European countries. The partners have been deeply involved and cooperative in all requested activities within WP8, as illustrated by the attendance of more than 90% partners in the four coordinating meetings taken place so far, as well as by the successful accomplishment of objectives in all WPs (all deliverables scheduled to date have been successfully accomplished).

The project is based on seven proactive advisory committees targeting crucial components of the project: scientific, industrial, ethical, communication, intellectual property right, sampling and marine toxins. These committees form the basis the Governing Board's wise decision-making. The implementation of 2-monthly scientific report and a 6-monthly financial report have been extremely useful in

enabling the partners to track advances in all WPs and the status of expenditures. The IPR and dissemination issues have been carefully addressed by a group of enthusiastic professionals with strong expertise in these fields.

The 6-month periodicity of the coordination meetings have ensured closer links between partners and encouraged faster advances in the projects as well as immediate implementation of corrective measures whenever necessary. Such meetings were combined with several Skype meetings between the partners to speed up the decision making process in the project. The project's positive working environment has lead to the accomplishment of several collaborations and visits between the partners, as well as common publications of research activities undertaken. The project will face new challenges in the coming months that will no doubt be overcome by the partners in an efficient way.



Interview with Dr Johan Robbens (ILVO), Work Package 1 leader

Can you briefly outline, to a wider audience, what your work package aims to achieve and why it is important in terms of the overall aims of the ECsafeSEAFOOD project?

I am responsible for Work Package 1 which involves the set up of a database containing information about chemical contaminants which affect seafood safety. A risk ranking of the contaminants is also carried out in this work package, with the ultimate aim of selecting the most important and relevant contaminants found in seafood. We then look into how toxic these chemicals are and from which level these toxic effects are evident. Based on this information, we select the most important chemicals to be analysed as these signify a potential risk for the European (seafood) consumer. It is only relevant- from a food safety point of view- to analyse chemicals that are present at levels close to the effect level.

Although I am the coordinator of this work package, most of

the work is done by Griet Vandermeersch, who is doing a PhD on chemical seafood contaminants

Outline the criteria used to select the list of contaminants to be targeted in ECsafeSEAFOOD.

We use different criteria to select the contaminants. In the risk assessment process we look at two aspects, the first of which is the concentration of the contaminants. This information is based on literature search, analysis, reports, etc. We also look at the effect or toxicity of the contaminants, i.e. level at which you can expect an effect. Effect data on humans are very scarce, so we use all kinds of toxicity data to try to extrapolate the potential risk for humans. It is the balance of these two aspects in the risk assessment process that is central to finally selecting the contaminants. The ultimate selection is finally approved via 'expert judgment' at a partner meeting.

Has the process of selecting priority contaminants presented scope for future research?

Indeed the selected priority contaminants open new routes for future research. The selected contaminants will be the scope of the future research in the different work packages as the ECsafeSEAFOOD project progresses. They are also the model compounds for biosensor development (work package 4) and for toxicity studies (work package 5). Sensitive analytical methods will also be developed for these contaminants.

Also, the approach of the project is unique. We use a complementary approach (selection, analytical methods,

biosensor development, toxic studies - all on the same contaminants). For most partners, this will be a novel technique which will be used again for further research.

Contaminants originating from harmful algal blooms (HABs) and those associated with marine litter have been specifically mentioned as priorities for this project. Explain why these are especially relevant.

HABs are a significant threat for European consumers. Because of climate change, and subsequent HABs, algae that were not present in some of our European seas in the past could potentially be present now. Therefore it is very important to closely monitor the 'emerging marine toxins' that might endanger food safety of European consumers. Marine toxins are therefore also an important issue in our developed database. Regarding marine litter (and microplastics), it is a very recent concern, and for the moment a lot of questions are still open about the potential dangers. For some species (like mussel) microplastics have already been observed. The potential threat is that microplastics might transfer in the food chain. The picture of marine litter and microplastics is very complex.

Effects of microplastics might be caused by the (plastic) polymer (e.g. PE, PVC, Nylon). It may also be a result of its size. This is mainly an issue with micro- and nanoplastics where the size of the particle- irrespective of the polymer itself might have another effect. Effects may also result from its chemical load. Plastics are hydrophobic particles that can accumulate all kinds of persistent molecules. Effects might also be due to the microbial load of the plastics (i.e. some bacteria might adhere to the plastics). A combination of all these effects may also contribute, so you see it is a complicated issue, and important enough to monitor this for the European consumer.

How have you been collaborating with other project partners on this work package?

I am very happy about the collaboration with the different other partners. We have a project meeting every six months. This might seem frequent, but it is the perfect way to get to know each other better. We are also in regular contact via mail, Skype, teleconference, etc. Plans have also been made to exchange (young) scientists between different partners to intensify the collaboration.

As for our specific work package, we relied on the different partners to input their data in the database. All partners- despite their often busy schedules- have managed to input their data, and we are very grateful to them.

What is the most significant task in your work package? What is coming up for this work package in the future?

The most significant task in our work package is the ranking and prioritization of the contaminants in a database. This was the first milestone. Now, it is important that we keep our database up to date. The ultimate aim is that at the end of the project, we will have an up to date database, and that people are trained so that once they have important data about food safety of seafood, they put it into the database. At the end of the project, we hope our database will be an important asset for food safety issues.

Work Package 1 Highlights

In work package 1, we have developed a database that includes all relevant data (e.g. concentration, effects, PBT-criteria etc.) for seafood from a risk-assessment point of view. Partners received a username/password and are able to login and insert data. At this point, 2909 contaminant reports have been added to the database. According to the available information, contaminants were classified based on 1) concentration levels in seafood/biota and 2) toxicity effects. Subsequently, the contaminants were ranked and prioritized. Based on these ranking lists, the hotspot results of WP2 and on expert judgment, a final selection of approximately 40 contaminants was extracted from the database.

These selected contaminants are the basis for the further progress of ECsafeSEAFOOD. The occurrence of the selected contaminants in seafood will be determined (WP2) and the toxicological impact of relevant contaminants will be assessed (WP5). Additionally, innovative devices will be developed for the rapid detection of emerging contaminants in seafood (WP4). Once all the required information is gathered, risk assessment will be performed (WP3) with the aim to mitigate the risk for human consumers.

ECsafeSEAFOOD TEAM PROFILES



**SILKE JACOBS
(PHD STUDENT, UGENT)**

Silke is a PhD student working at Ghent University under the supervision of Prof. Wim Verbeke and Dr. Isabelle Sioen. She has been involved in the ECsafeSEAFOOD project since September 2013.

She is involved in ascertaining consumers' perception of the marine environment and knowledge of contaminants within European countries. She is also involved in performing a risk-assessment to evaluate the risks linked to the presence of environmental contaminants in seafood. The results of these activities will serve to develop an information strategy which considers the kind of information that is needed and should be disseminated to the general public in order to reduce the impact of public health risks on seafood consumption. Based on the work she has done so far, she will give an oral presentation of the abstract entitled 'European seafood consumers' perceived causes of pollution in the marine environment and related concerns' at Aquaculture Europe (October, 14-17, 2014, Spain). This has been made possible due to collaboration within the ECsafeSEAFOOD project.



TANJA CALIS (PROJECT ASSISTANT, AQUATT)

Tanja holds a BA degree in Zoology from Trinity College, Dublin and a MSc in Science Communications from Dublin City University. She joined AquaTT in 2013.

As a project assistant, she provides support to AquaTT's project officers by helping with project management, dissemination and knowledge transfer tasks as part of a number of EC-funded projects.

As part of the ECsafeSEAFOOD project, Tanja is involved in WP3 (publishing guidelines of mitigation measures) and WP7 (Dissemination, knowledge transfer and IPR management), carrying out the dissemination and knowledge transfer of the outputs of the project.



**DAMIÀ BARCELÓ
(DIRECTOR, ICRA)** Director of ICRA, head of the Water Quality research group, research Professor at the Institute of Environmental Assessment and Water Studies (IDAEA) of the Spanish National Research Council (CSIC). Coordinator

of the Research Group "Unit of Water Quality and Soil", Consolidated Research Group of the Regional Government of Catalonia. His researcher career has been focused on the area of Water Quality, particularly in the development of methods for controlling organic pollution by the so-called "emerging pollutants" (polar pesticides, surfactants — detergents—, endocrine disruptors and pharmaceutical products) in waste and natural water.



**SARA RODRÍGUEZ-MOZAZ
(RESEARCH SCIENTIST, ICRA)**

Sara focuses her research on the study of the origin, fate and ecological impact of different emerging contaminants (pharmaceuticals and Endocrine Disruptors) in fresh-waters as well as in other environmental matrices

such as biota. She also studies the removal of these emerging compounds during alternative water treatments principally for water reuse. She has been involved in national and international projects such as AWACCS (EVK1-CT-2000-00045) and SEDNET (EVK1-CT-2001-200). As well as participating in ECsafeSEAFOOD, she participates in other European funded projects like ENDETEC or SEA ON A CHIP. She is also member of the European Network NORMAN, related to the topic "Emerging Contaminants in The Environment".



DIANA ALVAREZ-MUÑOZ (POSTDOC RESEARCHER, ICRA)

Diana focuses her career on the study of the interaction between organic emergent contaminants and marine organisms. In the course of her Ph.D. she was working with synthetic surfactants researching on their bioaccumulation, biotransformation

and toxic effects. Her postdoctoral experience at Sussex University (UK) gave her the opportunity of working with endocrine disrupting compounds and their toxicity identification and evaluation. Besides, she has a wide experience in metabolomic studies for the identification of transformation products of contaminants as well as endogenous biochemical biomarkers of exposure using mass spectrometry. She has participated in the DIESE project financed by the European Union IV Interreg programme and some others national projects. Currently, she is working on two European funded projects: ECsafeSEAFOOD and SEA ON A CHIP.

SEAFOOD SAFETY IN THE NEWS

Discovery of efficient test for paralyzing toxin found in mussels, March 2014

A new discovery made at the University of Oslo, Norway, reveals a faster and cheaper way to check whether mussels contain the extremely dangerous and paralyzing neurotoxin saxitoxin. www.apollon.uio.no/english/articles/2014/1_mussels.html

FDA reviewing advice on mercury in seafood, 1st June 2014

The Food and Drug Administration (FDA) have drafted an update of its guidance for pregnant and nursing women on the appropriate levels of mercury in seafood. <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm397929.htm>

Malaspina Expedition Finds World's Oceans Littered With Microplastics, 1st July 2014

The results of a 2010 ocean voyage around the world, indicates that there are five large accumulations of microplastic in the open ocean accumulations that match the five large open-ocean currents. <http://goo.gl/y8KQkg>

185 projects planned to reduce marine litter

The plastics industry's annual progress report 2014 has revealed that as of December 2013 there were more than 185 projects planned, underway, or completed aimed at reducing marine litter – this represents a more than 90 percent increase in the number of projects since March 2011. <http://plastics.americanchemistry.com/Education-Resources/Publications/Progress-Report-2014.pdf>

Microplastic dwelling fouling organisms may be helping to clean up the oceans

New research shows that some microplastics are home to marine life, some of which may play an important role in plastic degradation. <http://goo.gl/bgV5mc>

New maximum cadmium levels permitted in seafood in the EU, 12 May 2014

The European Commission has published legislation (Regulation 488/2014) that changes the maximum permitted levels of cadmium in several fish species from the 1st June 2014. <http://goo.gl/OQDQGf>

Mussel farming banned in Cornwall due to high concentrations of E. Coli, 21 May 2014

High concentrations of E.coli have led to a ban on mussel farming in parts of Cornwall this May, after the Food Standards Agency downgraded the water quality across the country. Industry experts believe the entire shellfish industry could be under threat. <http://goo.gl/NvpLDO>

Harmful Algal Blooms and human epilepsy, 1st May 2014

Scientists from Stanford University have found that sea lion epilepsy caused by domoic acid found in harmful algal blooms may hold clues to human epilepsy. <http://goo.gl/F4XgRs>

PUBLICATIONS

This section includes details of some of the growing number of scientific publications acknowledging ECsafeSEAFOOD

Development of a liquid chromatography – tandem mass spectrometry procedure for determination of endocrine disrupting compounds in fish from Mediterranean rivers.

Jakimska, A. (2013). *Journal of Chromatography A*. 1306, 44-58. Available from: doi: 10.1016/j.chroma.2013.07.050. <http://goo.gl/djTWVF>

Confirmation of pinnatoxins and spirolides in shellfish and passive samplers from Catalonia (Spain) by liquid chromatography coupled with triple quadrupole and high-resolution hybrid tandem mass spectrometry

by María García-Altare, Alexis Casanova, Vaishali Bane, Jorge Diogène, Ambrose Furey and Pablo de la Iglesia, has been accepted for publication in the open-access journal *Marine Drugs*.

Assessment of acylation routes for the semi-synthesis of ester analogs of lipophilic marine toxins,

by Pablo de la Iglesia, Elena Fonollosa and Jorge Diogène, has been submitted for peer-review to the *Journal of Agricultural and Food Chemistry*.

Brominated Flame Retardants and Seafood Safety: A review,

by Rebeca Cruz, Sara C. Cunha and Susana Casal (ICETA) was presented to IPRC with the intention of being submitted to the journal *Environment International*.

