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Contribution to the Symposium: '*The Effects of Climate Change on the World's Oceans*'

Quo Vadimus

A graphic novel from the 4th International Symposium on the Effects of Climate Change on the World's Oceans

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The world's oceans are changing in response to a changing climate, these changes have significant consequences, there is much at risk, and action is needed now to increase the resilience of ocean ecosystems and the people that depend on them. That was the message from the 4th International Symposium "Effects of Climate Change on the World's Oceans", held from 4 to 8 June 2018 in Washington, DC. The symposium gathered ~650 people from over 50 countries to discuss not only how to advance our understanding and scientific knowledge, but also how to enact solutions based on that science to address challenges facing the world's oceans. Two perceptions were explored at the symposium: that we just do not know enough to act, and that there is nothing but bad news. The reality is that while better understanding of the causes and consequences of climate-related changes in ocean ecosystems is always useful, we already know enough to act. There are also opportunities, positive outcomes, and cause for hope in considering and communicating those actions. A professional graphic artist attended the meeting, and produced a range of amazingly insightful and often poignant cartoons as an effective means to share lessons from the conference in real time. As an entree into the special theme set, a selection of the cartoons has been assembled here, providing a narrative of the meeting and offering areas for future consideration.

Keywords: changing oceans, climate change, comic strip, human dimensions, marine ecosystems, solutions.

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A graphic novel from the 4th International Symposium on the Effects of Climate Change on the World's Oceans

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Abstract:

The world's oceans are changing in response to a changing climate, these changes have significant consequences, there is much at risk, and action is needed now to increase the resilience of ocean ecosystems and the people that depend on them. That was the message from the 4th International Symposium „Effects of Climate Change on the World's Oceans," held from June 4–8, 2018 in Washington, D.C. The symposium gathered ~650 people from over 50 countries to discuss not only how to advance our understanding and scientific knowledge, but also how to enact solutions based on that science to address challenges facing the world's oceans. Two perceptions were explored at the symposium: that we just don't know enough to act, and that there is nothing but bad news. The reality is that while better understanding of the causes and consequences of climate-related changes in ocean ecosystems is always useful, we already know enough to act. There are also opportunities, positive outcomes, and cause for hope in considering and communicating those actions. A professional graphic artist attended the meeting, and produced a range of amazingly insightful and often poignant cartoons as an effective means to share lessons from the conference in real time. As an entree into the special theme set, a selection of the cartoons has been assembled here, providing a narrative of the meeting and offering areas for future consideration.

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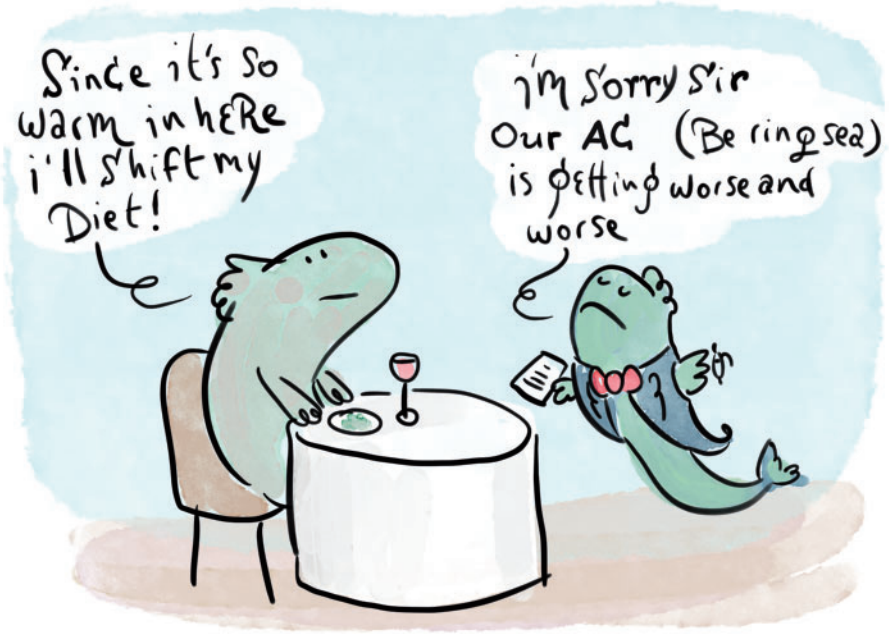
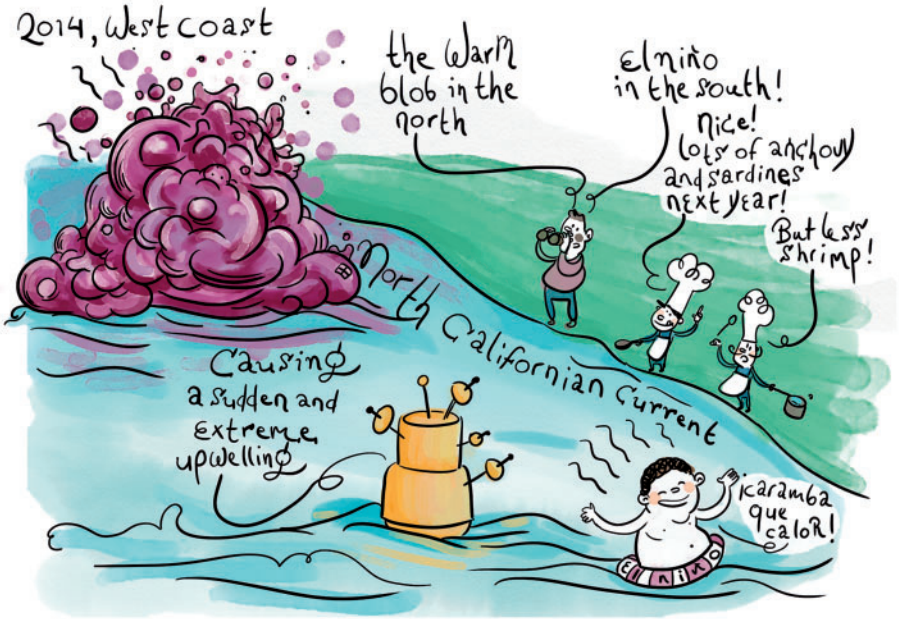
The Oceans are changing. We see increases in temperature.



We see extreme ocean heatwaves, also known as warm „blobs."



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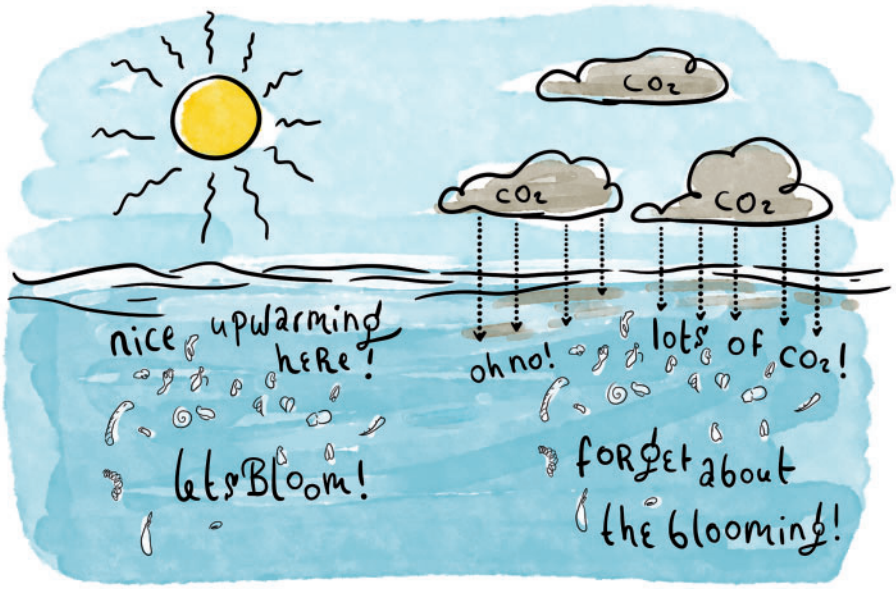
We see changes in carbon cycling



and the carbon pump.

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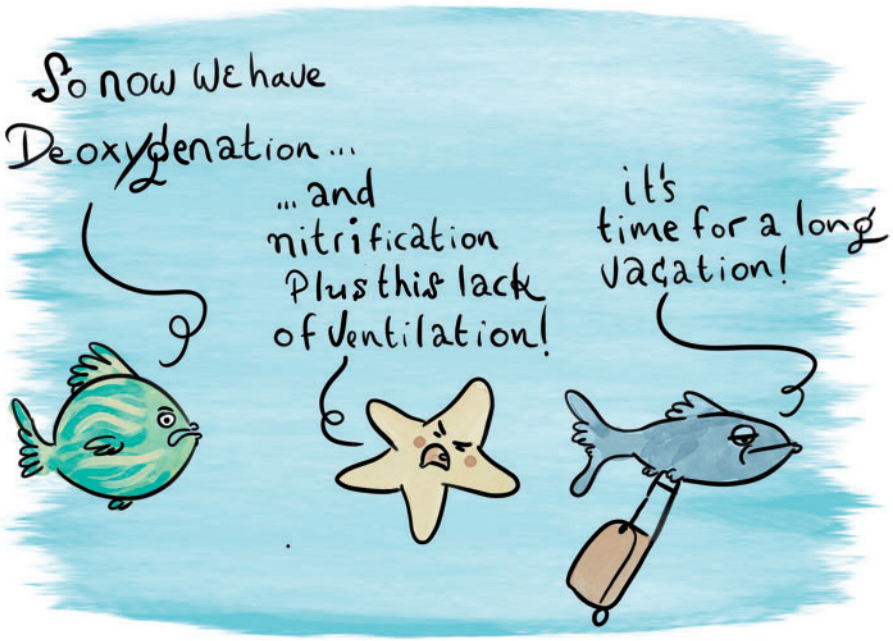
We see oxygen concentration declining

with other, multiple changes in ocean chemistry.



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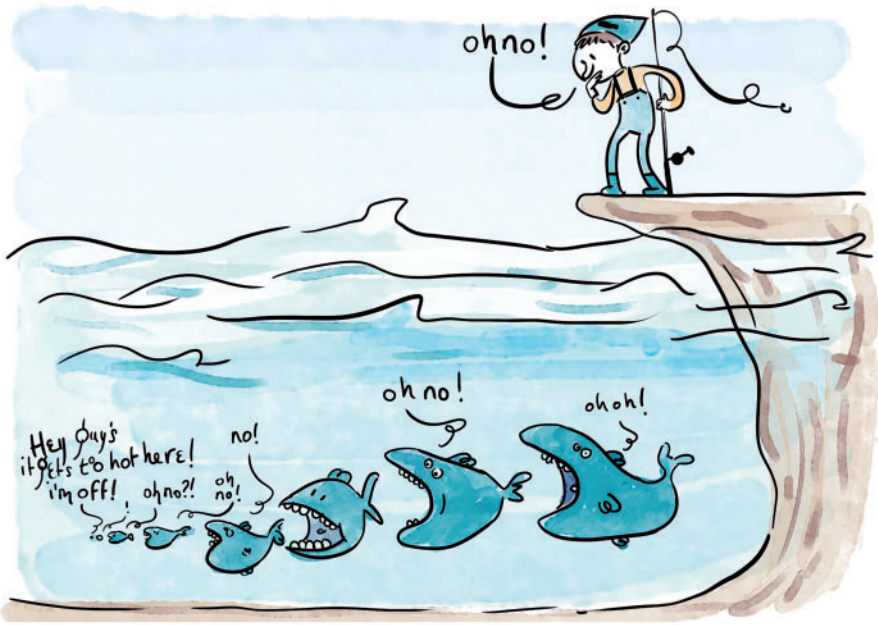
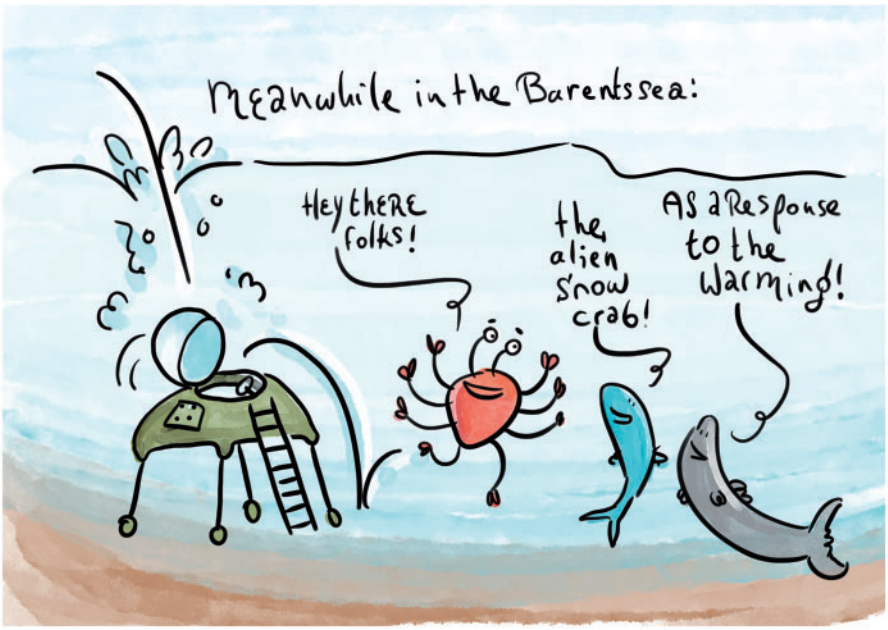
And the results are that species are now shifting their distributions,



invasive species are increasing,



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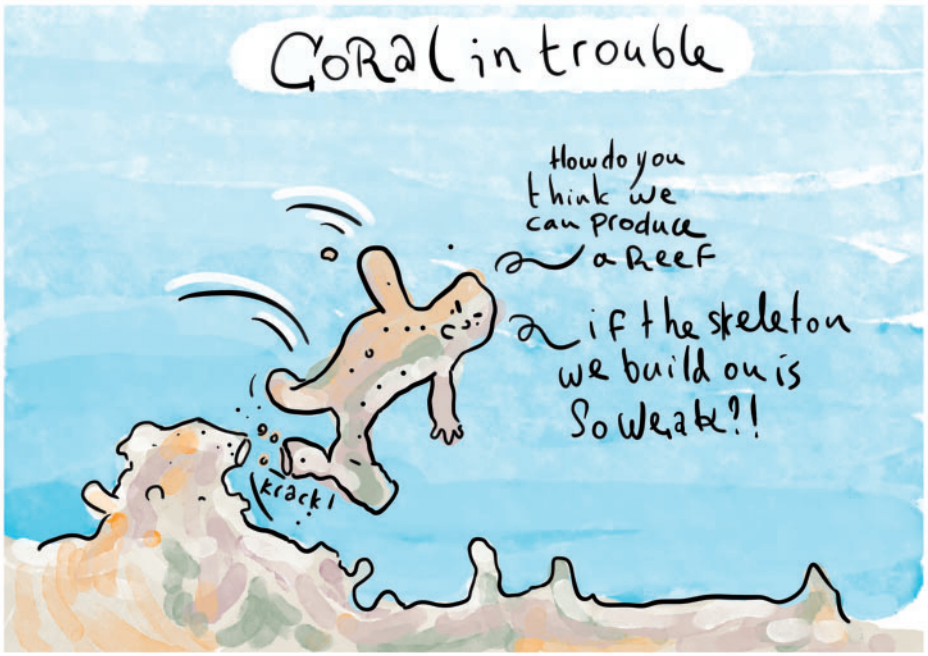
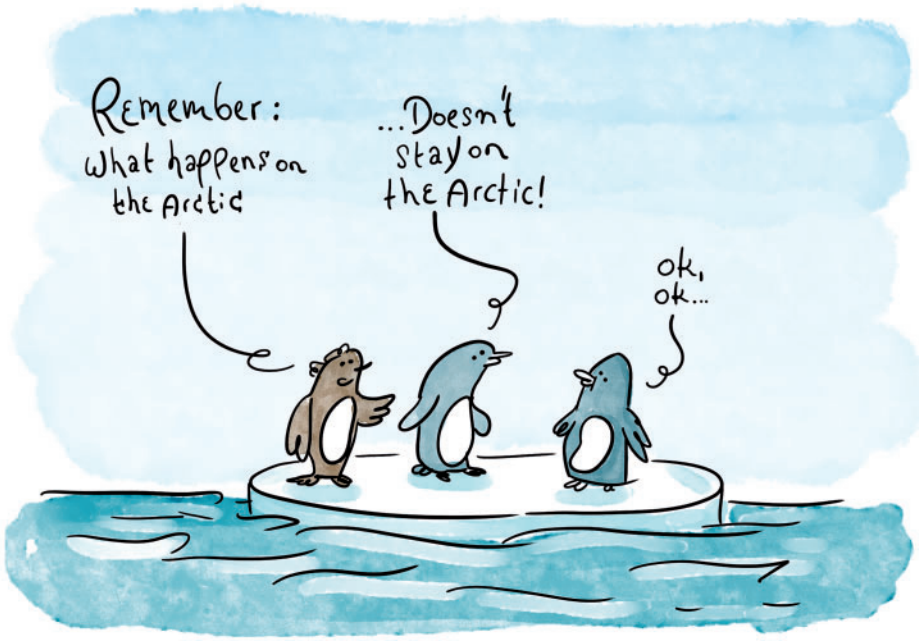
coral reefs are facing unprecedented multiple threats.



and the Arctic is significantly changing, in response to changing ocean conditions



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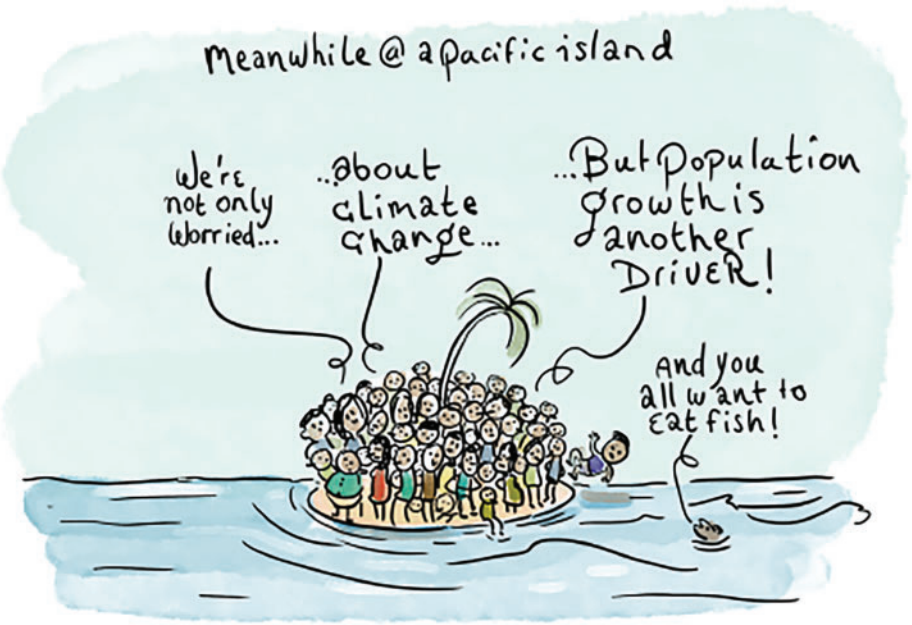
and all resulting in notable consequences.
To the point that there is a lot at stake.

There are impacts on human populations



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and consequences for human health.

food provision and security

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and some of the most traded commodities in the world.

ecosystem goods and services.

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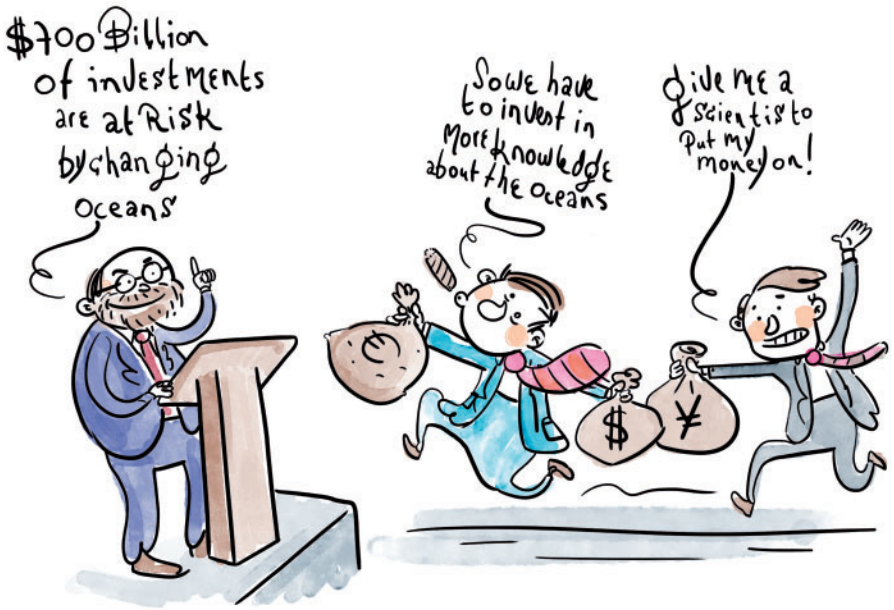
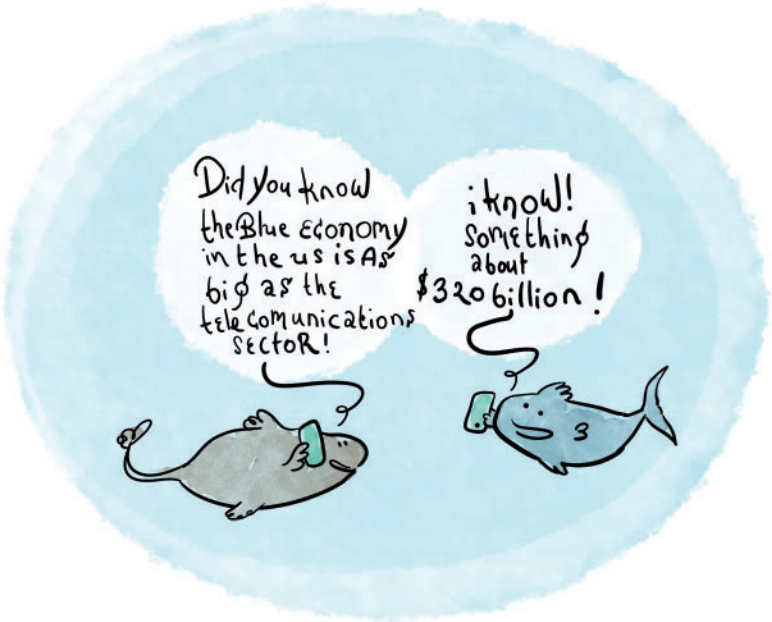
major businesses,



and significant parts of national and global economies.



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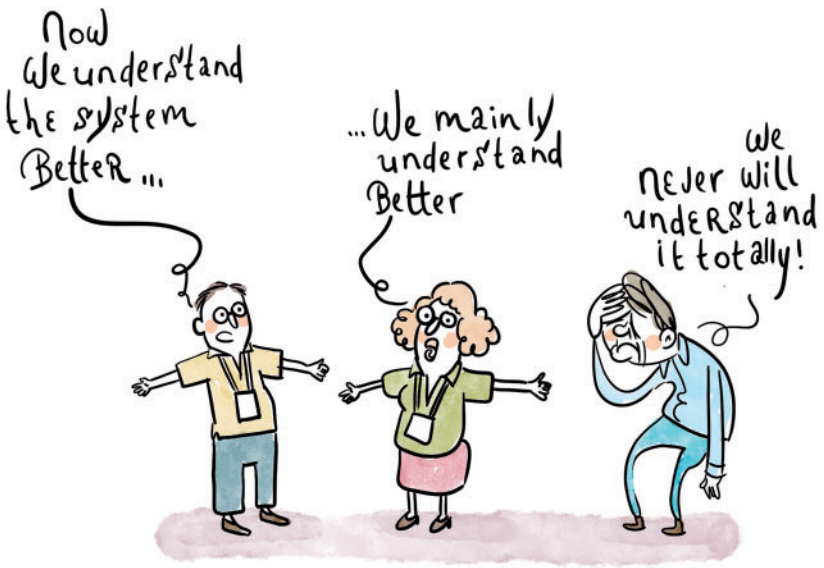
There is much science to do to understand these changes and consequences.



With lots of measures of risk

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and the need to sort out trends and variability.

By using lots of types of models: fish models.

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marine ecosystems models.

and even entire earth system models.

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By using big data

that all needs to have a much broader context than it used to.

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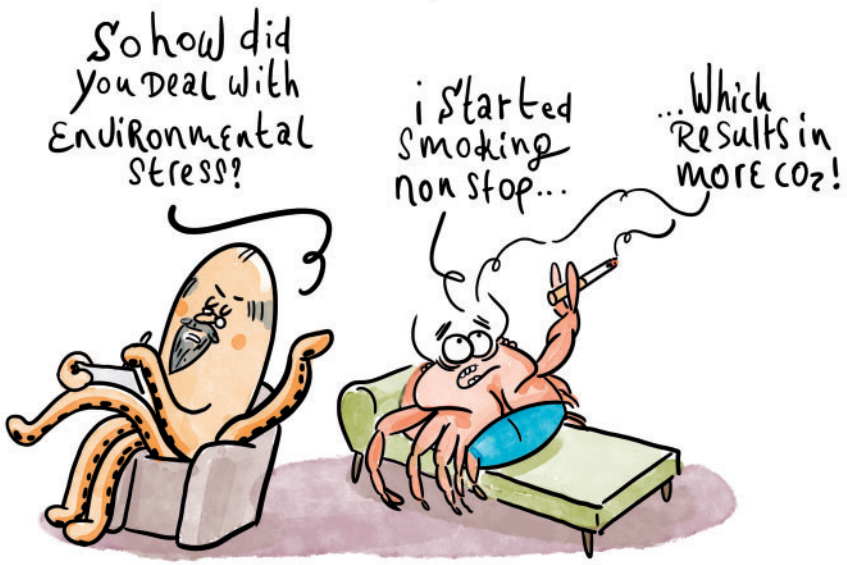
necessary to inform decisions that need to be made now.

To find solutions that deal with climate-induced changes and consequences-



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Using a wide array of knowledge

and exploring different types of possible responses.

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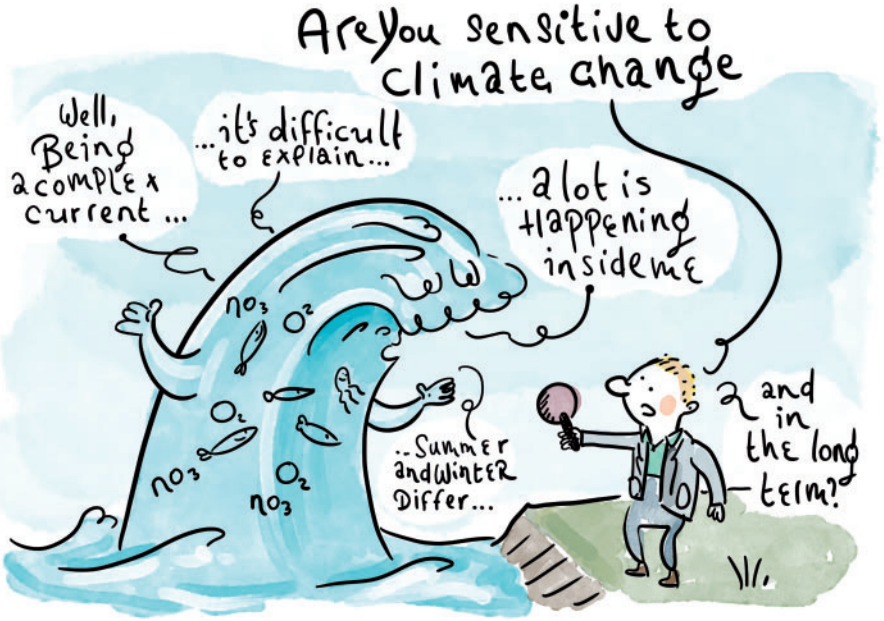
While not too complex



and staying close to reality by using both existing tools

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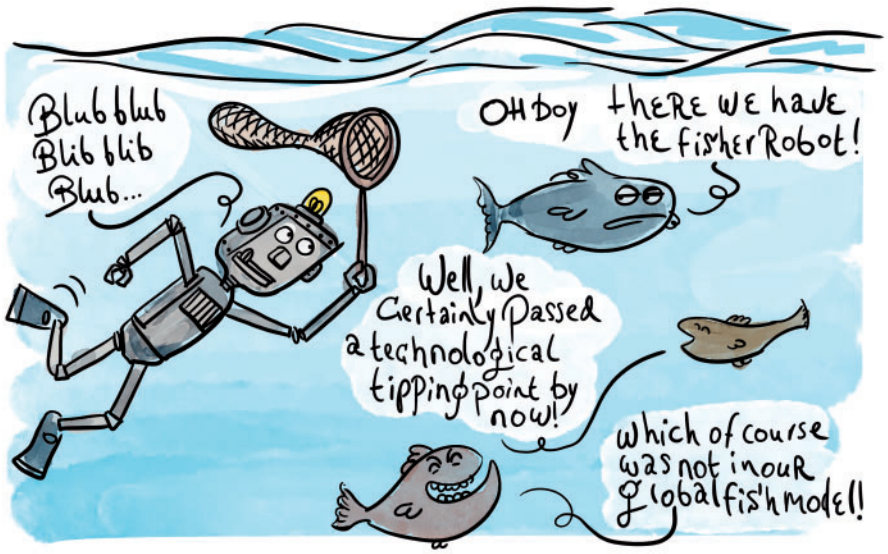
and new technologies.



By identifying situations and communities that are most vulnerable

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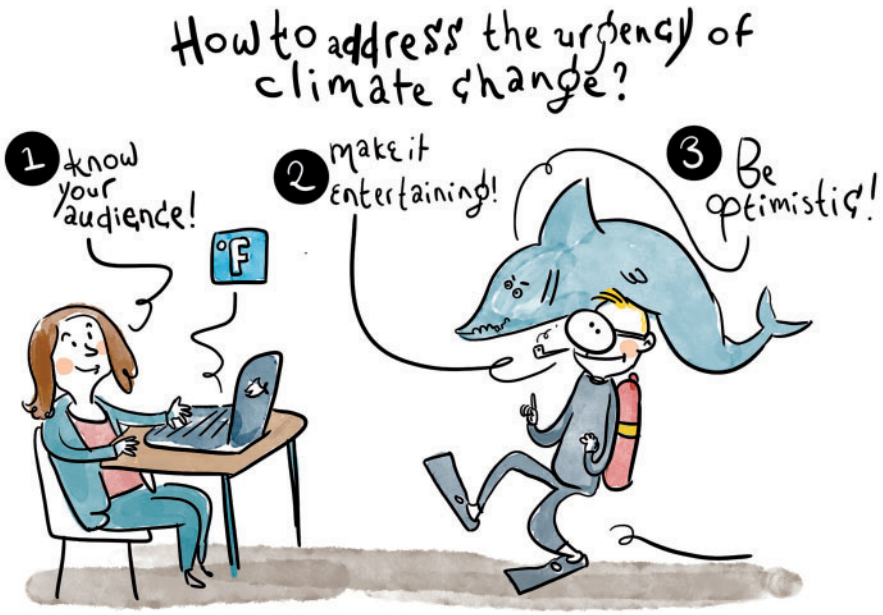
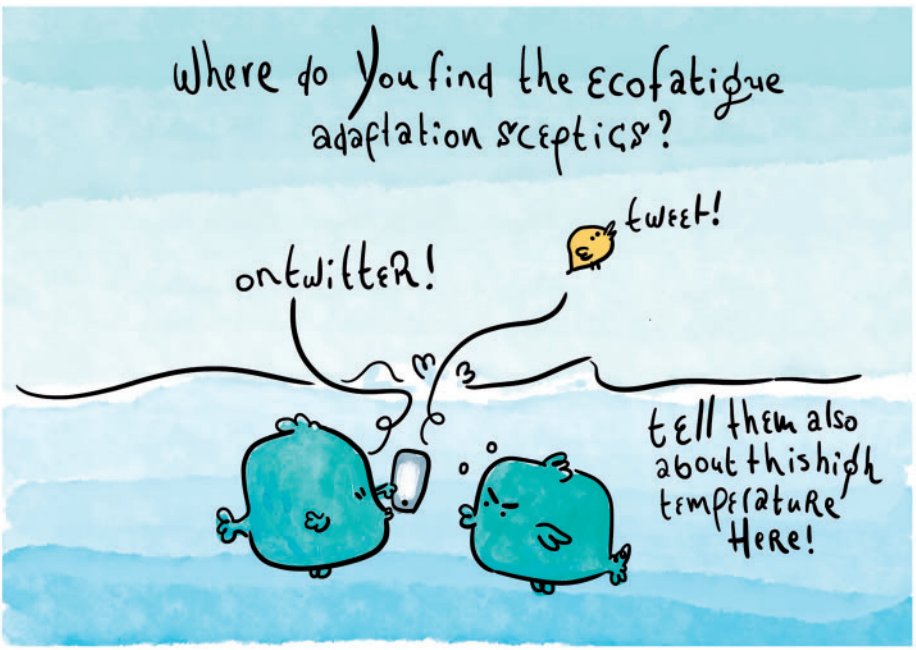
while communicating information to a wide range of people.



For both those not yet convinced



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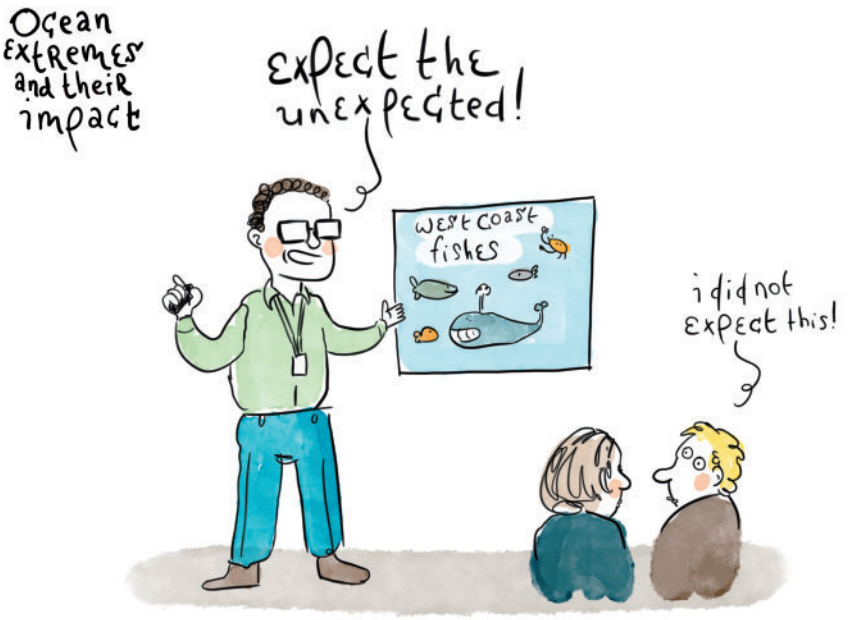
and those not fully aware of the issues.



All in a way that builds hope and not despair

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and that leads to action

and to true solutions to these challenges facing the changing oceans.

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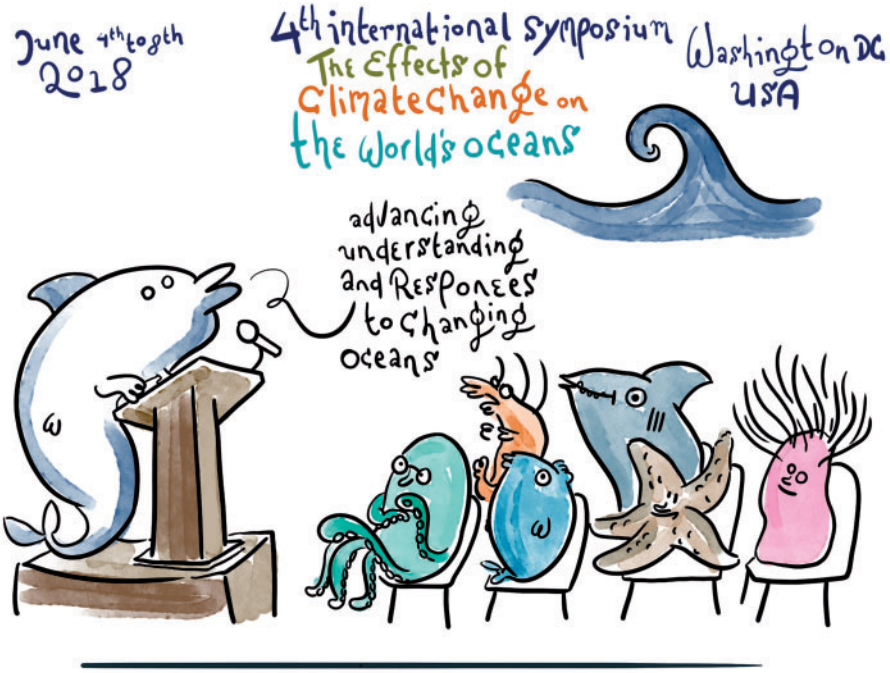

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