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THE OCEANS
AT THE HEART
OF CLIMATE CHANGE

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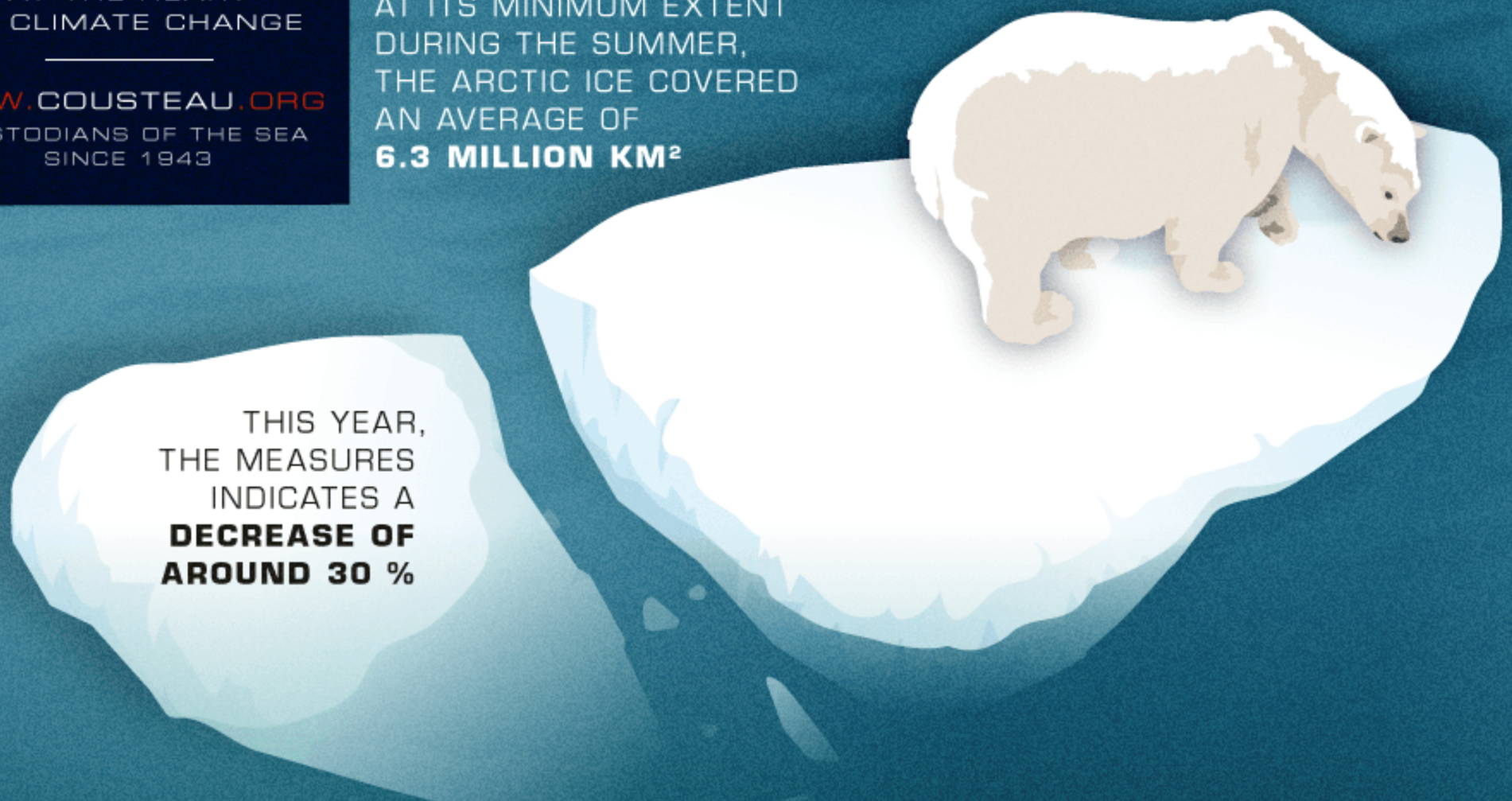
SINCE 1943

BETWEEN 1981 AND 2010,
AT ITS MINIMUM EXTENT
DURING THE SUMMER,
THE ARCTIC ICE COVERED
AN AVERAGE OF
6.3 MILLION KM²



THIS YEAR,
THE MEASURES
INDICATES A
DECREASE OF
AROUND 30 %

The Arctic has not been so warm for more than 40,000 years, and the summer ice is melting at an alarming rate that raises fear of its dissipation before 2040.

The melting ice provokes an augmentation of the effects of climate change and affects many species, such as polar bears. In the Beaufort Sea in Alaska, the bear population dropped 40% between 2001 and 2010.

Sources : National Snow & Ice Data Center, Ecological Society of America.

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THE WORLD'S OCEANS ABSORB

88%

OF THE HEAT ASSOCIATED WITH GLOBAL WARMING

The remainder is shared between landmasses (4%), the atmosphere (3%) and melting ice (5%). The oceans therefore play a major role in the reduction of the impact of global warming.

Source : Levitus and al. (2012) / National Oceanic Data Center (2012) / Nuccitelli and al. (2012)

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THE OCEANS HAVE ABSORBED **30% OF THE CO_2** PRODUCED BY HUMAN ACTIVITIES...

... RESULTING IN A **26% INCREASE IN THE ACIDITY** OF THE OCEAN

The current rate of acidification is estimated to be 10 to 100 times faster than any time in the past 50 million years. Many species of algae and animals with calcium carbonate skeletons are at risk, and detrimental effects have already been recorded in shellfish fisheries.

Source : Ocean Acidification Summary for Policymakers 2013.

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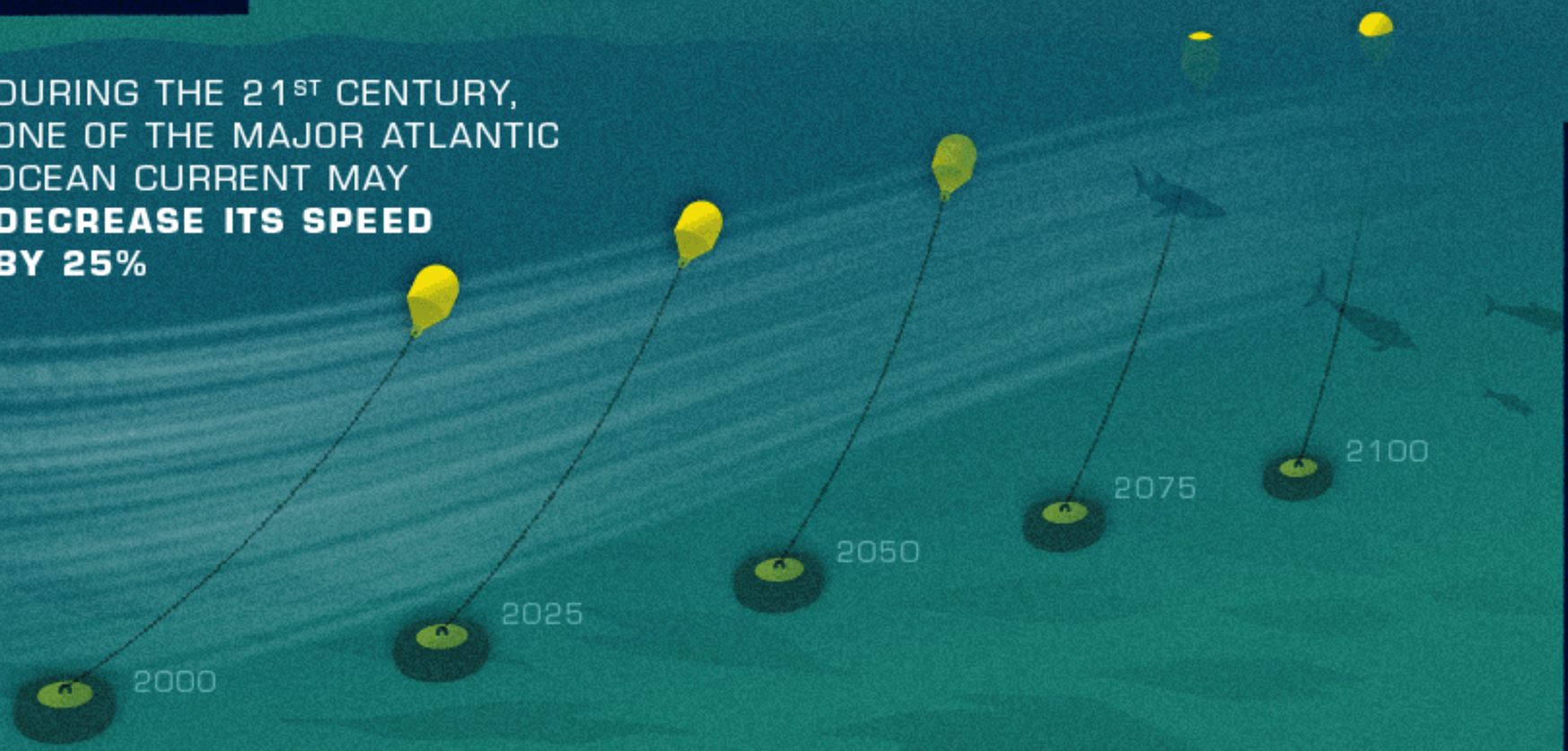
THIS COULD AFFECT
THE GLOBAL AND
REGIONAL CLIMATES
AND PERTURBE MARINE LIFE

DURING THE 21ST CENTURY,
ONE OF THE MAJOR ATLANTIC
OCEAN CURRENT MAY
DECREASE ITS SPEED
BY 25%



Source : UPENN (Pensylvania University), 2014 / Franjka-Williams, 2015.

The Atlantic Meridional Overturning Circulation – AMOC – rate of decrease was estimated to be around 4 million m^3/s each 100 years.

But a recent study discovered that in 8 years, the AMOC speed has already reduced by 1 million m^3/s (between 2004-2012). This is most likely linked to a stronger effect of climate change.

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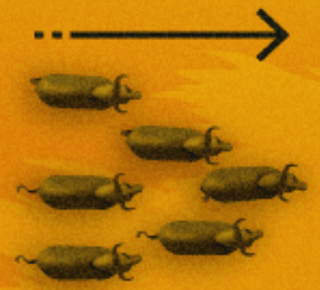
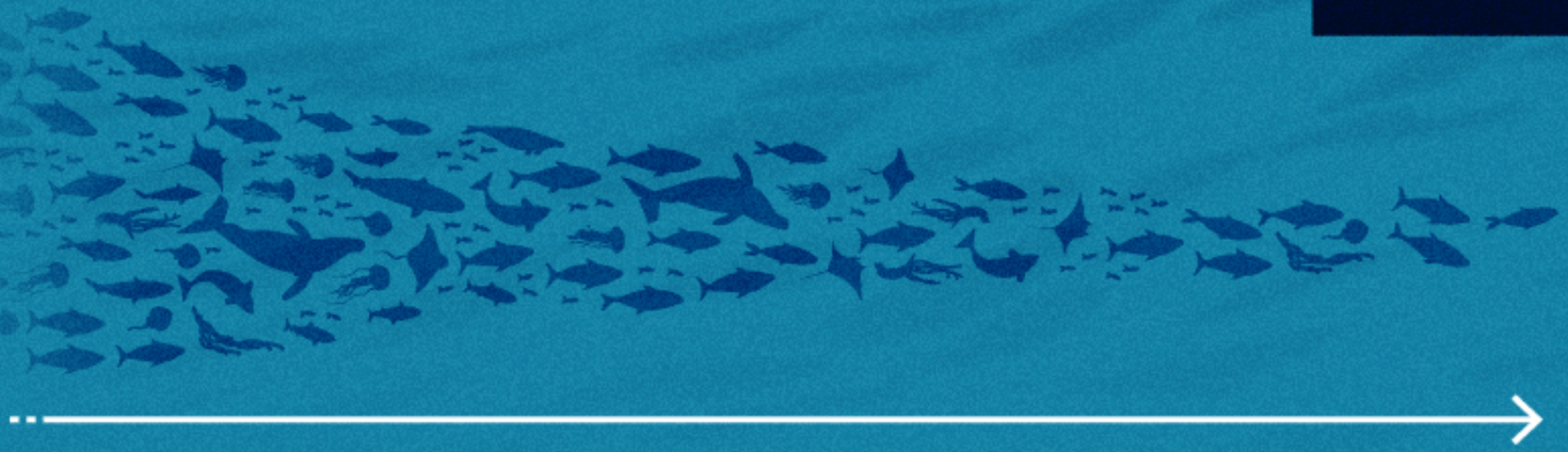


IN THE LAND TERRITORY,
DUE CLIMATE CHANGE,
SPECIES HAVE MOVED FROM
6 TO 17 KM EACH DECADE

More than 80% of marine species are already affected by climate change. Bony fish has ecologically moved an average of 200 km per decade and the diatom algae ecological movement rates reached more than 400 km per decade.

The polar marine species are the most exposed to major adaptation difficulties.

MEANWHILE,
MARINE SPECIES
HAVE MOVED 75KM



Sources : Poloczanska et al. Nature Climate Change 2013. Chen et al. Science 2011.

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TODAY,
60 MILLION PEOPLE
HAVE BEEN DISPLACED
BY WAR

FROM NOW TO 2100,
187 MILLION PEOPLE
COULD BE DISPLACED
BY RISING SEA LEVELS

The rise in sea level is estimated to be between 26 cm and 82 cm from now to 2100.

634 million people live in zones less than 1 meter above the actual sea level, and more than two thirds of cities of more than 5 million people are located in these areas.

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Sources : Intergouvernemental Panel on climate change / Nations unies / Royal society / International Institute for Environment and Development

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They would total the equivalent of 120,000 TWh of electricity, taking into account existing technologies and the feasibility of these uses (ocean thermal energy 83%, offshore wind 15%, wave 1% and tidal 1%).

In 2012 mankind produced 155,505 TWh.

77%

OF THE CURRENT ENERGY NEEDS OF HUMANKIND

COULD BE MEET WITH RENEWABLE ENERGY FROM THE OCEAN

Sources : International Energy Agency (IEA), Key World Energy Statistics as per 2014 / Club des Argonautes.

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GOODS AND SERVICES FROM THE WORLD'S OCEANS AMOUNT TO AT LEAST **$2.500 BILLIONS** EACH YEAR

UNITED STATES

CHINA

JAPAN

GERMANY

FRANCE

UNITED KINGDOM

BRAZIL

ITALY

RUSSIA

INDIA

CANADA

THIS IS THE EQUIVALENT OF **THE WORLD'S 7TH LARGEST ECONOMY** (GDP)

However, the ocean ressources are threatened by overfishing, pollution, destruction of natural habitats and the impacts of climate change.

For example, 80% of global fish stocks are over-exploited or in decline.

Source : "Reviewing the ocean economy"
WWF ; Global Change Institute ;
Boston Consulting Group (2015)

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PLANKTON
IN THE OCEAN PUMPS PER YEAR
2.3 TIMES MORE CARBON
THAN ALL THE VEGETATION
AND SOIL OF THE CONTINENTS

This equates to 6 gigatons of carbon per year, compared to 2.6 gigatons absorbed by vegetation and soils.

An important part of this plankton carbon sinks into the deep ocean in the form of zooplankton excrement and of aggregations.

Ocean acidification, the destruction of biodiversity and the increase in water temperature can greatly disrupt the service rendered.

Sources : Siegel et al. 2014 / UNEP, FAO, UNFF. 2008 / Vital Forest Graphics

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IN 2014,
MARINE PROTECTED AREAS
COVERED ONLY **3.4%**
OF THE OCEAN SURFACE

The objective accepted by the United Nations is 10% of coverage by 2020. Within no-take marine protected areas, animal size increases on average by 28%, density of animals and plants by 166%, number of species by 21%.

For comparison purposes, 15.4% of the surface of the continents is protected.

TO PRESERVE MARINE ECOSYSTEMS,
THEY WOULD HAVE TO COVER 20 %

Sources : Protected Planet Report, UNEP 2014
& Lester, et al (2009). Biological effects within no-take marine reserves : a global synthesis. MAnne Ecology Progress series