UN environment

United Nations World Geospatial Information Congress
联 合 国 世 界 地 理 信 息 大 会

The Geospatial Way to a Better World
同绘空间蓝图 共建美好世界

Harnessing Big Data on the Environment for Sustainable Development and Humanitarian Action

Our Geospatial way to a Better World

Deqing, China, UN World Geospatial Information Congress, 19-21 November 2018

Alexandre Caldas, Chief, Country Outreach, Technology and Innovation Branch, Science Division, UN Environment

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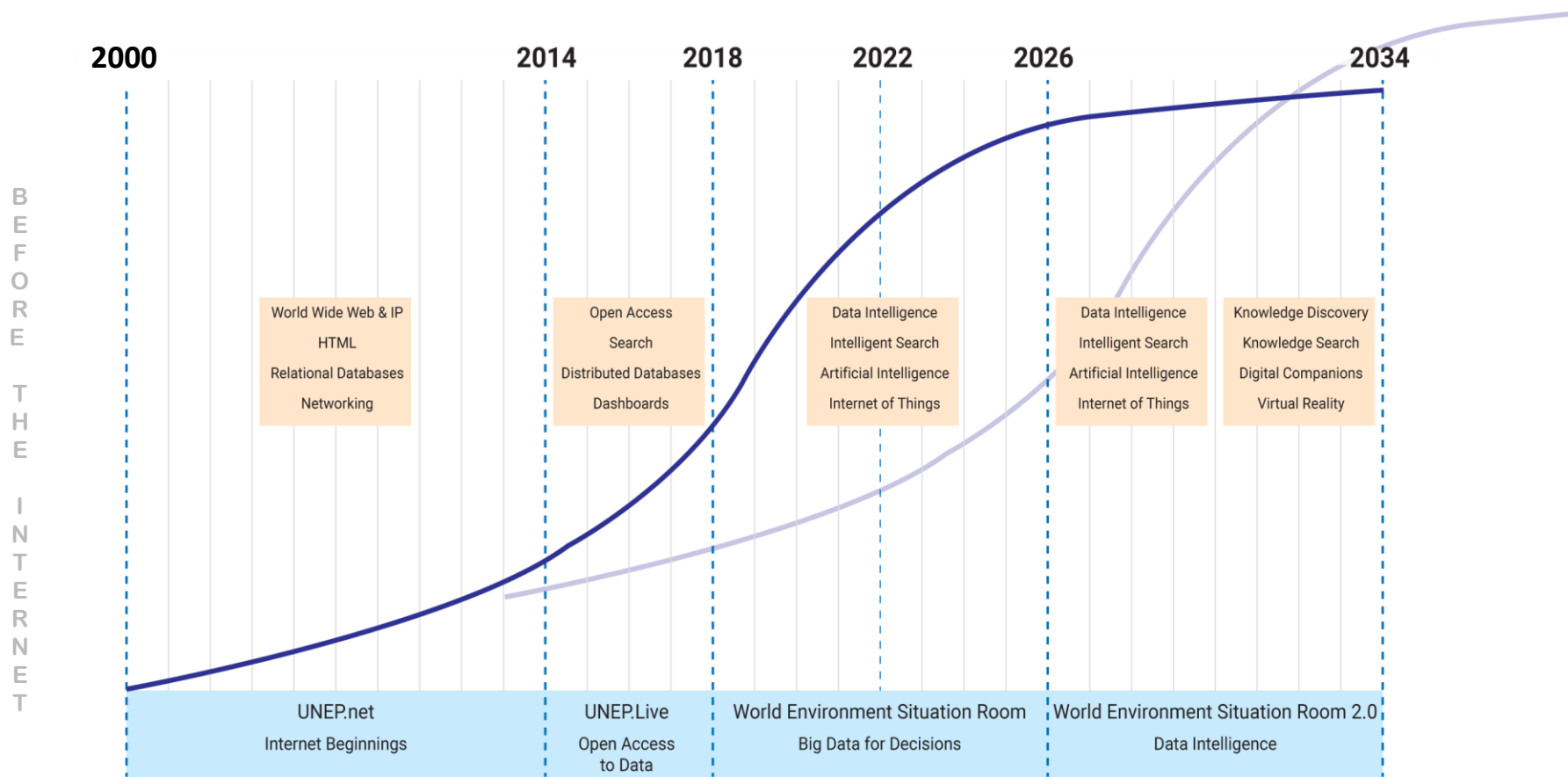
UN System Wide Initiative

"… The availability of quality, accessible, open, timely and disaggregated data is vital for evidence based decision-making and the full implementation of the 2030 Agenda and realization of its ambitions of leaving no one behind ..."

Progress towards the Sustainable Development Goals – 2018 Report of the Secretary-General

https://sustainabledevelopment.un.org/content/documents/18541SG_SDG_Progress_Report

environmentlive.unep.org/situation

UN Environment Data Strategy, Long-term Trends and Future

More than 40 Year's investing in Transparent Access and Use of Data, Information and Knowledge

BEFORE THE INTERNET

| 2000 | 2014 | 2018 | 2022 | 2026 | 2034 |

2000
World Wide Web & IP
HTML
Relational Databases
Networking

2014
Open Access
Search
Distributed Databases
Dashboards

2018
Data Intelligence
Intelligent Search
Artificial Intelligence
Internet of Things

2022
Data Intelligence
Intelligent Search
Artificial Intelligence
Internet of Things

2026
Knowledge Discovery
Knowledge Search
Digital Companions
Virtual Reality

UNEP.net
Internet Beginnings

UNEP.Live
Open Access
to Data

World Environment Situation Room
Big Data for Decisions

World Environment Situation Room 2.0
Data Intelligence

UN Environment Data Strategy – a wide spectrum of Information

Integrating a Variety of Types of Environmental Data

1 Technology and Knowledge

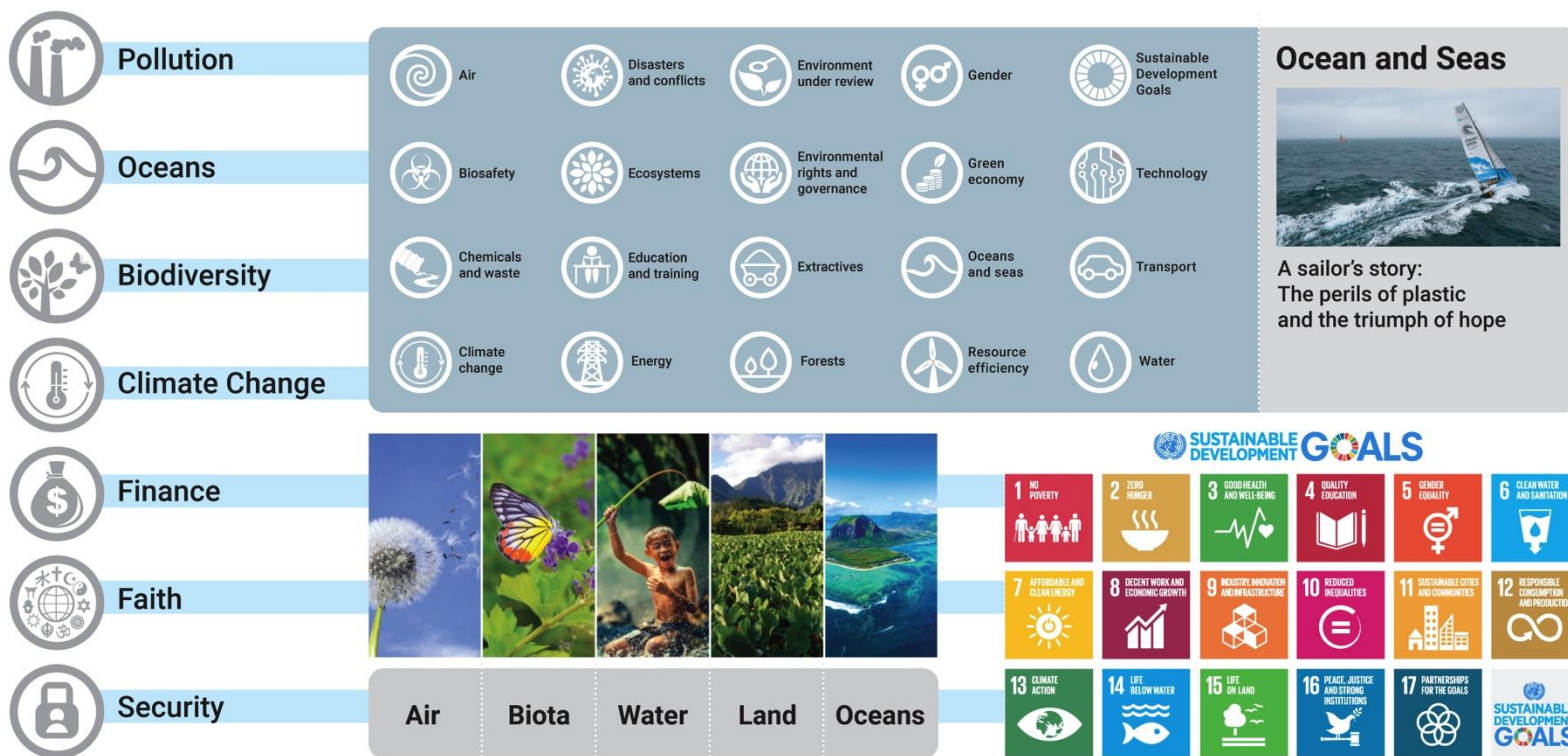**2 SDGs and Environment Statistics**

3 Scientific information on the Environment

4 Global Environmental Monitoring

5 Global Environmental Outlook, Scientific Assessments and other Thematic Assessments

6 Private and Citizen Science

7 Foresight Green and Emerging Issues

World Environment Situation Room

Environment Live (Open data and forecasting)

Indicator Reporting Information Systems

Geospatial information systems

SDG Reporting and International Obligations

Building national capacity on environment statistics and economic environmental accounting

Indicators informing policy - SDG policy briefs, data use and analysis, and Environment Live database

Providing access and use of scientific information for developing countries

Library and knowledge services

Knowledge management tools and services

Network partners e.g. Online Access to Research on the Environment

Global Environmental Monitoring Systems on Water

Air Quality Monitoring

Monitoring Land and Biota Systems

Monitoring the oceans

Global Environment Outlook

Frontiers

Emissions Gap Report

and more

Private institutions, business and other non-governmental organizations

Citizen science data with relevance in e.g. environment and health, such as the Global Mosquito Alert Consortium, or City planning

Data for the future

Scenario building, modelling

Supporting decision making

Forecasting and prevention

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UN Environment Wide Initiative – 'Acting as One'

Science and Data driving our Policy, Priorities and Action

P o l l u t i o n

**Sustainable Consumption and Production**

Pollution

Oceans

Biodiversity

Climate Change

Finance

Faith

Security

Air | Disasters and conflicts | Environment under review | Gender | Sustainable Development Goals

Biosafety | Ecosystems | Environmental rights and governance | Green economy | Technology

Chemicals and waste | Education and training | Extractives | Oceans and seas | Transport

Climate change | Energy | Forests | Resource efficiency | Water

Ocean and Seas

A sailor's story:
The perils of plastic
and the triumph of hope

Air | Biota | Water | Land | Oceans

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Indicators Informing Policy – Synergies between SDGs and MEAs

Indicators informing policy - SDG Policy Briefs, Data Use and Analysis, and Environment Live Database

At the regional and global level, scientists, policy analysts, decision-makers, donors and the public rely on consistent, reliable, up-to-date information for guiding research, preparing assessments, developing regional and global approaches for sustainable development, facilitating policy action, allocation of funds and keeping informed on the state and trend of the environment. In order to promote data use, UN Environment plays a key role in providing easy access to a wealth of data and information needed to support and enable implementation of the environmental dimension of the 2030 Agenda through the functionality of Environment Live. Data visualization tools, including maps, charts and other graphics, also support users in understanding and using environmental data.

environmentlive.unep.org/situation
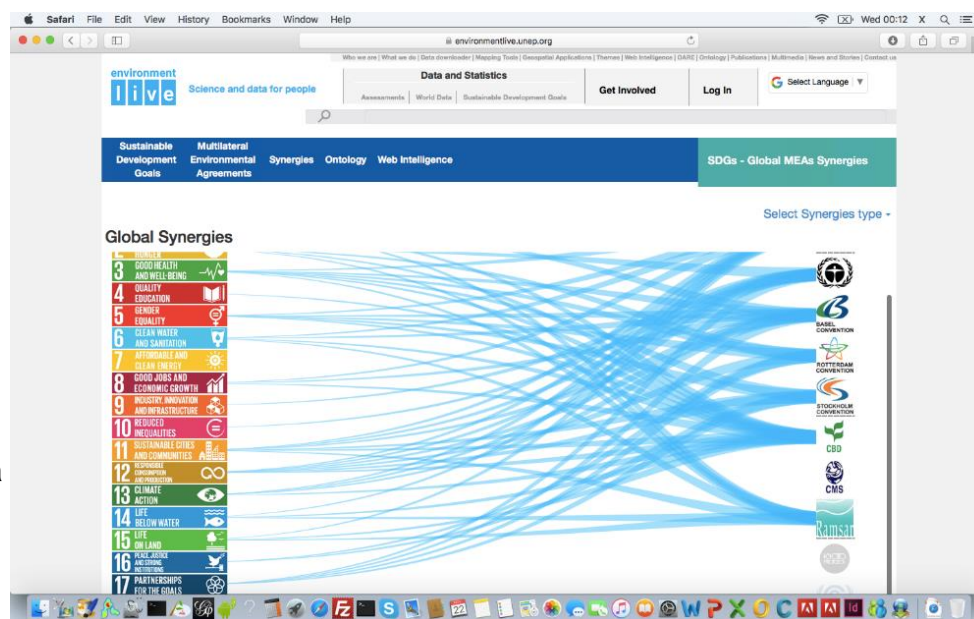
Reporting to SDGs, International Obligations and Capacity Building

SDG Reporting and International Obligations
UN Environment has the formal mandate as custodian for 26 SDG Indicators. UN Environment works with countries and other UN agencies in the SDG indicator process through the Inter-agency Expert Group on SDG Indicators (IAEG-SDG).The SDG unit provides data on SDG indicators to the IAEG-SDG/UN Statistical Division as input into the Secretary General Progress report on SDG's. The SDG unit is responsible for the development of the metadata and methodology for Tier III SDG environmental indicators.

Building national capacity on environment statistics and economic environmental accounting
UN Environment is working with the UN Statistics Division (UNSD) and all five UN Regional Commissions to address the lack of necessary environmental data and statistics for making evidence-based decisions, monitoring the SDGs and reporting on environmental agreements, including Nationally Determined Contributions under the Paris Agreement. The aim of this coordinated effort is to build and strengthen environmental statistical capacity at the national level in relevant institutions such as the Ministries of Environment and the National Statistical Offices. An increased capacity to produce environmental statistics forms a foundation for the delivery of high quality information to be integrated into the SDGs reporting.

UN Environment as Custodian Agency

Global Environmental Monitoring Systems

GEMStat

Over 4600 stations
(>4 million samples) in 75
countries with the longest
time series since 1965.

GEMStat
International Centre for Water Resources and Global Change
Koblenz, Germany, October 2017
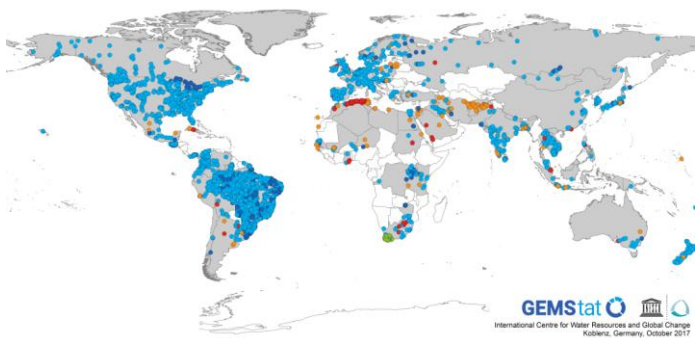
Station Types
- Groundwater station
- Lake station
- Reservoir station
- River station
- Wetland station
- Countries contributing to GEMStat

Visualisations

Interactive data explorer, maps and charts for temporal and spatial coverage of GEMStat data, usage statistics
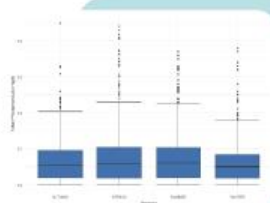
Statistics

Interactive statistics portal to draft statistics reports, indicators, indices, load calcultation

Metadata

Interactive metadata catalogue on GEMStat measuring programmes, parameter catalogue, station catalogue

Publications

Reports, posters, lectures, website, flyers

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Spatial-temporal patterns of global water quality

Water quality parameter

River stations

Mean Annual Total Phosphorus Concentration (mg/L)

♦ > 0.19 (Seriously Disturbed)

◇ 0.02 - 0.19 (Largely Natural - Largely Disturbed)

◆ < 0.02 (Natural)

1965 to 2018

Example: Water quality in the Amazonas river. Classification and thresholds according to UN Environment, 2017
www.gemstat.org
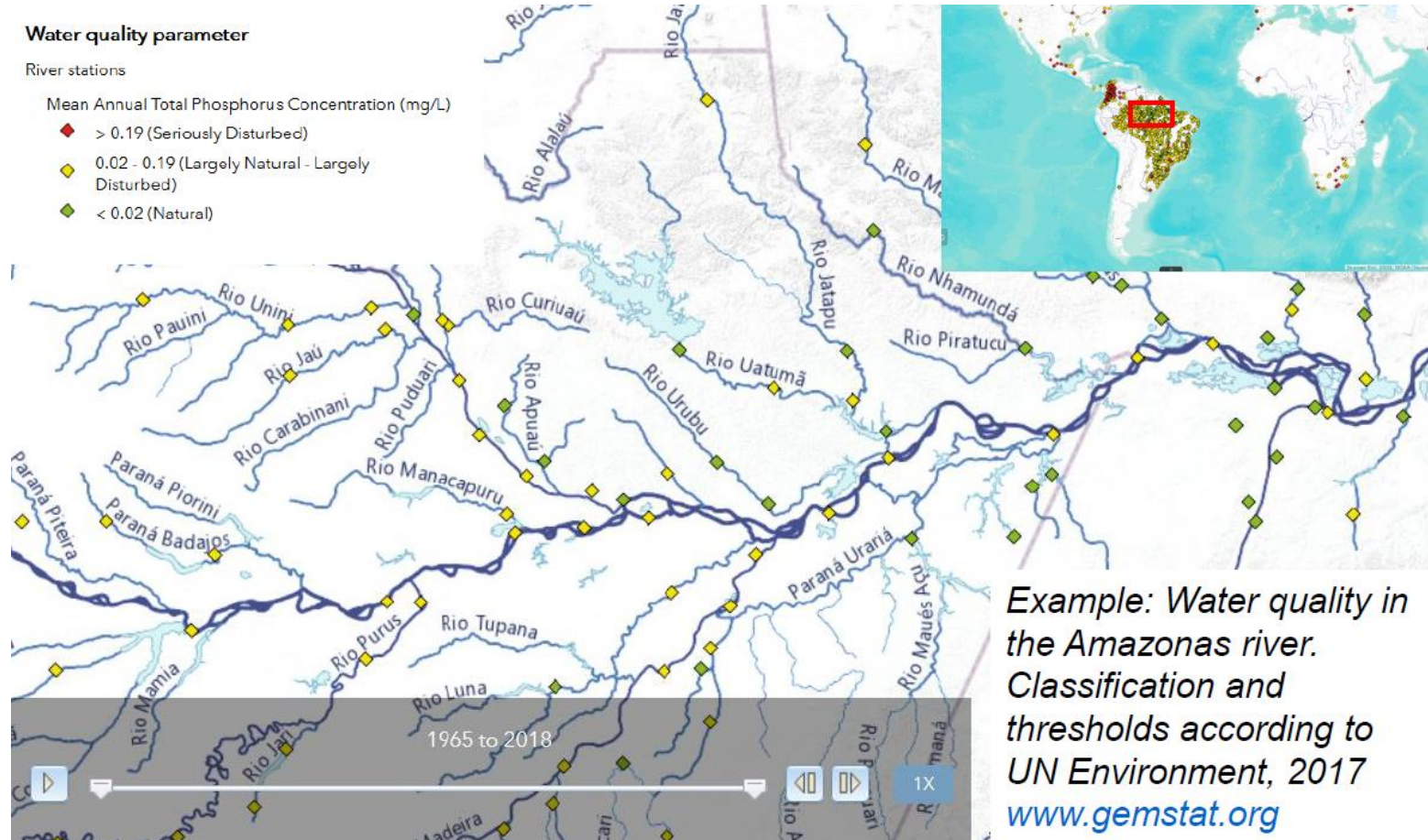
World Water Quality Assessment

Nexus: Water Quality and Human Health

Modell-estimates of in-stream concentrations of **faecal coliform** bacteria (FC) for Latin America, Africa and Asia for February 2008-2010.

Bar charts show minimum and maximum monthly estimates of river stretches in the severe pollution class per continent in the 36-month period from 2008-2010.

FC February
2008-2010 cfu/100ml

- low pollution (≤200)
- moderate pollution (200<x≤1000)
- severe pollution (>1000)

low – suitable for primary contact
moderate – suitable for irrigation
severe – exceeds thresholds
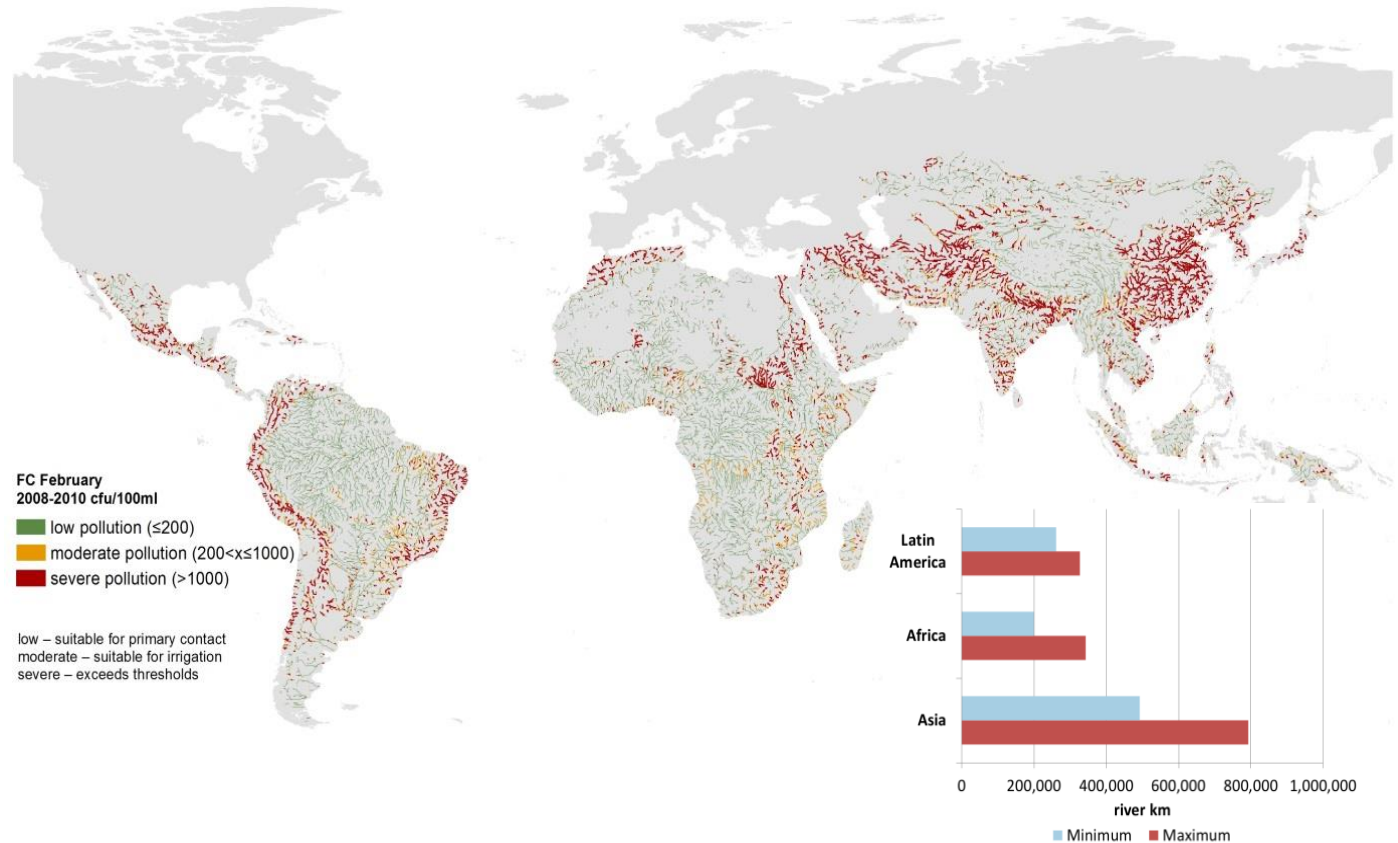
World Environment Situation Room
it is about the best technology and Innovation…

Alexandre Caldas, Chief , Country Outreach, Technology and Innovation Branch, Science Division, UN Environment

World Environment Situation Room

A Single Entry Door to Geospatial Information connecting a HUB of Data Centers worldwide

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A novel way of Communication, with high impact for decision making turning data into information and knowledge

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Supporting timely decision making, using geospatial data for identifying Hotspot's (*hope spots*) of climate change, policy actions and decision making

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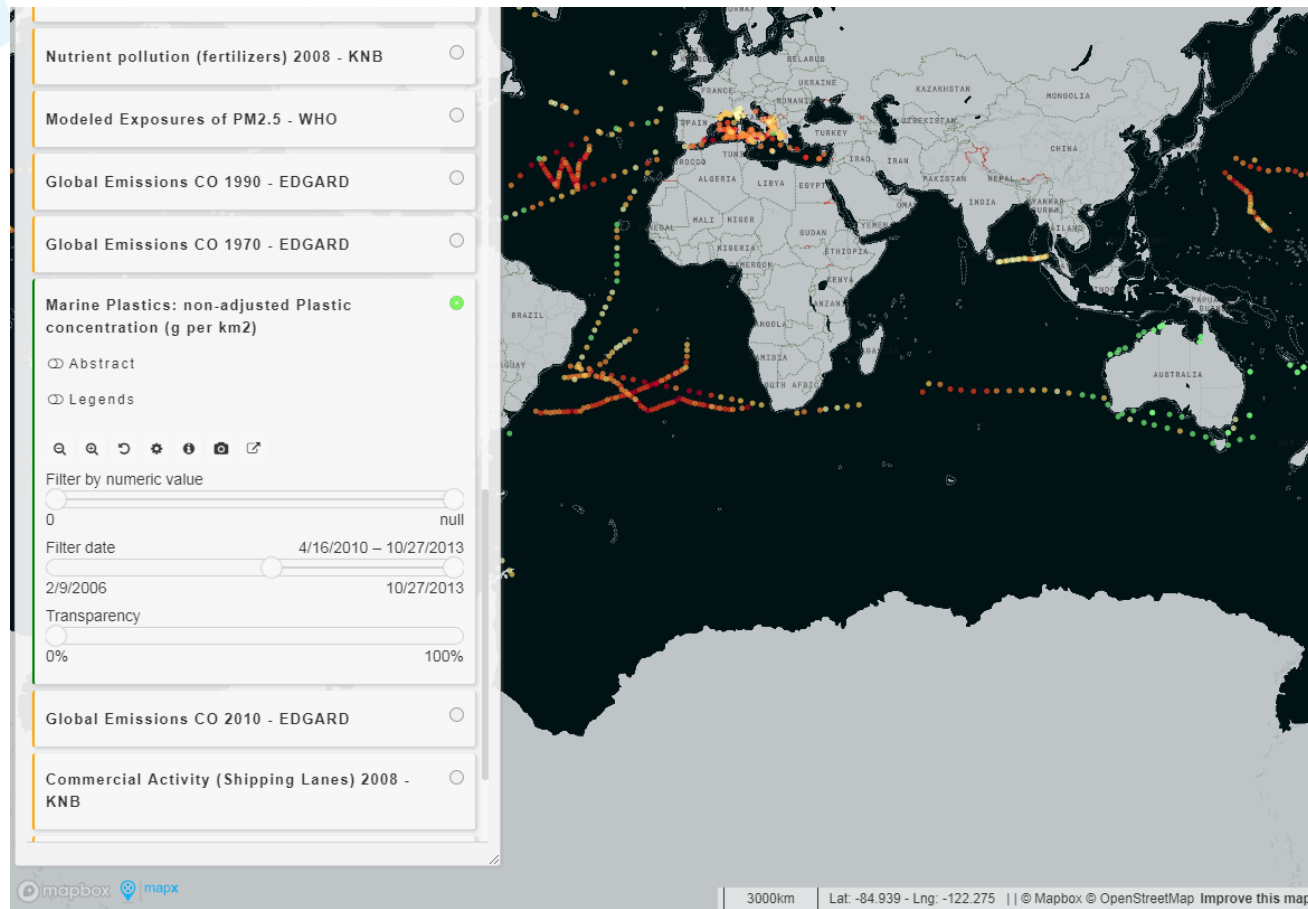
World Environment Situation Room

A Digital Companion, gender-balanced and truly global personality

Darwin Wangari is UN Environment's **Digital Companion** supporting and advising users finding information, navigating the Situation Room, and personalizing their experience and interface.

- *Darwin Wangari uses the best available technology of human computer interaction, big data, artificial intelligence, Internet of Things and data analytics to be a digital companion on accessing and using the World Environment Situation Room*

- *Darwin Wangari is a mobile APP, providing information and knowledge on the Environment anywhere, anytime*

- *Darwin Wangari can learn with user preferences to personalize their experiences, searching information, navigating the Situation Room or assisting on new information available in the World Environment Situation Room about specific topics of interest*

Darwin Wangari will have its own personality and animated character, assisting users all over the place

environmentlive.unep.org/situation

it is about Impact *on the Ground* Countries … and People

Alexandre Caldas, Chief , Country Outreach, Technology and Innovation Branch, Science Division, UN Environment

Online Access to Research on the Environment (OARE) for Developing Countries

Access to OARE resources
- Countries that have free access to OARE resources
- Countries that have low-cost access to OARE resources
- No data
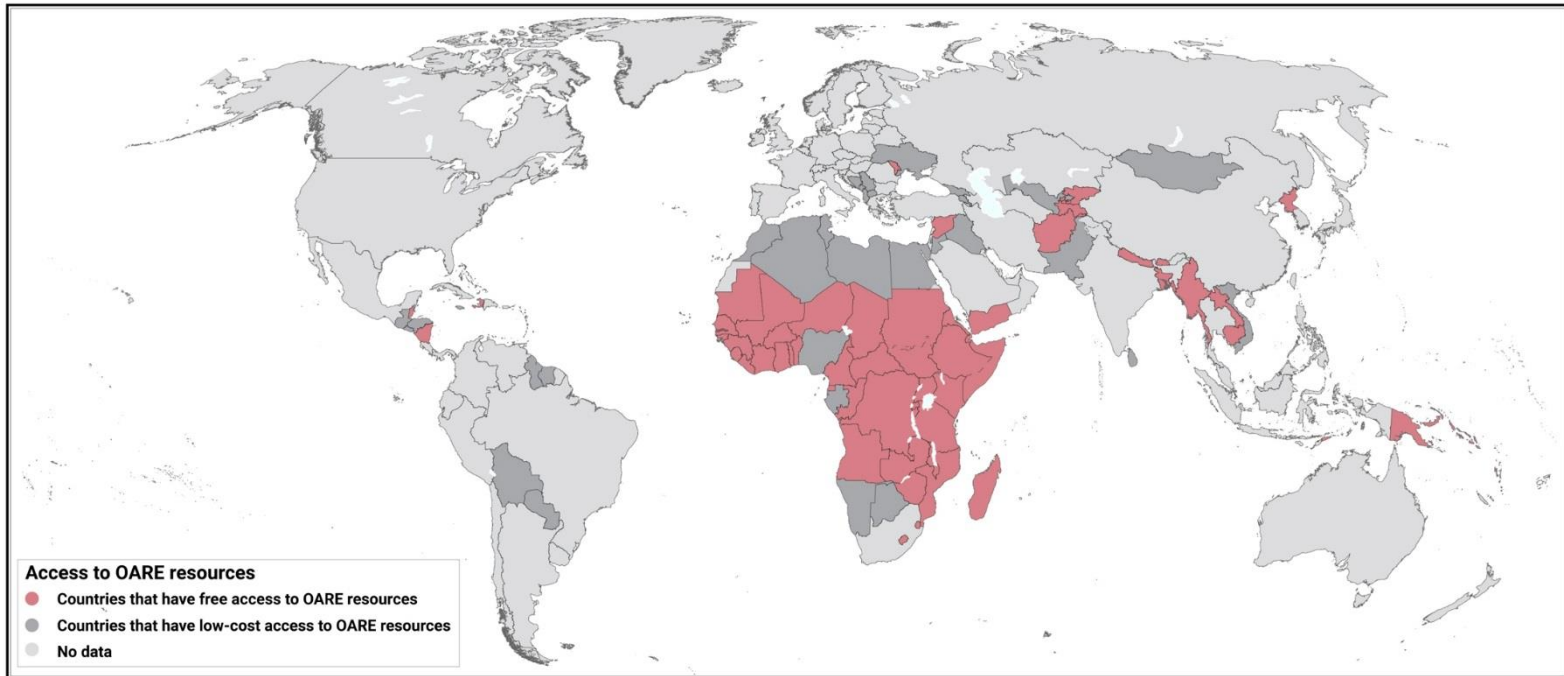
Set up by the United Nations Environment Programme in 2006 together with Yale University and major scientific publishers, OARE provides access to a collection of up to 11,500 scientific journals, 27,000 e-books, 40 databases and other information resources in 118 countries.

OARE helps bridge the knowledge gap between developing countries and the industrialized world, and build the capacity of researchers and experts to facilitate the development of science-driven policies for a sound management of the environment.

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Data for Regional Assessments, State of Environment Reporting and Policy

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Data for Regional Assessments, State of Environment Reporting and Policy

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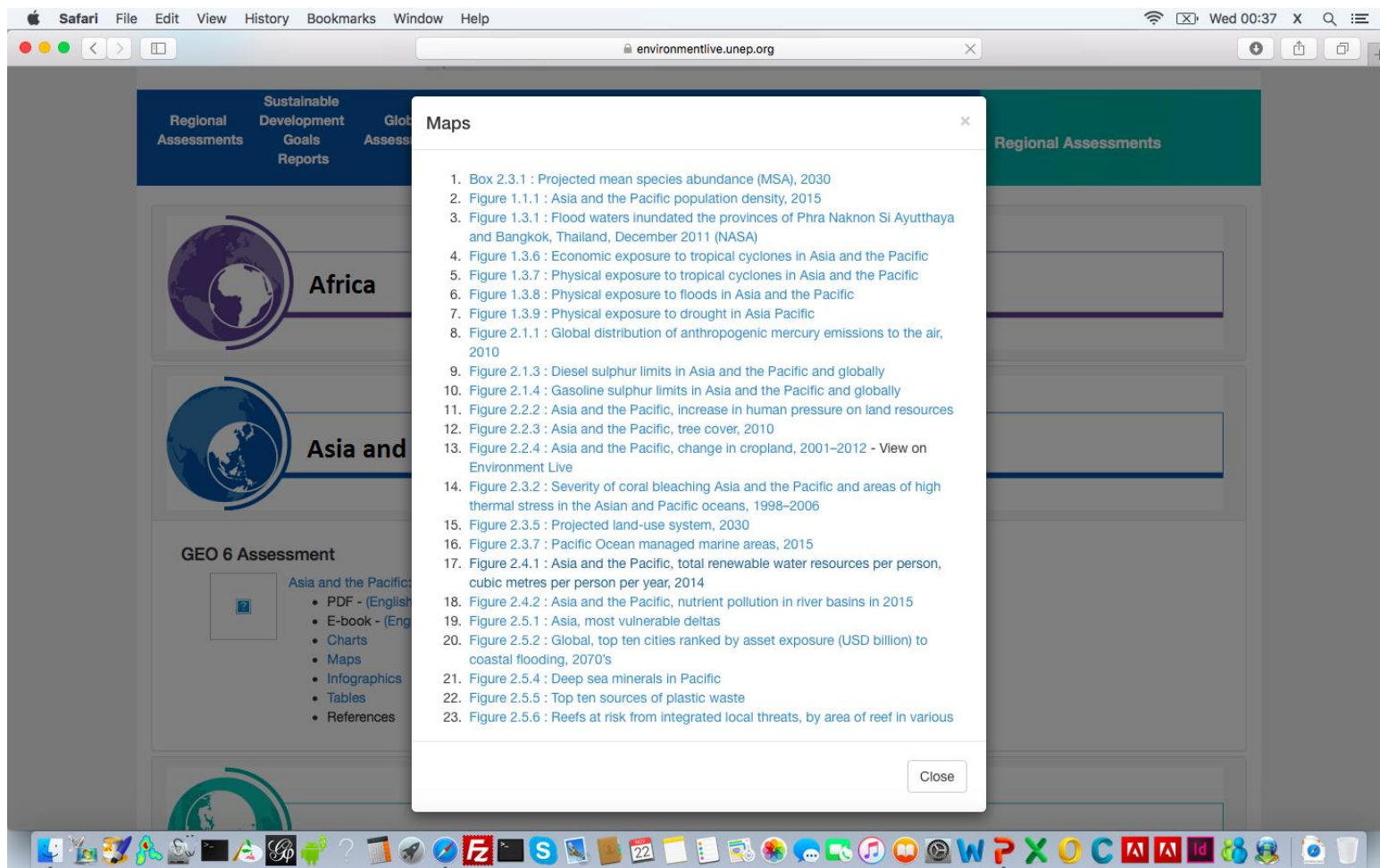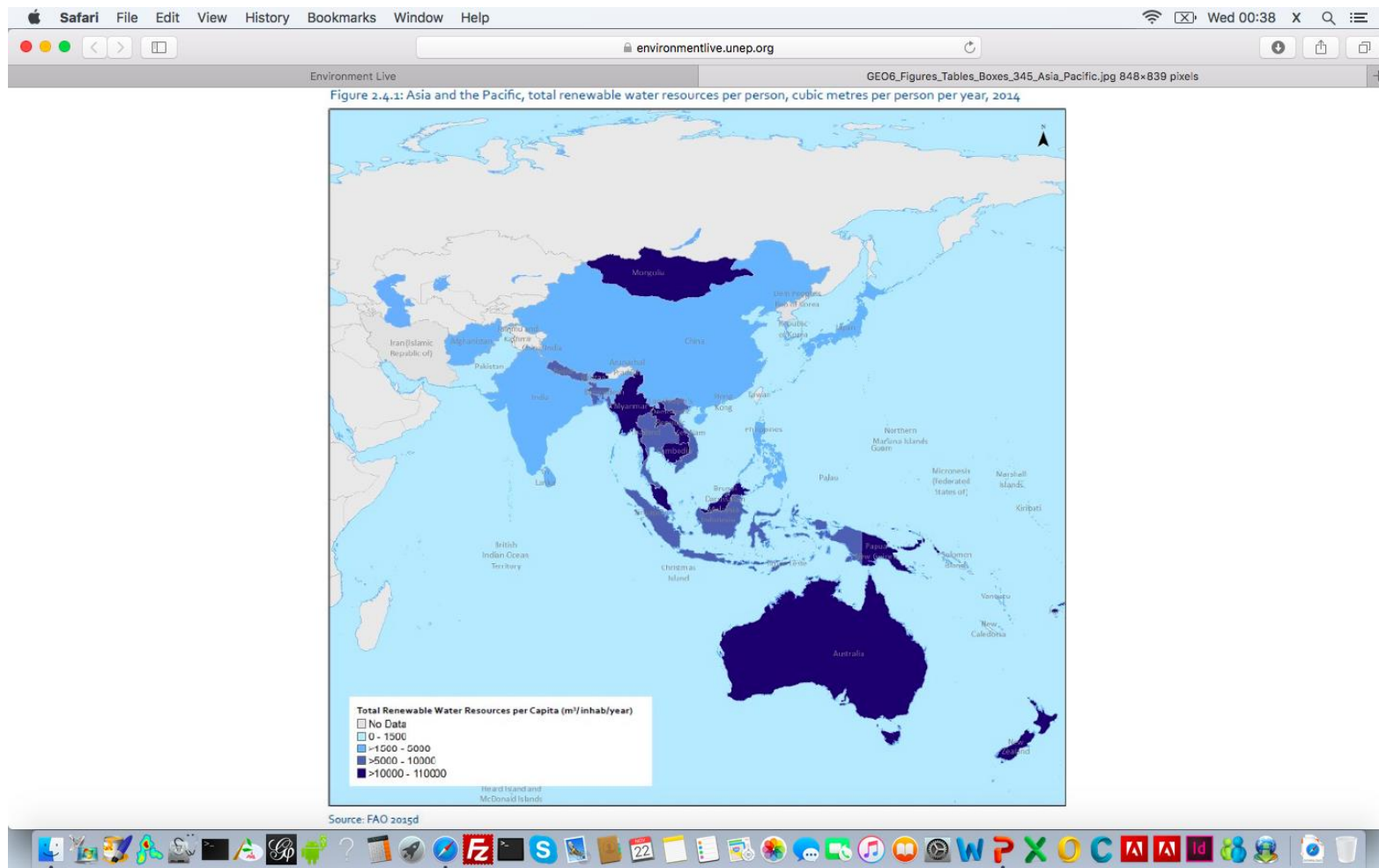
World Environment Situation Room: **Impact on People**

March 2018   L-OTI(°C) Anomaly vs 1951-1980   0.90

−4.1 −4.0 −2.0 −1.0 −0.5 −0.2 0.2 0.5 1.0 2.0 4.0 7.4
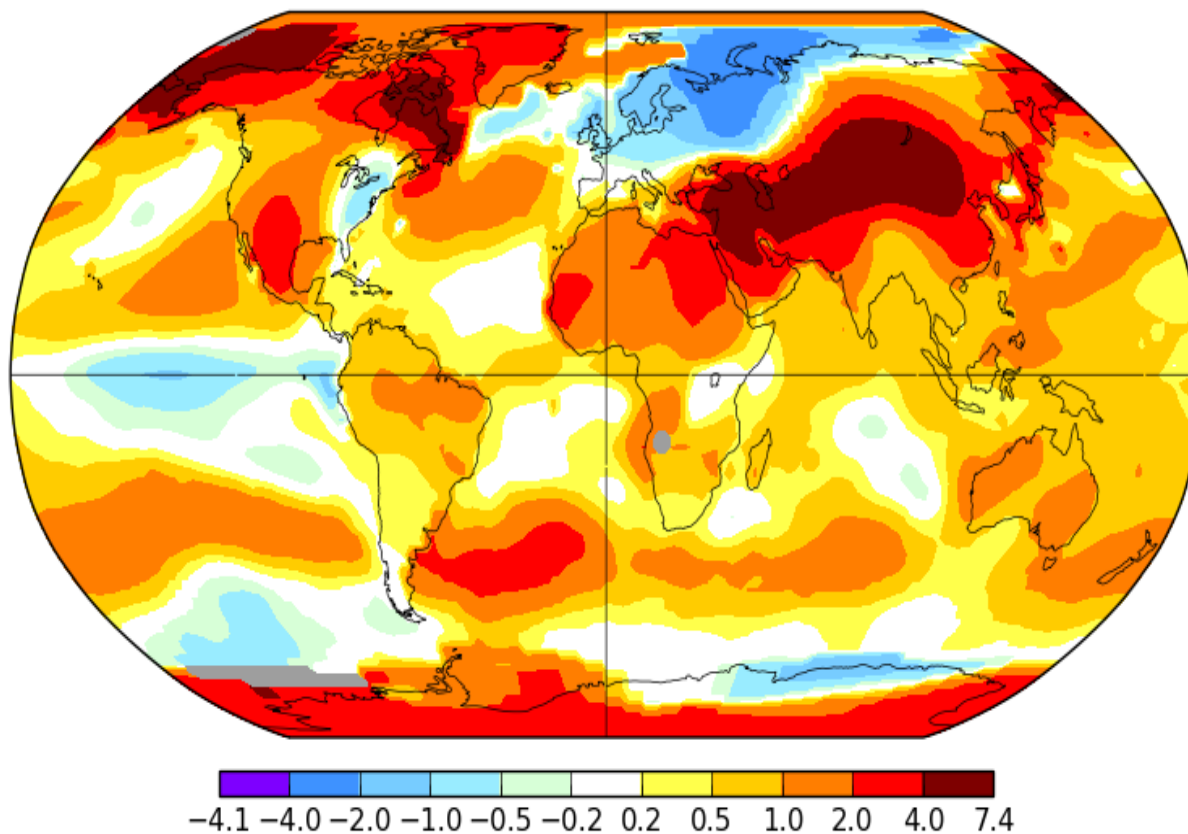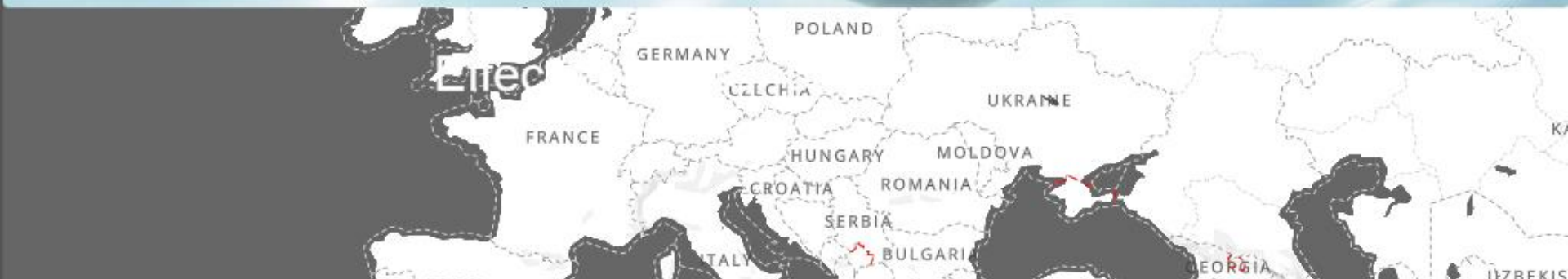
Impacting on millions of People: Water Quality and Health

Water quality and our health

The quantitative, ecological and chemical status of European waters can significantly affect human health and well-being.

These health effects can be direct, related to lack of access to good quality drinking water, inadequate sanitation, exposure to contaminated bathing water, and consumption of affected freshwater and seafood.

The overall burden of water-borne diseases in Europe is probably underestimated (EFSA, 2013), and is likely to be affected by climate change (WHO, 2008).

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Impacting on millions of People: Freshwater Pollution
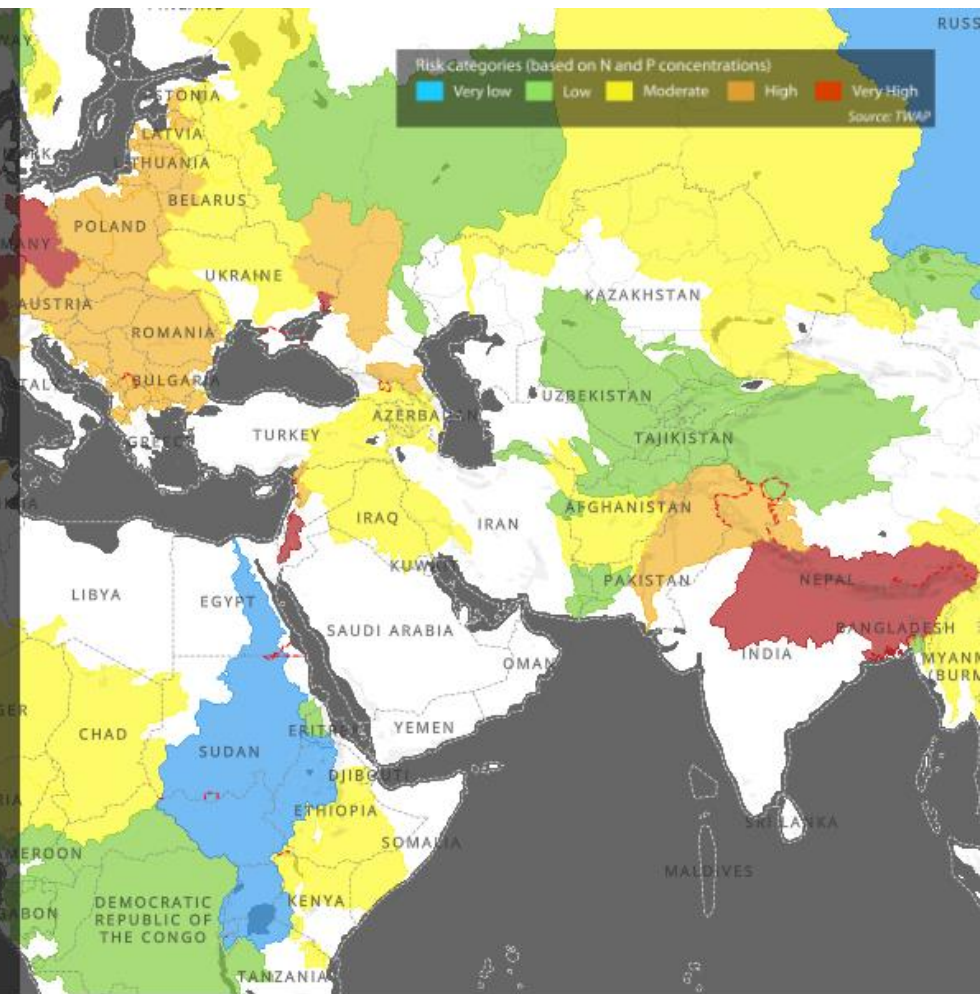

FreshWater pollution

Watershed-based pollution: nutrients

River nutrient pollution is caused mainly by agricultural activities (fertiliser use and wastes from livestock), urban wastewater, and atmospheric deposition of nitrogen.

Contamination by nutrients (particularly forms of nitrogen and phosphorous) increases the risk of eutrophication in rivers, which can pose a threat to environmental and human health.

Photo: Don McCullough 2014

Risk categories (based on N and P concentrations): Very low, Low, Moderate, High, Very High
Source: TWAP

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It is about Foresight and Future …

Alexandre Caldas, Chief , Country Outreach, Technology and Innovation Branch, Science Division, UN Environment

it is about Foresight and Future

Science Data for our common Future

I - Foresight: Permanent and Dynamic Early Warning (PERMANENT FORESIGHT)

Dynamic Foresight processes attempt to identify particularly based upon data analysis of scientometric and bibliometric data, big data repositories such as geospatial and earth observation data centers, large and dynamic knowledge bases, as well as combined with expert analysis, topic related trends, with a view to provide permanent support for early warning and timely decision making.

*(Example: **GEAS** in the Past and Current **Foresight Briefs**, edited monthly)*

II - Foresight: Frontiers and Emerging issues (ONE YEAR CYCLES FORESIGHT)

Based upon a selection of topics of emerging issues, an analysis is conducted to provide a robust perspective of the likely scenarios of evolution of these topic areas. A combination of data analysis, with survey techniques and expert analysis constitutes the usual methodology for providing such outlook and assessment for the scenarios of evolution identified.

*(Example: **Frontiers**, edited annually)*

III - Foresight: Long Term Futures (LONG-TERM 5 YEARS AND LONGER FORESIGHT)

A long term study is conducted, combining data analysis, usually scientometric, bibliometric and patent analysis, Delphi methods and similar techniques, scenario building and modelling, altogether with a large consultation (survey and other techniques) of expert and expert analysis, to provide a long term perspective on the evolution of an area or specialty of policy concern (such as broadly, the Environment.

*(Example: **21 Issues for the 21st Century**, edited every 5-10 Years)*

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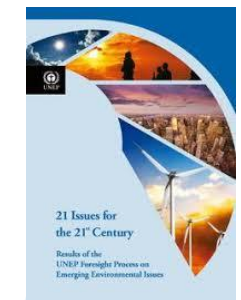
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Foresight, Scenario Analysis and Futures Modelling

Marine Plastics

The global production of plastics has increased from 1.5 million tons in 1950s to about 300 million tons currently, at an average rate of 4 per cent per annum and is expected to continue growing (Boucher and Friot 2017). About 50 per cent of the plastics produced is for single use, and the literature estimates that 8 million tons (2.5 per cent) of the plastic produced are leaked into the oceans annually (Plastics Europe 2016). China is the dominant producer at 27.8 per cent of world production (Plastics Europe 2016).

Global releases of plastics into the worlds oceans: A comparison of microplastics with plastics originating from mismanaged wastes
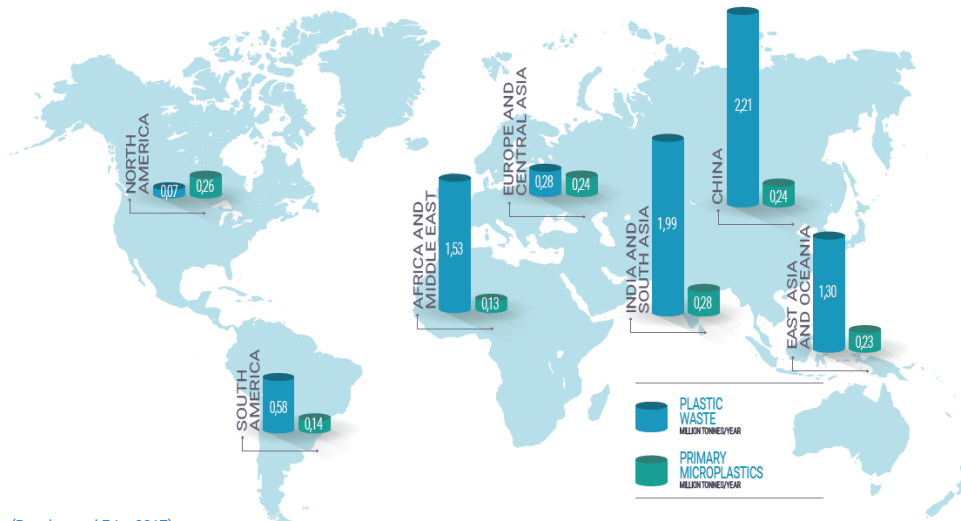
(Boucher and Friot 2017)

Trends in Global Plastic Production (1950 – 2050)
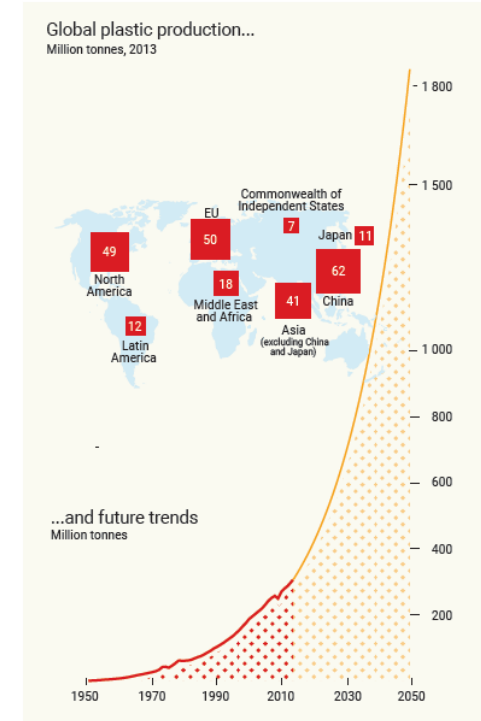
Ryan in UNEP 2015 and GRID-Arendal 2016

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Environmental Forecasting and Global Monitoring

Consumption of Ozone – Depleting substances – CFC's (1990 – 2016)
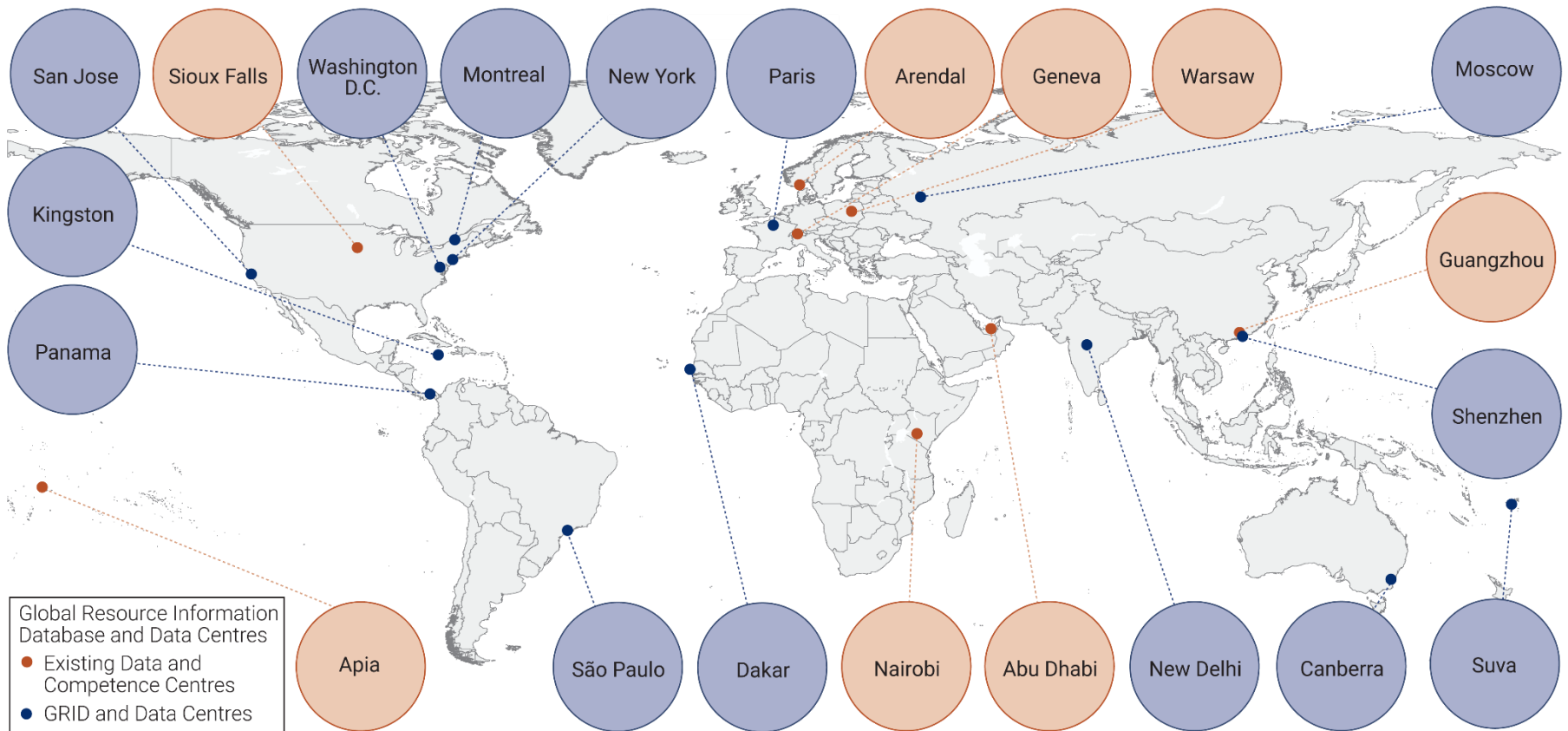
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it is about a Worldwide Partnership involving the Private Sector

Alexandre Caldas, Chief , Country Outreach, Technology and Innovation Branch, Science Division, UN Environment

Partnerships around the Globe

A *Hub* of Competence and Collaboration Centers distributed worldwide

GRID and Data Centers

Global Resource Information Database and Data Centres
- Existing Data and Competence Centres
- GRID and Data Centres

San Jose, Sioux Falls, Washington D.C., Montreal, New York, Paris, Arendal, Geneva, Warsaw, Moscow, Kingston, Guangzhou, Panama, Shenzhen, Apia, São Paulo, Dakar, Nairobi, Abu Dhabi, New Delhi, Canberra, Suva

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Near to People

World Environment Situation Room in selected cities of the world

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**UN
environment**

World Environment Situation Room

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Thank you!

Alexandre Caldas
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Director of the United Nations Organization, D1

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