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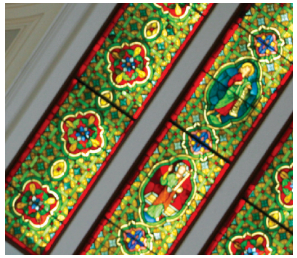




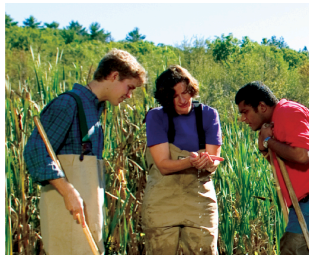

Water and the Sustainable Development Goals:

Water Availability, Pollution, and Ecosystem Health as we look toward 2030.

Dorothy Boorse Gordon College

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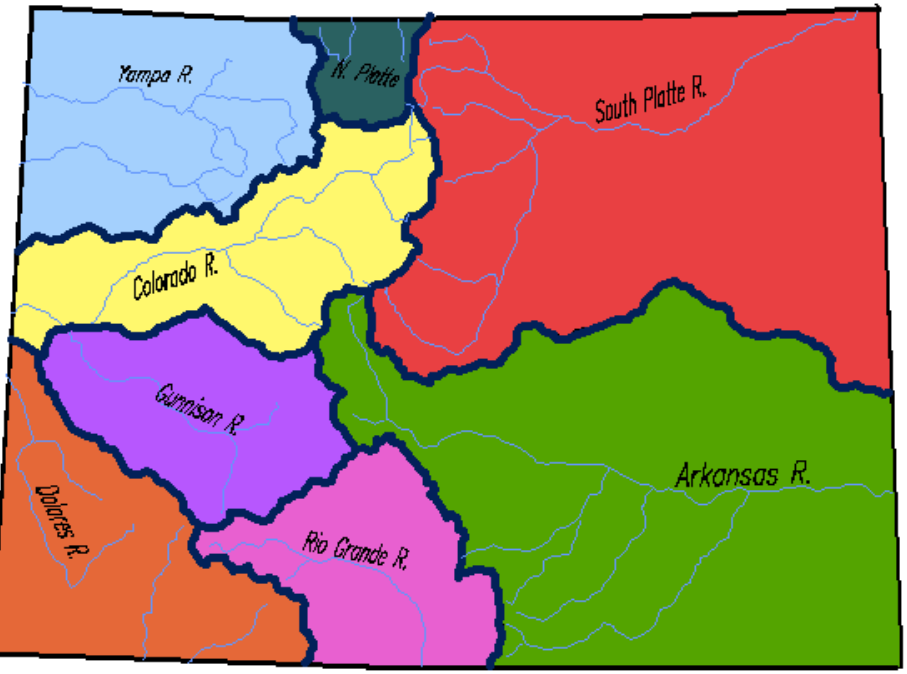
Introduction: Colorado



*80% of pop'n in East
*2/3 of water leaves state
*80% of water flows West
*89% of consumed water is used by farms and ranches
*CO has 5.3 million people, expects 8.5 mill. in 2050
*CO recv. 20 in rain/yr avg.
*Climate change impacts loom

USDA map of river watersheds in Colorado

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/co/snow/products/?cid=nrcs144p2_063323

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Overview

- The Central Importance of Water
- The Millennium Development Goals
- The Problem of Environmental Degradation and Development
- Planetary Boundaries- a new paradigm
- The Sustainable Development Goals
- How the SDGs support efforts to protect water: Availability, pollution control, aquatic ecosystem health

Water is”the oil of the twenty first century”

http://www.globalwaterconference.com/
,

- January 2017: The World Economic Forum issued the 12th edition of the *Global Risk Report.*
- The report ranks “water crises” at number 3 in the list of the top 10 global risks in terms of impact.
- (extreme weather events is number 2, and natural disasters is number 4)
- “*water crises can trigger or exacerbate geopolitical and societal risks*”
  - http://www.aquafed.org/News/Entry/item/world-economic-forum--the-global-risks-report-2017-31.sls

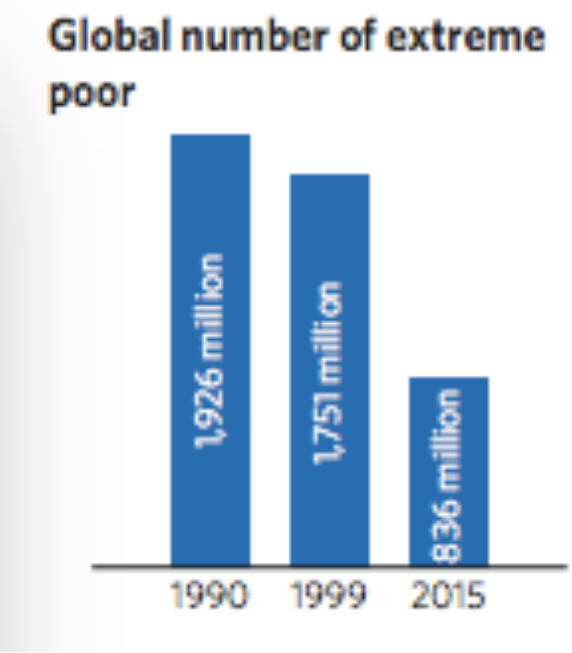
Millennium Development Goals

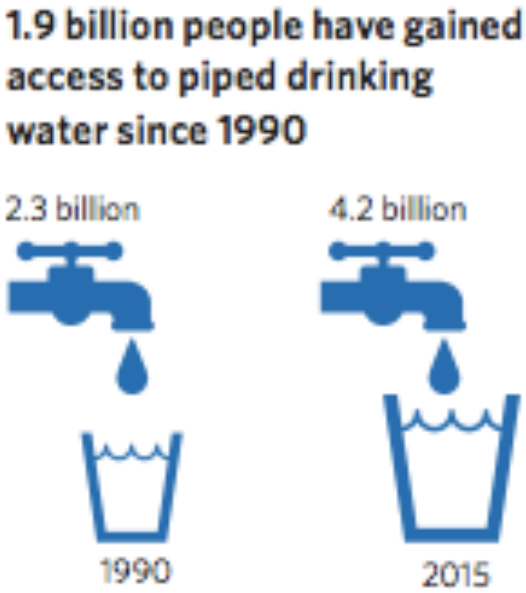
2000-2015

UN development goals

Water target a part of Goal 7

Target 7.C:
Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation





Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation

- "The world has met the target five years ahead of schedule.
- Between 1990 and 2015, 2.6 billion people gained access to improved drinking water.
- Worldwide 2.1 billion people have gained access to improved sanitation (another 2.4 billion still using unimproved sanitation, including 946 million people still practicing open defecation."
- http://www.un.org/en/sections/issues-depth/water/

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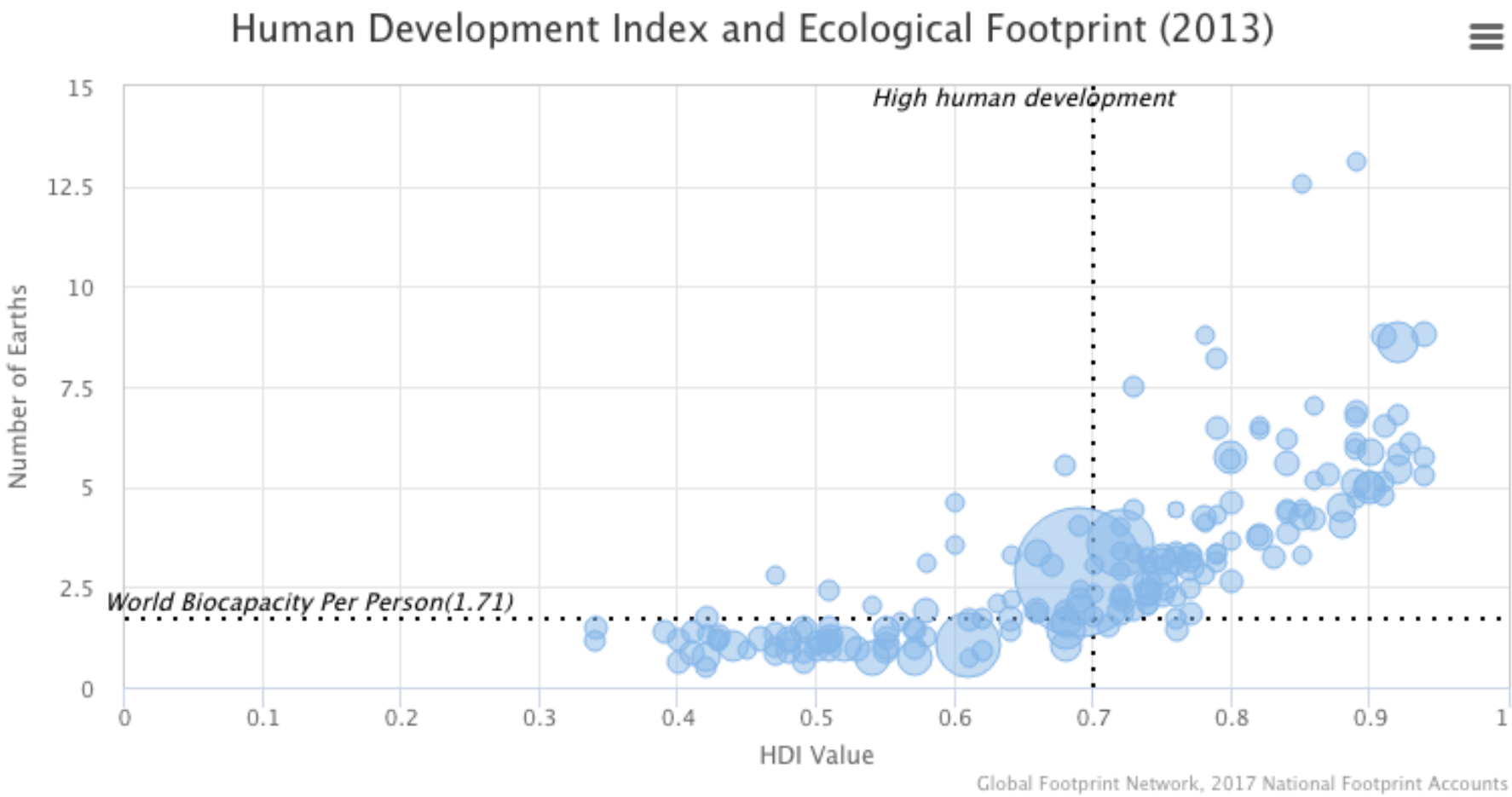
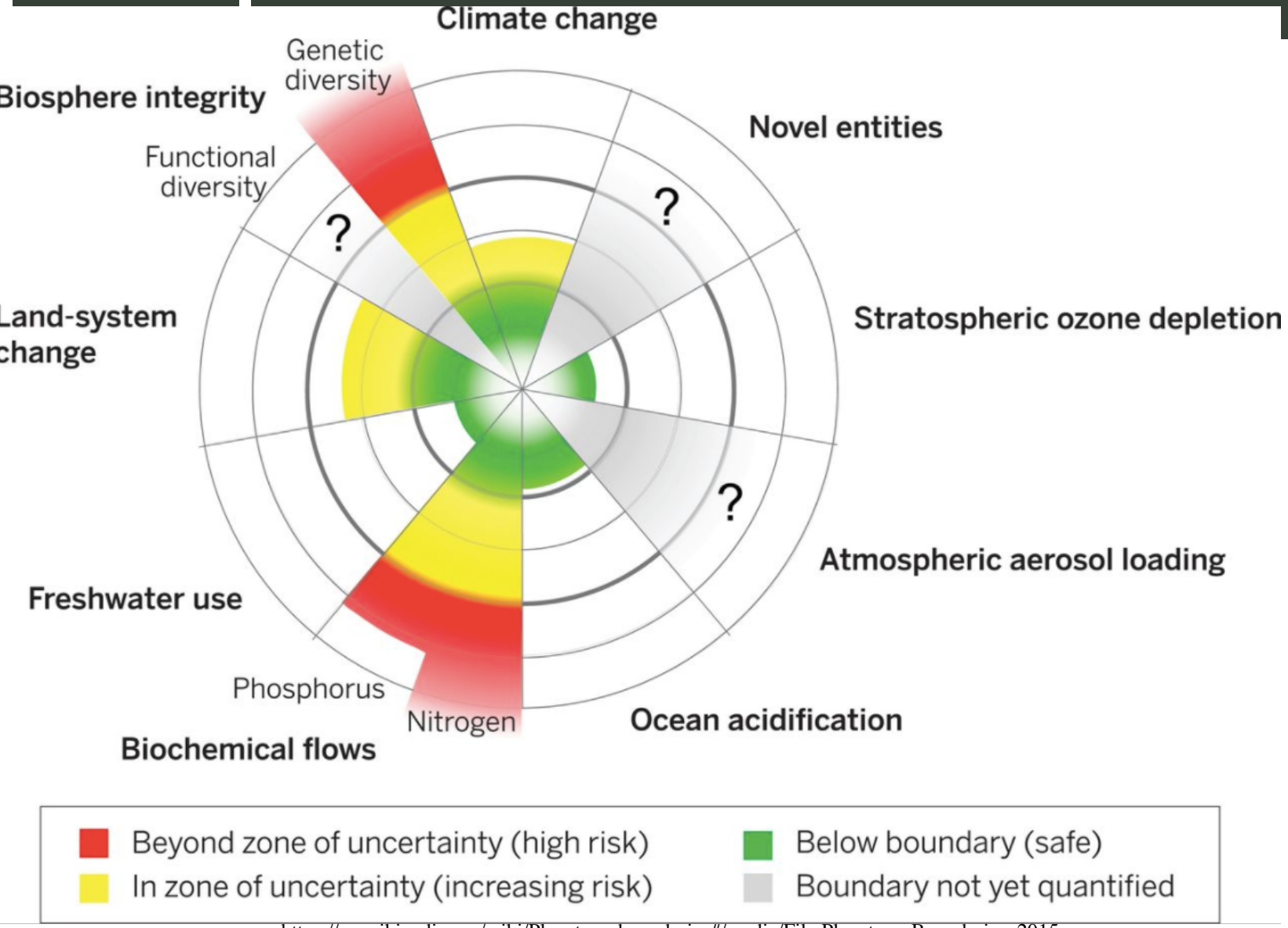
What happened to the environment in the meantime?

Human Development Index and World Biocapacity

- http://data.footprintnetwork.org/countryMetrics.html?yr=2013&cn=all



"Planetary Boundaries" Rockström et al 2009



https://en.wikipedia.org/wiki/Planetary_boundaries#/media/File:Planetary_Boundaries_2015.svg

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Sustainable Development Goals 2015-2030

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Sustainable Development Goals

- **SDG 6: Ensure access to water and sanitation for all**
- **SDG 12: Ensure sustainable consumption and production patterns**
- **SDG 13: Take urgent action to combat climate change and its impacts**
- **SDG 14: Conserve and sustainably use the oceans, seas and marine resources**

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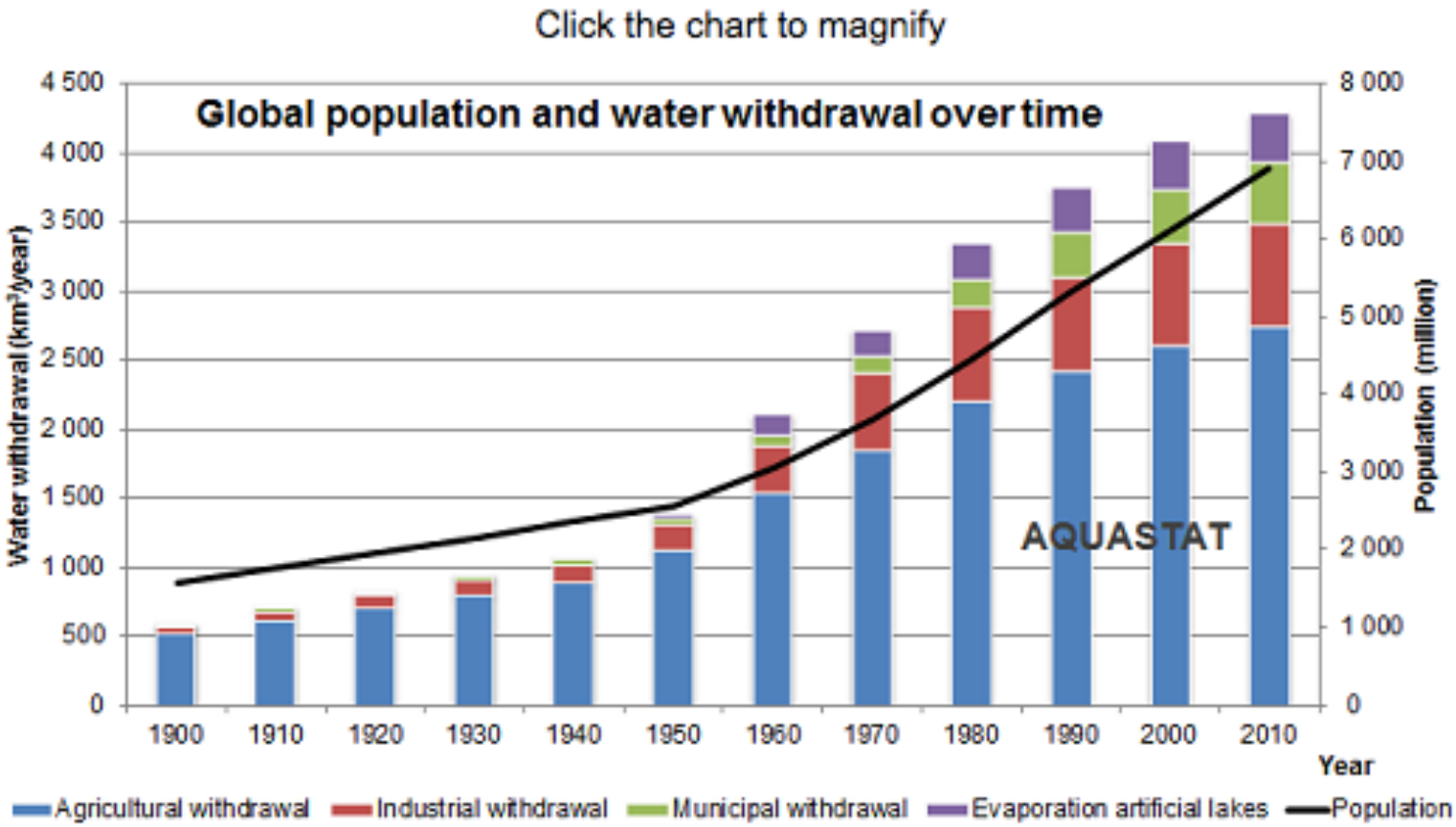
Three water issues to focus on:

- Water availability,
- water pollution,
- Health of aquatic ecosystems

Water Scarcity Facts: UN

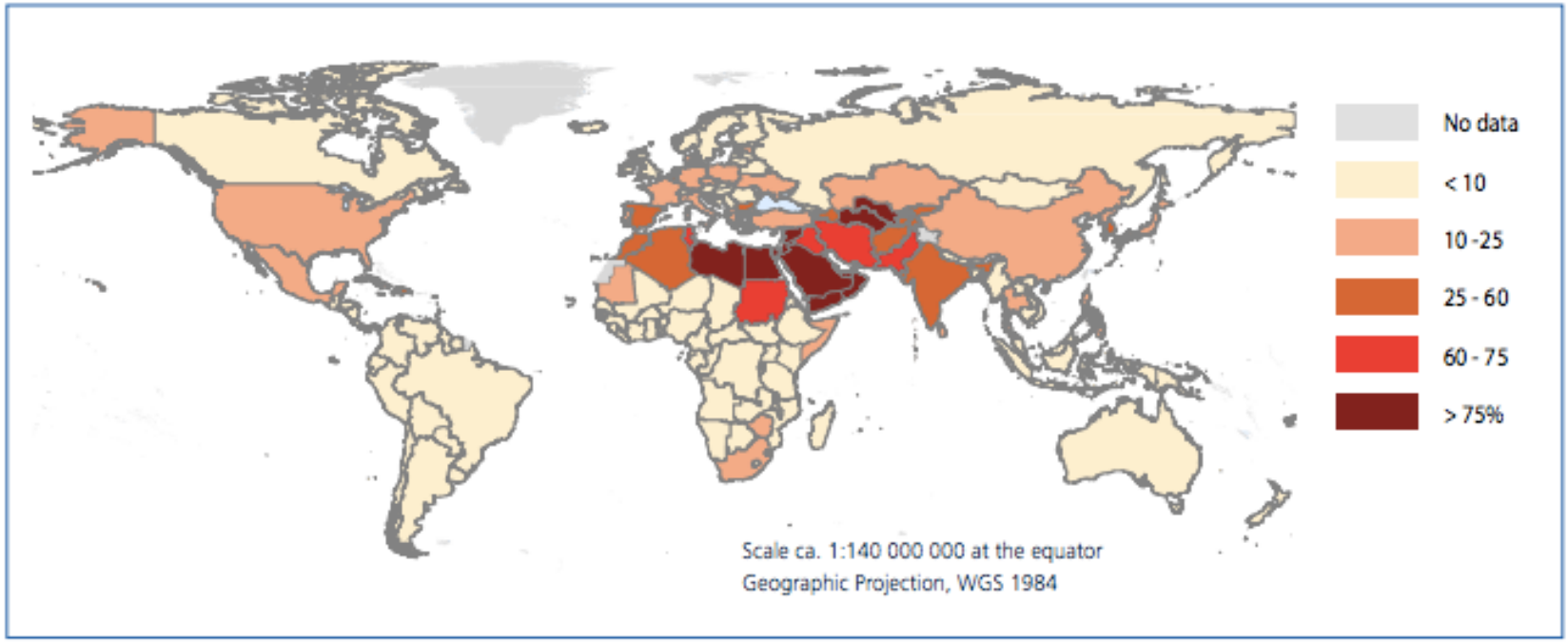
- "Around 700 million people in 43 countries suffer today from water scarcity. (Global Water Institute, 2013)
- Two thirds of the world's pop'n -in areas that experience water scarcity > one month a year. (Mekonnen and Hoekstra, 2016)
- By 2025: expect 1.8 bn living in regions with absolute water scarcity, 2/3 world population under water stress conditions. (UNESCO, 2012) "
- http://www.unwater.org/water-facts/scarcity/#

Population and water use- FAO data



Percentage of renewable water resources withdrawn

Figure 2.2 Percentage of renewable water resources withdrawn

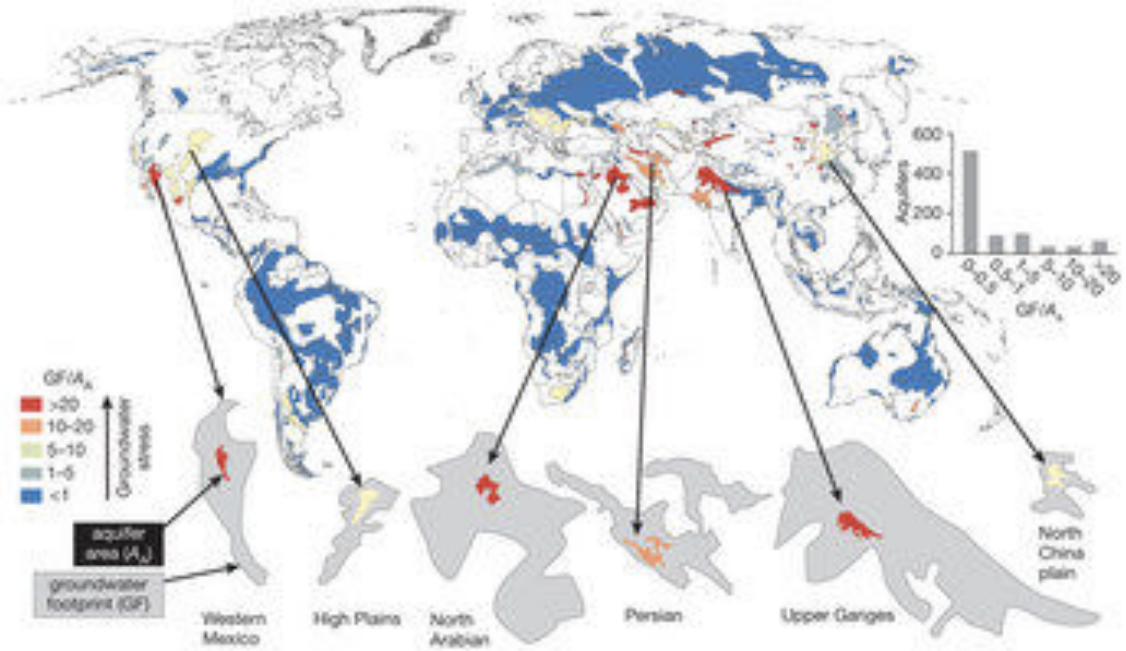


Source: FAO (2015a, http://www.fao.org/nr/water/aquastat/maps/MDG_eng.pdf).

http://unesdoc.unesco.org/images/0024/002440/244041e.pdf

Gleeson *et al* 2012 *Nature* 488:197-200

Figure 1: **Groundwater footprints of aquifers that are important to agriculture significantly larger than their geographic areas.**



Aquifers are major groundwater basins with recharge of >2 mm yr^{-1} in the global inventory of groundw resources[20] (see Supplementary Information). At the bottom of the figure, the areas of the six aquifers Mexico, High Plain…

Water scarcity solutions

- Cannot simply be increased drilling of wells. Need to include intense water conservation

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2. Pollution issues: Water and sanitation

- "Globally, 80% of wastewater is neither treated or reused (UNESCO, 2017).
- Most problems related to water quality are caused by intensive agriculture, industrial production, mining and untreated urban runoff and wastewater. (UN-Water, 2011)
- 1.8 billion people use a source of drinking water contaminated with feces (WHO/UNICEF 2015)"
- *http://www.unwater.org/water-facts/quality-and-wastewater/*

Naturally occurring pollution

- "Naturally occurring arsenic pollution in groundwater affects 140 mill people, in 70 countries. (UNESCO, 2009)"
  - From UN Water facts
  - *Solutions: better treatment and re-use of wastewater, better use of water by agriculture and industry*

Water and ecosystems

- Ecosystem services are in decline. From US$4.3 to US$20.2 trillion /year -ecosystem services lost from1997- 2011 due to land use change. (Constanza et al. 2014)

- Globally, # of lakes with harmful algal blooms will increase 20% by 2050. (UNESCO, 2015)
- http://www.unwater.org/water-facts/ecosystems/

Examples: Health of aquatic ecosystems: oceans

- **Loss of biota**: Overfishing, fishing of top predators, Bycatch, Ghost fishing, *Coral bleaching*
- **Pollutant** *debris, chemical pollution*
- **Climate change:** Changes in oxygen, pH, temperature, currents, Sea level rise
- Coastal zone changes: mangrove, sea grass loss
- *This is too much to even begin to address*

Coral bleaching

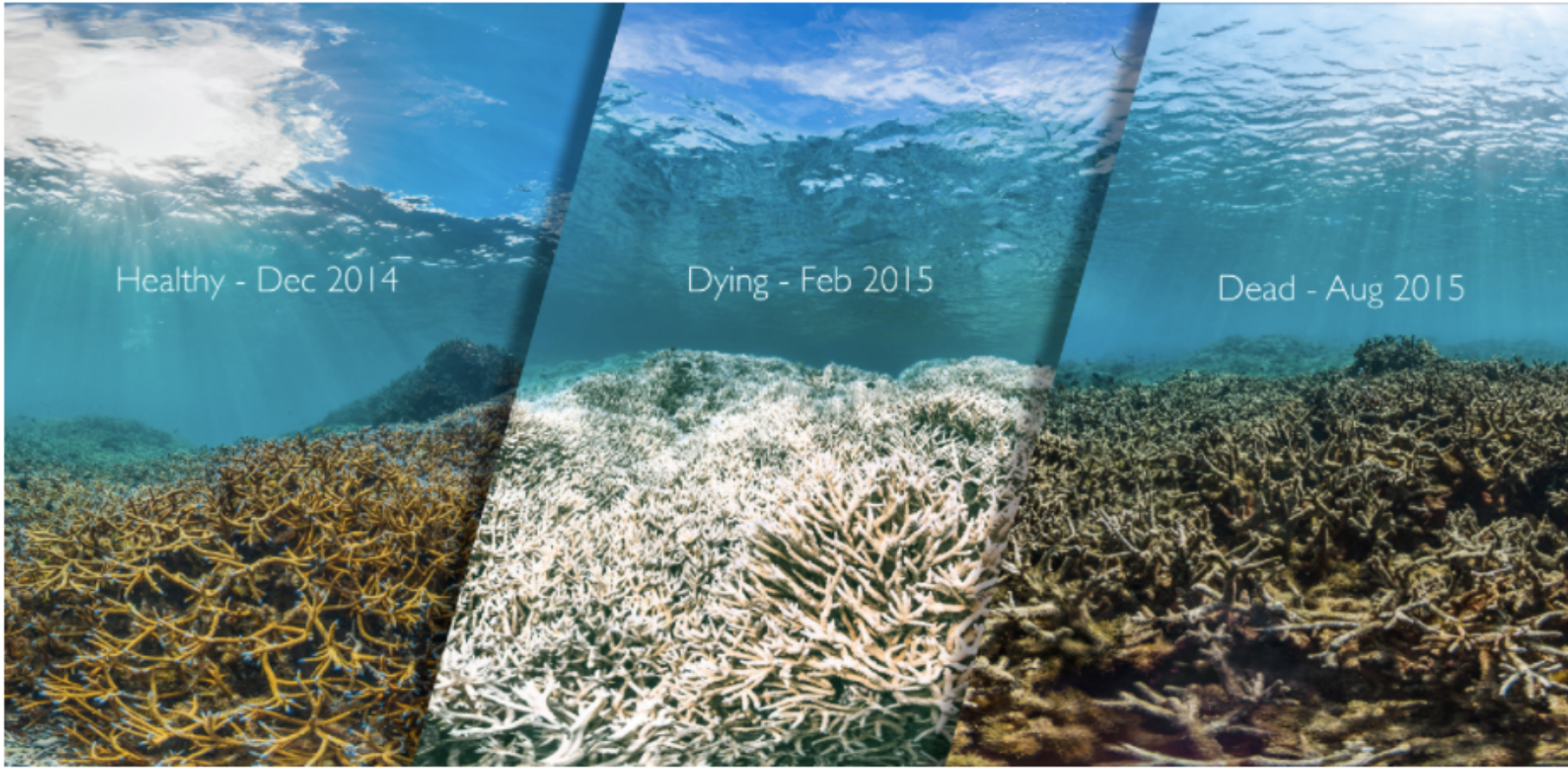

Figure 3. Photo composite of before, during, and after bleaching at Airport Reef, Tutuila, American Samoa (image courtesy of R. Vevers, XL Catlin Seaview Survey).

https://coralreefwatch.noaa.gov/satellite/analyses_guidance/global_coral_bleaching_2014-17_status.php

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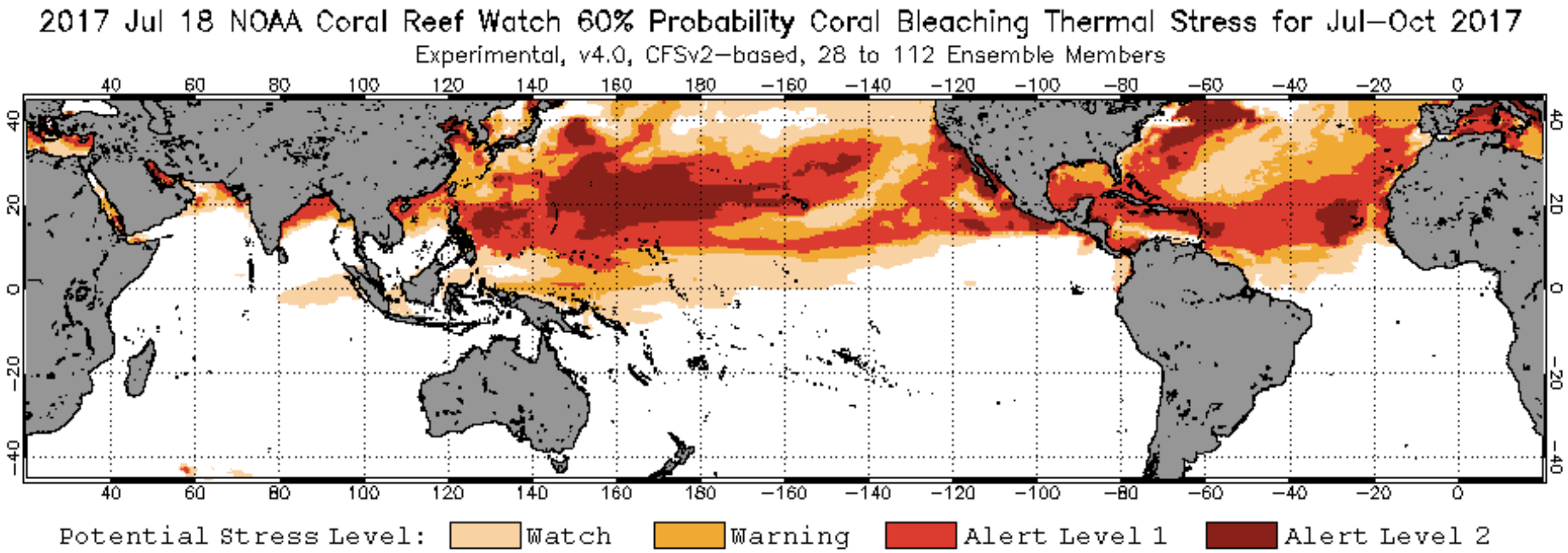
Health of ecosystems-biota



From NOAA: 60% probability of bleaching from thermal stress in 4 months, currently in third global bleaching event 2014-2017 (First 1998, second 2010)

https://coralreefwatch.noaa.gov/satellite/analyses_guidance/global_coral_bleaching_2014-17_status.php

Marine pollution

8.3 billion metric tons of plastic have been produced

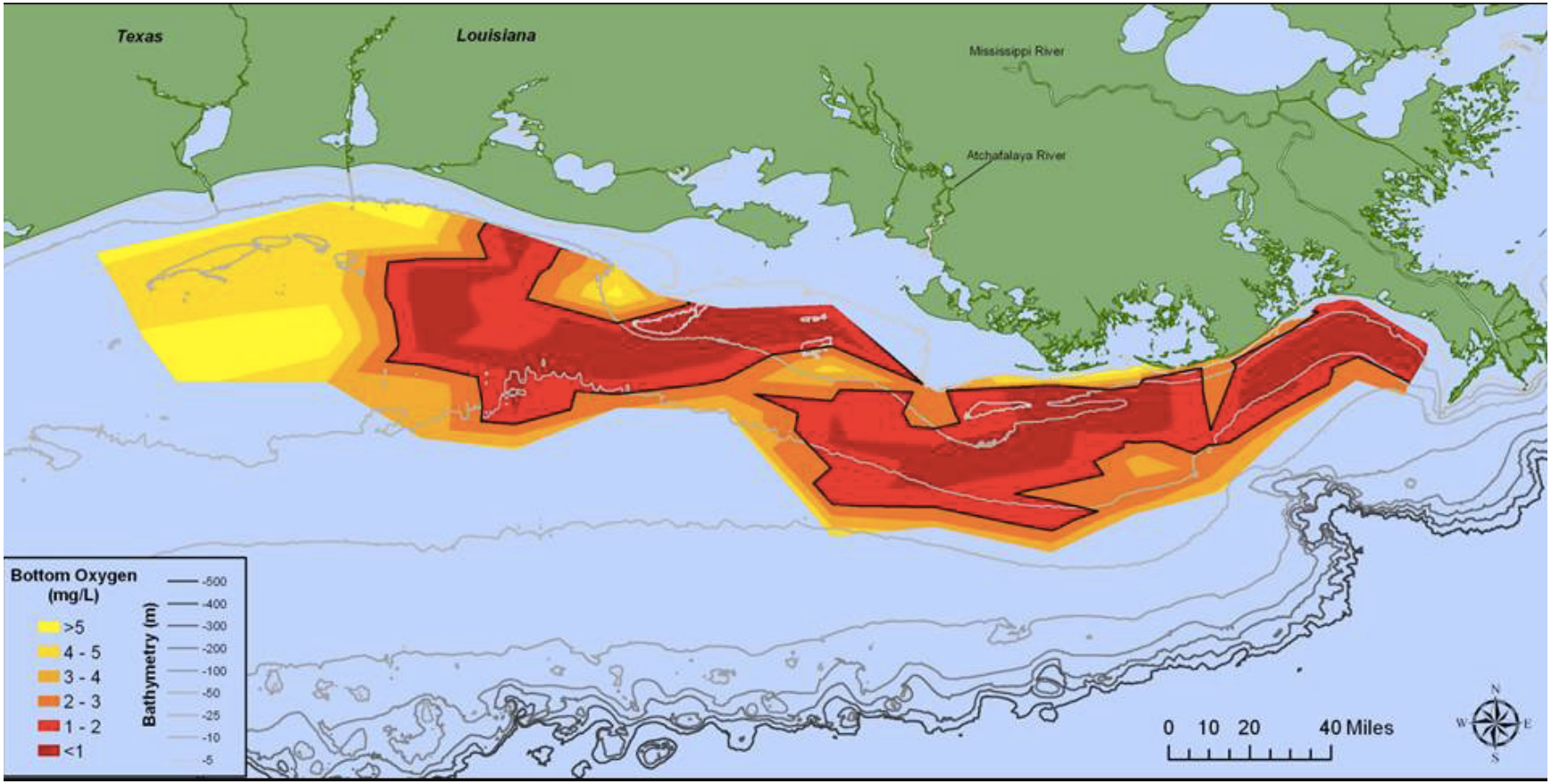
91% is NOT recycled

Est. > 5 trillion plastic bits in oceans

https://en.wikipedia.org/wiki/Marine_debris

Dead Zones- from nutrient run off

2015 Gulf of Mexico Dead Zone



From:NOAA

Back to SDGs and Planetary Boundaries

- SDG 6: Ensure access to water and sanitation for all
- SDG 12: Ensure sustainable consumption and production patterns
- SDG 13: Take urgent action to combat climate change and its impacts
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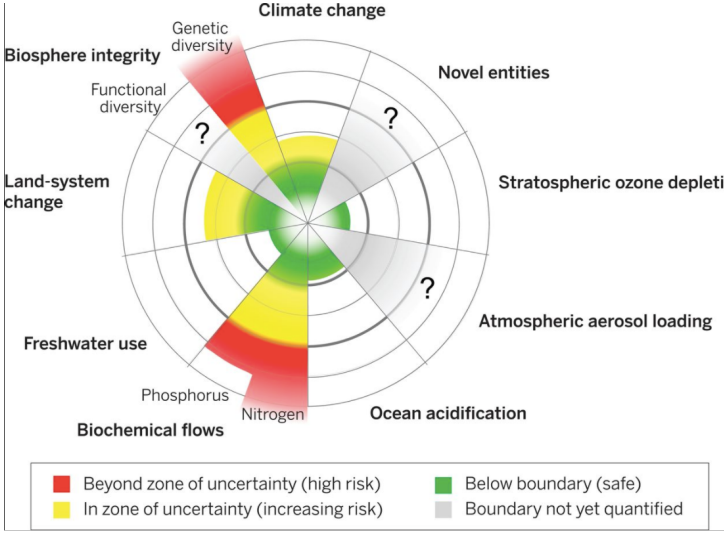

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Conclusion-

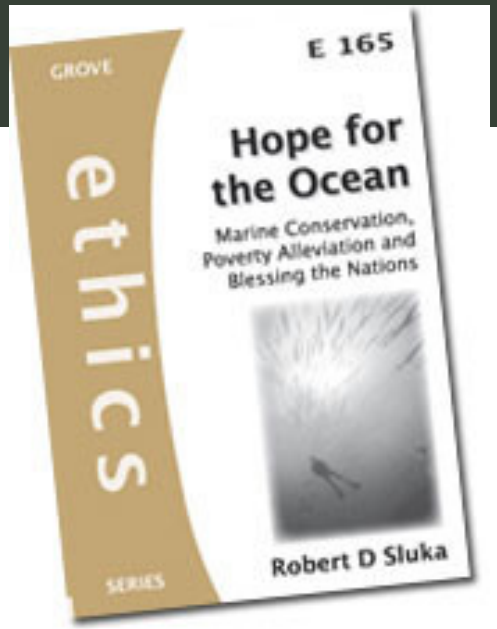
- Water availability, quality and water dependent ecosystems are under stress and are related to planetary boundaries humans need to stay within in order to thrive
- Human efforts to alleviate poverty *have to protect water habitats*. The sustainable Development Goals have components that can do this

Resources for faith and marine conservation

www.arocha.org/marine - summary of A Rocha's marine conservation projects with links for how to volunteer

www.arocha.org/microplastics – factsheets and coming in the autumn a Microplastics Toolbox for starting your own project

http://atyourservice.arocha.org – keyword "oceans", for downloadable resources on the ocean.



Grovebooks.co.uk

Contact:

Robert Sluka, Ph.D.
Marine and Coastal Conservation Programme
A Rocha International

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Some literature

- *Rockström, J; Steffen, WL; Noone, K; Persson, Å; Chapin III, FS; Lambin, EF; Lenton, TM; Scheffer, M; et al. (2009), "Planetary Boundaries: Exploring the Safe Operating Space for Humanity" (PDF), Ecology and Society, **14** (2): 32*

- *Rockström, J; Falkenmark, M; Lannerstad, M; Karlberg, L (2012). "The planetary water drama: Dual task of feeding humanity and curbing climate change". Geophysical Research Letters. **39**: L15401. Bibcode:2012GeoRL..3915401R. doi:10.1029/2012gl051688.*

- Steffen, W.; Richardson, K.; Rockström, J.; Cornell, S. E.; Fetzer, I.; Bennett, E. M.; Biggs, R.; Carpenter, S. R.; de Vries, W.; de Wit, C. A.; Folke, C.; Gerten, D.; Heinke, J.; Mace, G. M.; Persson, L. M.; Ramanathan, V.; Reyers, B.; Sorlin, S. (2015). "Planetary boundaries: Guiding human development on a changing planet". *Science*. **347** (6223): 1259855. doi:10.1126/science.1259855

- United Nations Secretary-General's High-Level Panel on Global Sustainability (2012). Resilient People, Resilient Planet: A future worth choosing (.pdf) (Report). New York: United Nations. p. 24. Retrieved 30 January 2012.

- *Zalasiewicz, J.; Williams, M.; Steffen, W.; Crutzen, P. (2010), "The New World of the Anthropocene" (PDF), Environmental Science & Technology, **44** (7): 2228–2231, Bibcode:2010EnST...44.2228Z, doi:10.1021/es903118j*