# Sustaining Aquatic Biodiversity

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1. We have explored about 5% of the oceans
2. Biodiversity is higher near the coast than in the open sea and in the bottom region of the ocean more so than the surface region
3. Marine
    - Coral reefs
    - Mangrove forests
    - Seagrass beds
    - Ocean acidification
4. Freshwater
    - Dams
5. Invasive species
    - Threaten native species
    - Disrupt and degrade whole ecosystems
    - Blamed for about two-thirds of all fish extinctions since 1900
    - Ballast water from ships
    - Accidentally or deliberately introduced
    - Ex. Lionfish in the Atlantic
6. 80% of all humans live along coasts
7. Nitrates and phosphates, mainly from fertilizers, enter water
    - Leads to eutrophication
    - Increase in dissolved oxygen

- Kills off fish
- Increase in algae blooms

8. Toxic pollutants from industrial and urban areas
9. Plastics
    - Ocean garbage
10. Climate Change
    - Sea levels will rise and aquatic biodiversity is threatened
        - Coral reefs
        - Swamp some low-lying islands
        - Drown many highly productive coastal wetlands
        - Warmer ocean water stresses phytoplankton
    - Coral bleaching
11. Fishery — Concentration of a particular wild aquatic species suitable for commercial harvesting in a specific area
12. Fishing is the key factor in the depletion of up to 80% of the population of some wild fish species in only 10-15 years
13. Fishprint — Area of ocean needed to sustain the fish consumption of an average person, nation, or the world
14. Overfishing leads to commercial extinction
    - Commercially valuable fish become scarce
    - Bluefin tuna ranching
15. Some marine mammals are also threatened due to overfishing
16. Biological extinction
    - Overfishing, water pollution, wetlands destruction, excessive removal of water from lakes and rivers
    - 34% of marine species are threatened
    - 71% of freshwater species are threatened
17. We can help to sustain marine biodiversity by:
    - Using laws and economic incentives to protect species
    - Setting aside marine reserves to protect ecosystems and ecosystem services

- Using community-based integrated coastal management

18. Marine Reserves
    - Closed to:
        - Commercial fishing
        - Dredging
        - Mining and waste disposal
    - Core zone
        - No human activity allowed
    - Less harmful activities allowed
19. Fully protected marine reserves work fast
    - Fish populations double
    - Fish size grows
    - Reproduction triples
    - Species diversity increase by almost one-fourth
20. Cover less than 1% of world's oceans
    - Marine scientists want 30-50%
21. Sustaining marine fisheries will require:
    - Improved monitoring of fish and shellfish populations
    - Cooperatives fisheries management among communities and nations
    - Reduction of fishing subsidies
    - Careful consumer choices in buying seafood
22. Co-management of the fisheries with the government
    - Government sets quotas for species and divides the quotas among communities
    - Limits fishing seasons
    - Regulate fishing gear
23. Government spends over 30 billion dollars per year subsidizing fishing (2015)
    - Often leads to overfishing
    - Discourages long-term sustainability of fish populations
24. 40% of the world's rivers are dammed

25. Many freshwater wetlands are destroyed
26. Invasive species
27. Overfishing
28. Human population pressures
29. Collectively, the world's largest body of freshwater are the Great Lakes
30. Invaded by at least 162 non-native species
    - Sea lamprey
    - Zebra mussel
    - Quagga mussel
    - Asian Carp
31. Columbia River — US and Canada
    - 119 Dams
32. Dams
    - Provide hydroelectric power
    - Provide irrigation water
    - Hurt salmon
33. Ecosystem services of rivers
    - Deliver nutrients to sea to help sustain coastal fisheries
    - Deposit silt that maintains deltas
    - Purify water
    - Renew and nourish wetlands
    - Provide habitats for wildlife
34. Sustainable management
    - Support populations of commercial and sport fish species
    - Prevent overfishing
    - Reduce or eliminate invasive species
35. Be More Sustainable:
    - Complete the mapping of the world's aquatic biodiversity

- Identify and preserve aquatic diversity hotspots
- Create large and fully protected marine reserves
- Protect and restore the world's lakes and rivers
- Ecological restoration projects worldwide
- Make conservation financially rewarding

36. The world's aquatic systems provide important economic and ecosystem services

    - There could be immense ecological and economic benefits
    - Aquatic ecosystems and fisheries are being severely degraded by human activities
    - We can sustain aquatic biodiversity