

# The Myth of Clean Hydropower

Energy and Environment

*The Washington Post*  
*Democracy Dies in Darkness*

## Reservoirs are a major source of global greenhouse gases, scientists say

By **Chris Mooney** September 28, 2016 [✉ Email the author](#)



Switzerland's Grimsel reservoir dam, which provides hydroelectric power; a new study suggests reservoirs contribute more than had been known to greenhouse gases. (EPA/Peter Klaunzer)

## Dams and Reservoirs Emit Greenhouse Gases and Make Climate Change Worse

- Gary Wockner, PhD

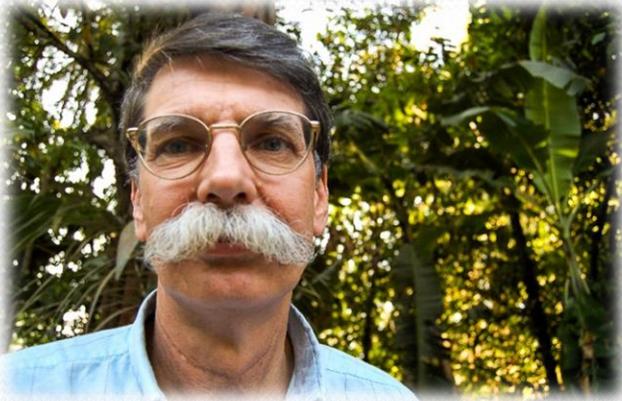
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# Dams Create Many Problems



- Dams Block Rivers – Fish, Sediment, Nutrients, Water.
- Dams Slow Rivers – Changes Ecology, Water Temperature, Sediment, Habitat.
- Dams Almost Always Make Water Quality Worse.
- Dams Can Cause Extinction to Fish and Aquatic Life.
- Dams Displace People, and cause human rights violations.
- Dams are Expensive.
- Dams can make flooding worse.
- Dams exacerbate coastal flooding, beach erosion, and sea level rise.
- Dams increase disease in humans.

# DAMS: The Methane/GHG Problem

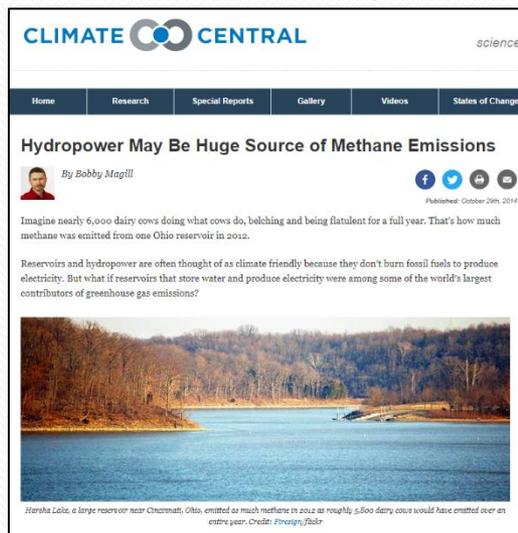


Dr. Philip Fearnside  
Brazilian/IPCC scientist who  
“discovered” the methane  
problem with dams and  
reservoirs 30 years ago

Since that time, studies have been done by:

- U.S. EPA
- U.S. Army Corps
- Dozens of international university research scientists
- IPCC scientists (2006 Kyoto Protocol)
- IPCC 2019 Update
- U.S. National Science Foundation

In 2015 and 2016, global media attention began showing up in the *Washington Post*, *Climate Central*, *EcoWatch*, *Smithsonian*, *Science Magazine*, *The Guardian*, *Mongabay*, etc.



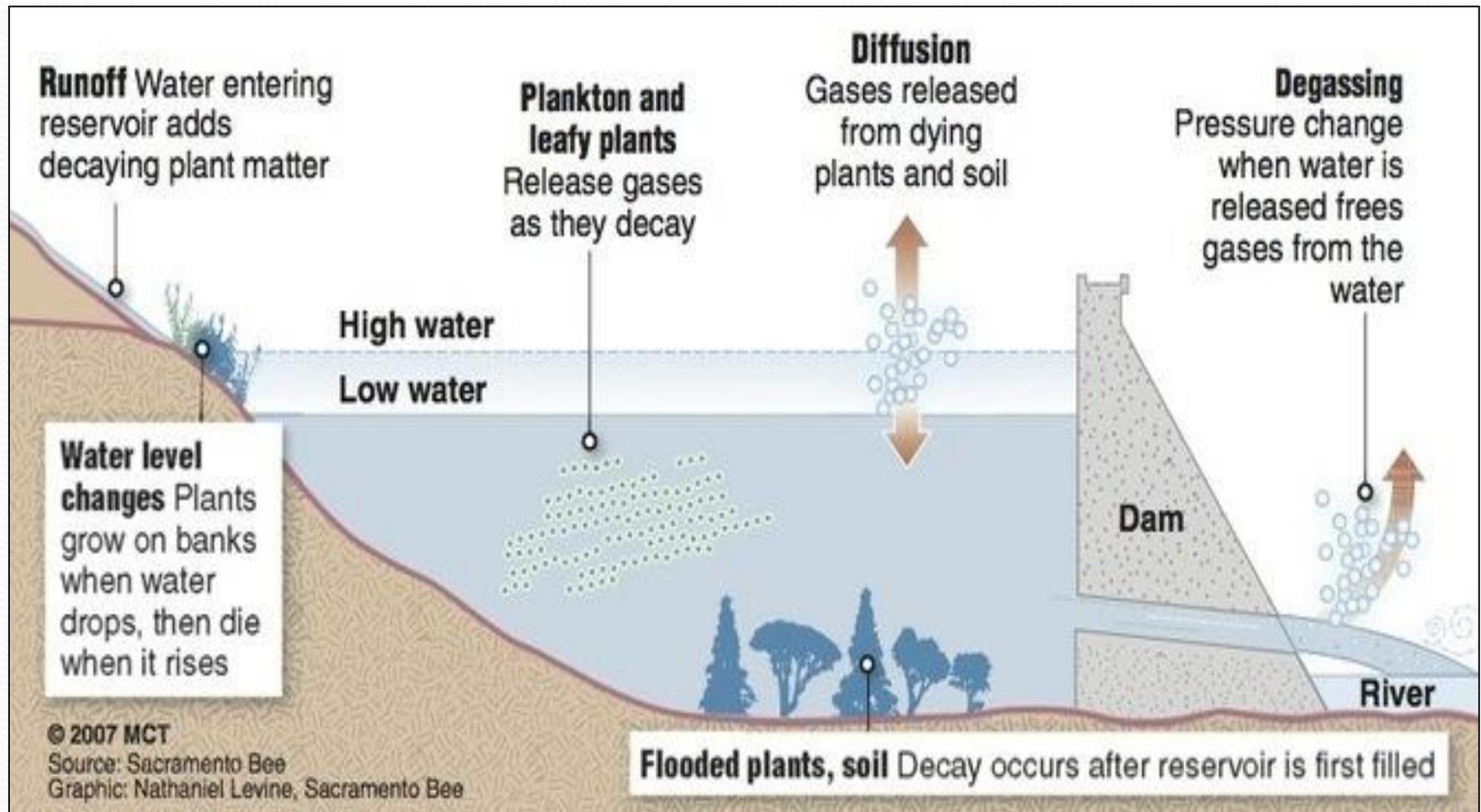
# How Dams and Reservoirs Create GHG Emissions: 1. Deforestation



- Forests sequester carbon.
- Estimates: Billions of acres of forests have been cleared worldwide for hydropower (reservoirs plus transmission lines). These forests do not regrow and are flooded.
- Over 300 million acres have been flooded in Quebec.

# How Dams and Reservoirs Create GHG Emissions: 2. Methane and CO<sub>2</sub>

(anaerobic breakdown of organic matter)



# Dam and Reservoir Greenhouse

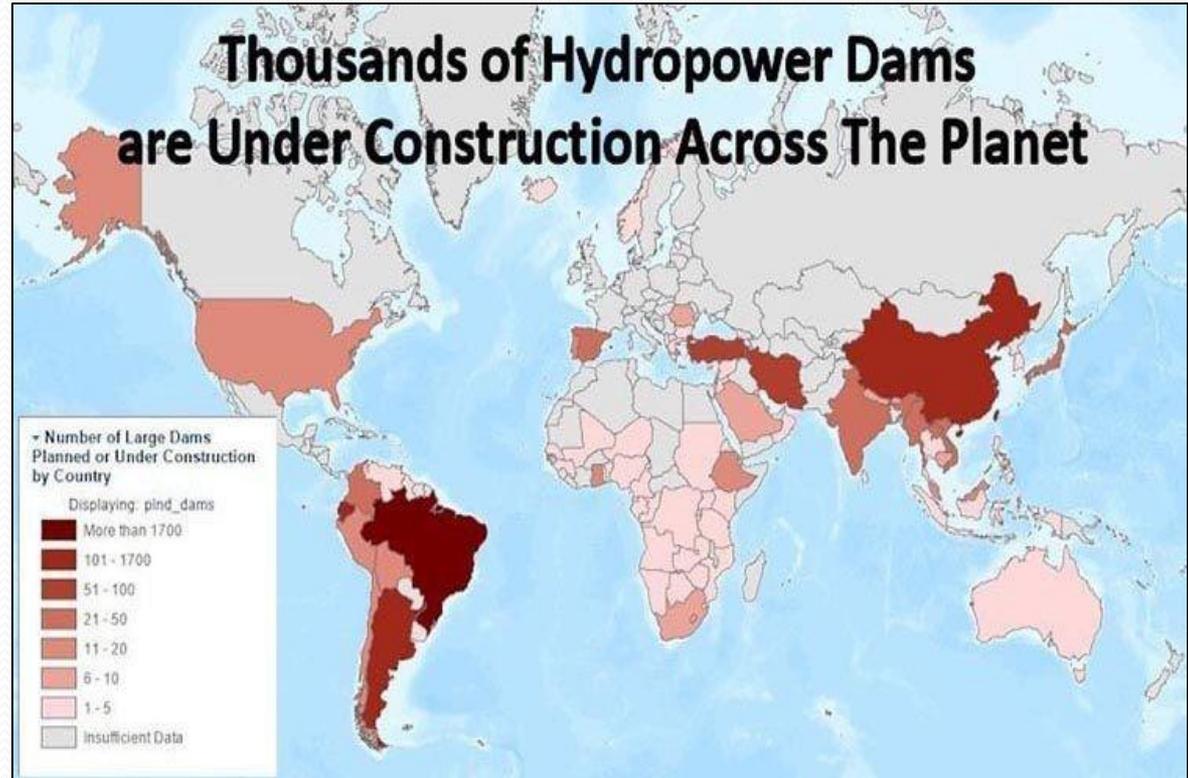
## Gas Emissions Are Worse Where:

- the dam is bigger and the reservoir is larger, and especially where the surface area of the reservoir is larger;
- the weather is warmer and wetter, and the water temperature of the reservoir is warmer;
- the initial flooding of the landscape involves large areas of vegetation;
- more vegetation and sediment run off into the reservoir;
- the reservoir's water level goes up and down on a seasonal or hydropower-ramping cycle causing vegetation to grow on the dry banks of the reservoir, and then become submerged when the reservoir level rises causing that vegetation to drown and decompose;
- the reservoir is newer and the landscape more recently flooded;
- the reservoir is near agricultural areas where fertilizer-heavy water and erosion runs off into a reservoir feeding the biological cycle that grows algae and other submerged vegetation;
- and, where any other type of heavy nutrient load is pouring into a reservoir including that from direct human wastes, stormwater runoff, or wastewater treatment plants.

Big, flat, warm reservoirs in tropical countries are the worst.  
Canadian reservoirs can also be consequential GHG emitters.

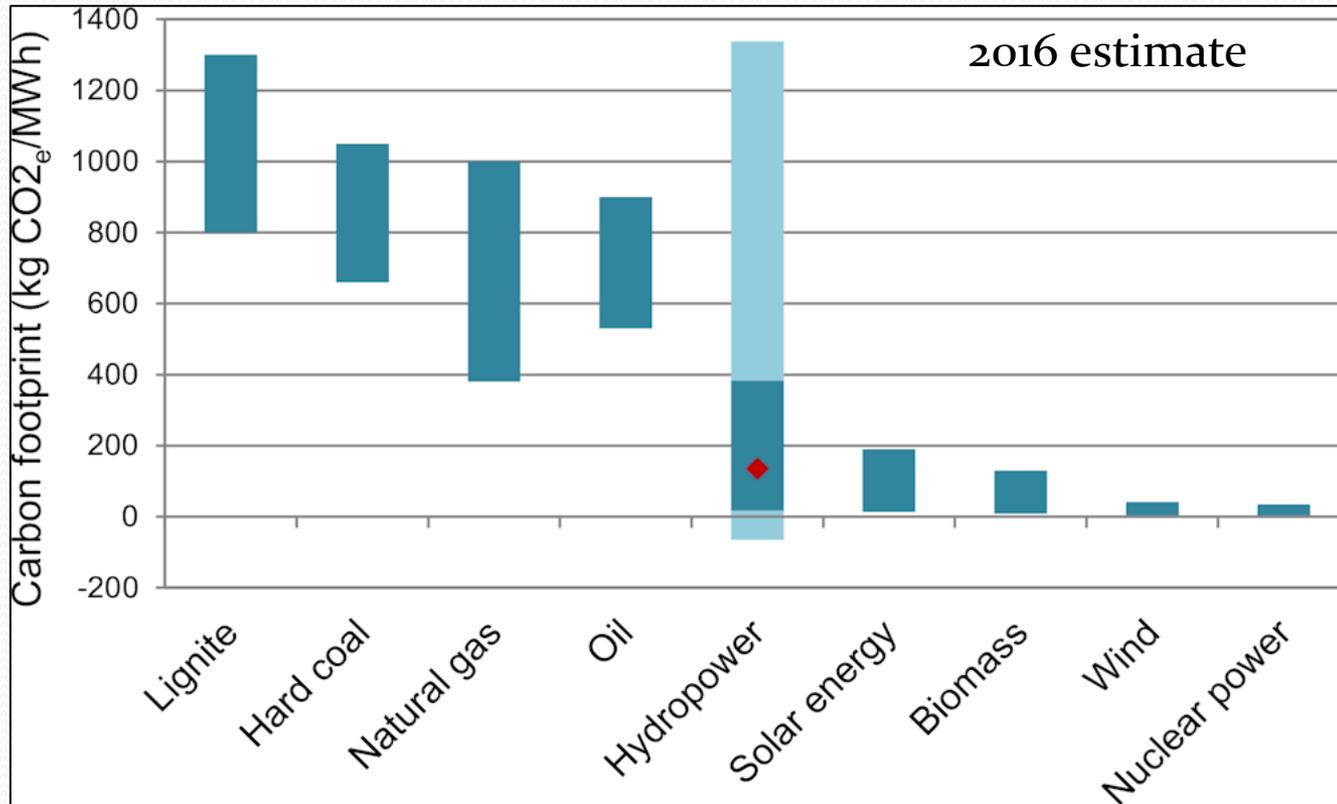
# All Types of Dams/Reservoirs Can Create Greenhouse Gas Emissions

- Hydropower
  - Traditional
  - Run of the River
- Flood Control
- Water Supply
- Recreation



# How Bad Is The GHG Pollution?

## Carbon Footprint of Various Energy Sources



“Those researchers suggest all large reservoirs globally could emit up to 104 teragrams of methane annually. By comparison, NASA estimates that global methane emissions associated with burning fossil fuels totals between 80 and 120 teragrams annually.” -- *Climate Central 2014*

# Emissions Are Not Being Counted.

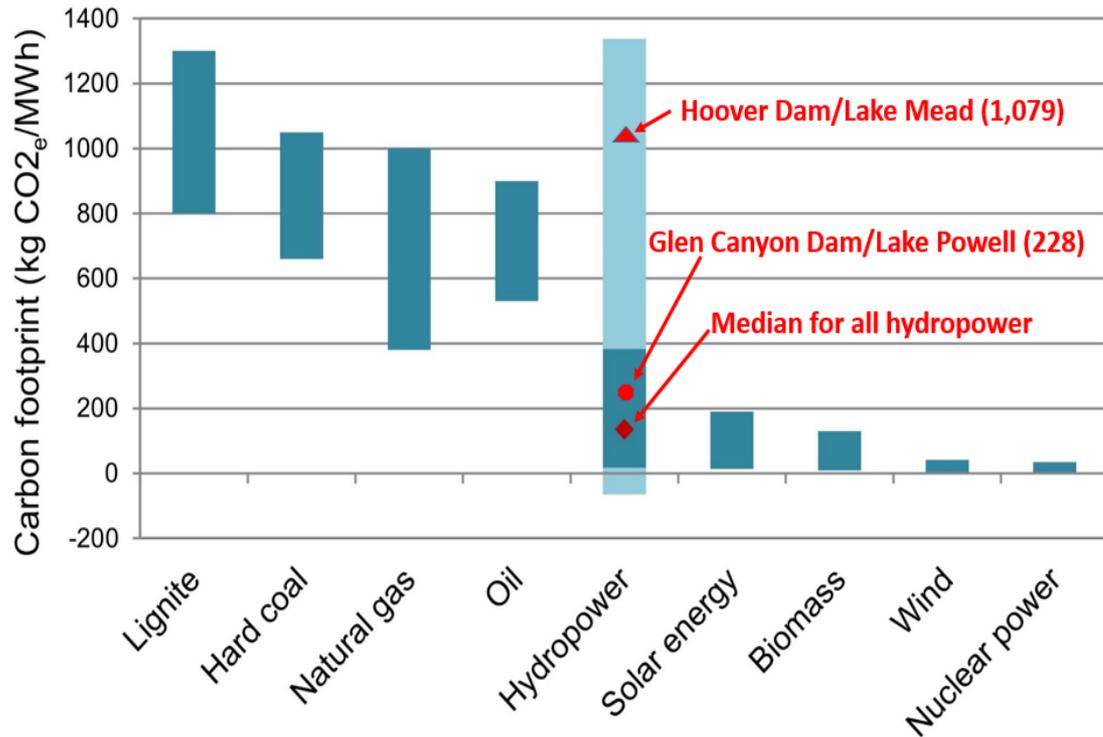
- Kyoto Protocol and the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines, included methane emissions.
- However, no one is reporting!
- “Intended Nationally Determined Contributions” (INDC) – not one COP21 country is including or reporting emissions from hydropower
- New IPCC protocol is being considered but facing extreme political pressure from “Big Hydro”



*“Thus, countries that are completely destroying their rivers and their climate with hydropower including Malaysia, Brazil, Guatemala, Russia and even the U.S. don't even list hydropower as a methane emissions source in their INDC, while including hydropower as a clean energy source, all under the auspices of likely misconstrued or purposely ignored IPCC guidelines.” – Gary Wockner, Nov. 2015*

# Hoover Dam and Lake Mead:

Hoover Dam is a hydroelectric plant that supplies electricity to all of southern California



WRITERS ON THE RANGE

## California isn't accounting for this major emitter

Even though large reservoirs emit methane, the state doesn't off-set their impact.

Gary Wockner | OPINION | April 11, 2017 | [PRINT](#) [SHARE](#)

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Gary Wockner is a contributor to Writers on the Range, the opinion service of High Country News. He is the director of the Save The Colorado River Campaign and the author of River Warrior: Fighting to Protect the World's Rivers.





# New York City Electricity Sources

- Sixty percent of NYC's electricity is generated by natural gas powerplants.
- Natural gas GHG emissions range from 395 – 1,000 kg CO<sub>2</sub>e/mwh.
- Quebec hydropower facility GHG emissions range from 100 – 2,250 kg CO<sub>2</sub>e/mwh with an average of the 16 plants of 386.

# Unquantified Emissions of Hydropower

- Construction – concrete production, hauling/trucking, deforestation.
- Downstream wetlands and forest alteration.

**Outcome: Switching from natural gas to hydropower is likely cause more GHG emissions, not less.**

# How To Fight The Myth of Clean Hydro and Protect Rivers: Counter The Greenwashing

- In 2022, New York will have to start reporting the GHG emissions from imported electricity.
- By the Hydropower Industry (Hydro Quebec).
- By Elected and Government Officials.
- By the Big Banks.
- By Some Environmental Groups.

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Dams have a notorious reputation; there's a long history of environmental damage caused by dams, from blocking migrating fish to withdrawing access to indigenous people.

Yet, dams do boost some positive impact from the electricity they generate: this is energy free of planet-warming climate emissions.